



E-Mobility Landscape and Options for Nanaimo

Technical Report

July 30, 2024

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ACCELERATING THE CLEAN ENERGY TRANSITION



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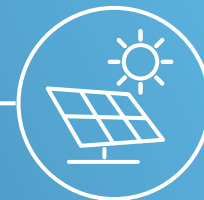
BUILDINGS



MOBILITY



INDUSTRY



ENERGY





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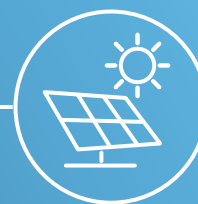
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MOBILITY



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UTILITIES

CORPORATE + NON-PROFIT

Table of Contents

1. Introduction	1.1 Defining E-Mobility 1.2 City Targets 1.3 Study Scope
2. E-Mobility Today	2.1 Current Transportation Landscape
3. E-Mobility Tomorrow	2.1 Approach 2.2 Forecast Uptake 2.3 Key Takeaways
4. Barriers & Opportunities	4.1 Approach 4.2 Findings from Interviews 4.3 Findings from Mail and Public Survey 4.4 Barriers Summary 4.5 Opportunities Summary 4.6 Key Takeaways
5. Role for the City	5.1 Approach 5.2 Findings from Staff Workshop 5.3 Findings from Interviews 5.4 Findings from Mail and Public Survey 5.5 Recommended Options for Role for the City
6. Appendices	6.1 Engagement Summary 6.2 ICBC Query

Defining E-Mobility

E-Mobility includes a range of transportation modes using **electricity** as a power source. This project covers two major e-mobility groups:

E-Micromobility

Electric Vehicles (EVs)



E-micromobility devices refer to any lightweight transportation options that are powered in part or in whole by electricity. Our study focuses **primarily on e-bikes**:

- **Electric bikes (e-bikes)** are power-assisted cycles that have a motor to help propel the device and the motor only operates when you pedal. There are two classes of e-bikes in BC: **light e-bikes** that are pedal-assist with a top motor-assisted speed of 25km/h and **standard e-bikes** that are pedal-assist and/or throttle-assist and have a top motor-assisted speed of 32km/h. **Electric cargo bikes** can be included in this group if they align with the BC definitions.
- **Electric micromobility (e-micromobility) devices** include e-scooters, e-skateboards, hoverboards and other lightweight low-speed electric-powered devices, including electric throttle-assisted bicycles that do not need to be pedalled to accelerate.*
- **Electric mobility support devices** (e.g., electric wheelchairs, electric mobility scooters with four wheels) are included in this group, though these devices can fall into other mobility categories.



*Under BC's Motor Vehicle, Act, e-scooters can only be operated under a municipal pilot. Nanaimo is exploring by-law amendments to continue in the pilot. Other devices, such as e-scooters, are illegal to operate where the MVA applies (i.e., public roadways, sidewalks).

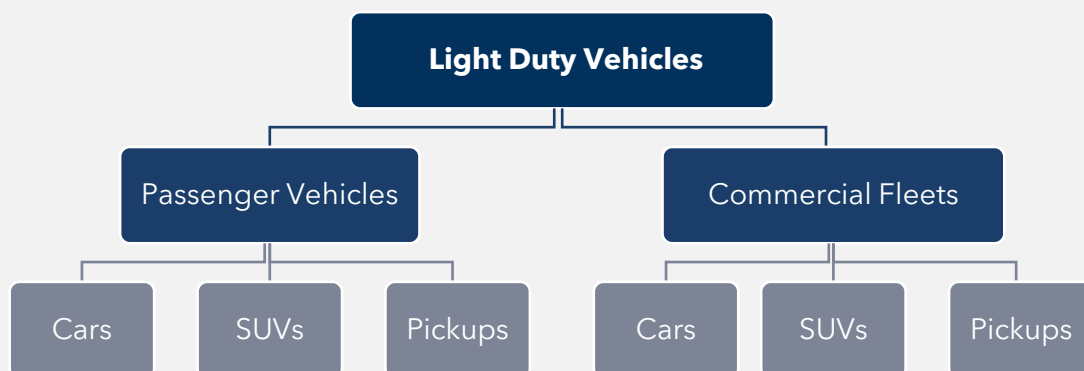
Defining E-Mobility (cont'd)

Electric Vehicles (EVs) in this study refer to light-duty plug-in EVs.



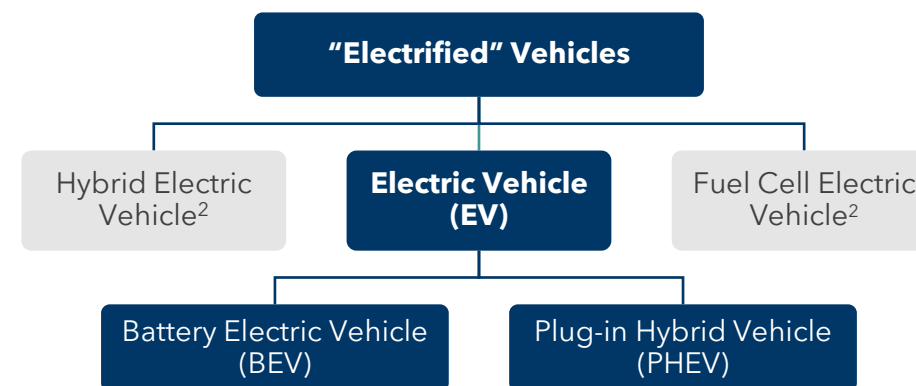
Light-duty EVs are defined as:

- **Passenger** and **commercial** vehicles considered light-duty based on gross vehicle weight¹ and selected using ICBC's body style filter.
- Broadly, these body styles include **cars**, **SUVs**, and light **pick-up trucks**.



Plug-in EVs are defined as:

- **Battery Electric Vehicles (BEVs):** "pure" electric vehicles that have only an electric powertrain and that plug in to charge (E.g., Chevy Bolt, Nissan Leaf)
- **Plug-in Hybrid Electric Vehicles (PHEVs):** hybrid vehicles that can plug in to charge and operate in electric mode for short distances (e.g. 30 to 80 km), but that also include a combustion powertrain for longer trips. (E.g. Chevy Volt, Toyota Prius Prime)



1. A passenger vehicle (or light duty vehicle) is defined as a vehicle with a gross vehicle weight rating of less than 3,856 kilograms (8,500 lbs), covering Classes 1 and 2a.

2. The following are excluded from the analysis: Hybrid Electric Vehicles that do not plug in to charge and are considered internal combustion engine (ICE) vehicles. Fuel Cell Electric Vehicles (i.e. hydrogen vehicles): market assumed to be small within the timeframe of the study

Why E-Mobility?

1. Mobility is the largest contributor to Nanaimo's emissions

- Electric micromobility can **encourage mode-shift** from vehicles by making active transportation more accessible.
- Electric vehicles can **reduce emissions** from vehicles.

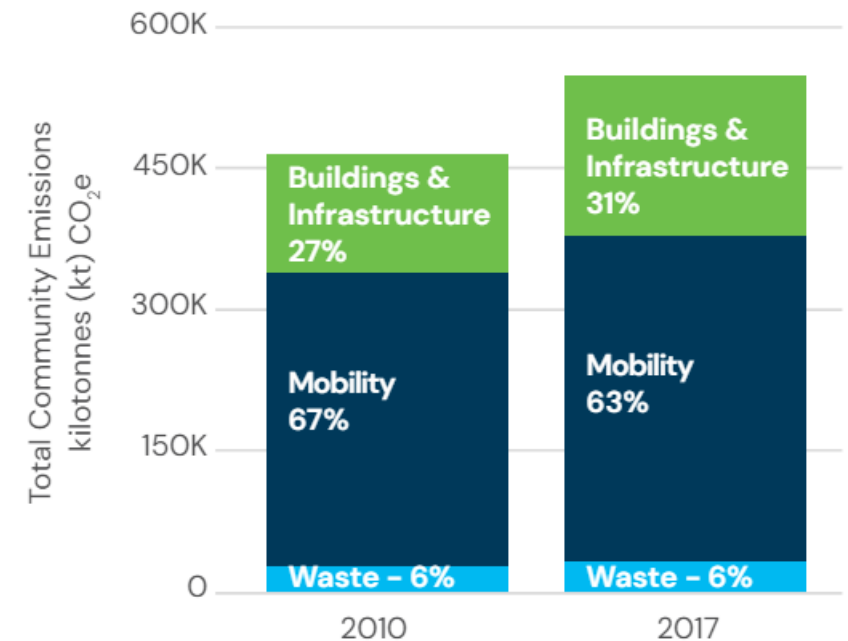
2. Electric mobility can support *Nanaimo Relmaged* climate and transportation goals:

- By **2050**, all transportation trips are **zero carbon**, through active transportation and zero-emissions vehicle (ZEV) adoption.
- Reduce emissions by **50% by 2030** and by 100% by 2050, compared to 2010 levels.

3. E-mobility can align with equity-focused goals in *Nanaimo Relmaged*, including:

- Safe Mobility (Vision Zero): Safe, healthy, and equitable mobility for all persons within the city (C2.4).

Sources of Emissions in Nanaimo



Source: City of Nanaimo. 2022. [City Plan Nanaimo Reimagined](#).

Defining Equity in the E-Mobility Context

For this project we use the *Nanaimo Relmaged* equity definition, with the following additions:

1. We define “**more positive outcomes**” as: “ensuring that the benefits and burdens of sustainable mobility are as **fairly distributed** as possible, leading to **improved accessibility and affordability, reduced transportation poverty, and increased adoption of e-mobility modes**”
2. “Safe, comfortable, convenient, accessible, enjoyable **and affordable** travel.”

Nanaimo Relmaged Equity Definition:

Equity recognizes that each person has different circumstances and allocates resources and opportunities to support **more positive outcomes** for all regardless of age, ability, gender, sexual orientation, faith practice, ancestry, or background.

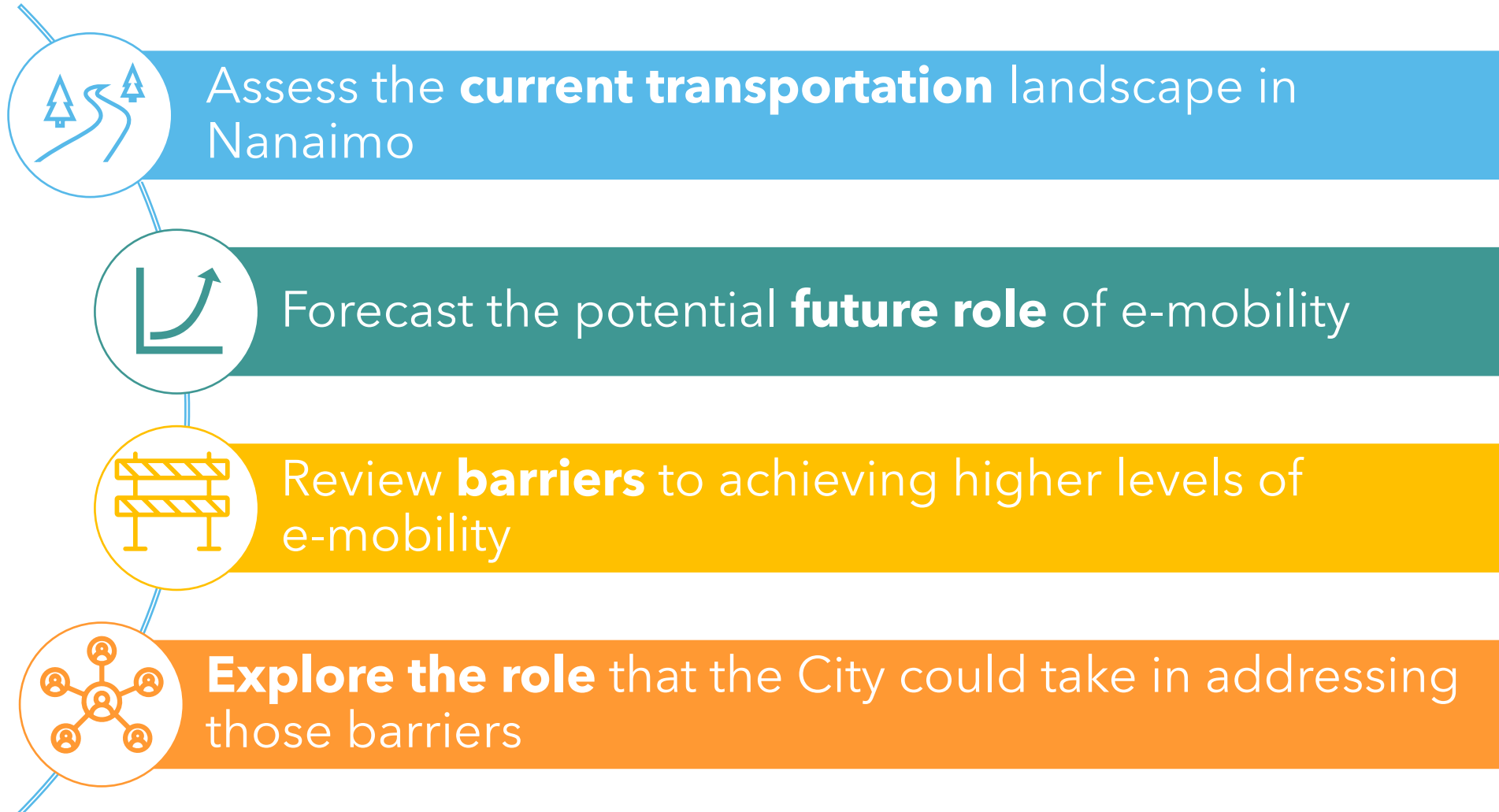
By identifying inequities and targeting investment in prevention and intervention, the wellbeing and inclusion of the diversity of people that make up our entire community can be enhanced, creating a city that puts people first and supports a sense of belonging.

Nanaimo Relmaged Desired Outcome C2.2 Integrated Walk, Roll, Cycle, & Transit Network:

A well-integrated walking, rolling, cycling, and transit network that is **safe, comfortable, convenient, accessible, and enjoyable** for persons of all ages and abilities.

This definition **does not speak to the broader benefits** of e-mobility (i.e., reduced GHG emissions, improved local air quality). These are important benefits that will be experienced by all residents. This definition is focused on the allocation of the resources and opportunities needed to ensure **e-mobility is available to all residents**, regardless of circumstances.

Research Objectives



Research Approach

E-mobility interest, barriers, and potential roles for the City were explored through a multi-part process, including:

Research & modelling

Forecasting using Dunsky's EVA™ model

Mail Survey

292 responses from City residents.

Statistics accurate within 5.7% 19 times out of 20

Public Survey

248 responses via Get Involved Nanaimo

Interviews

Engaged with **three equity-deserving groups**

Interviewed **seven e-bike users and non-users**

City staff workshop

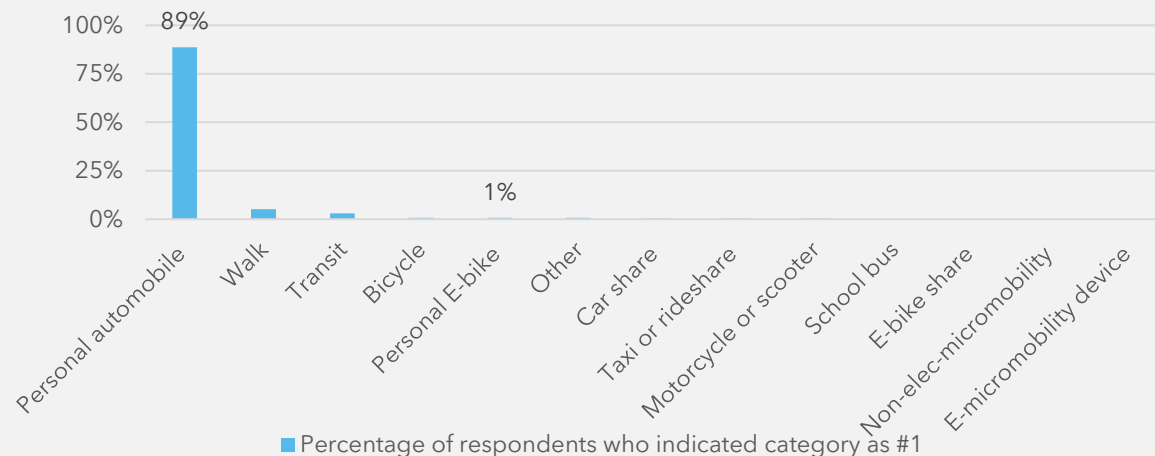
Seven staff participated across multiple departments

Table of Contents

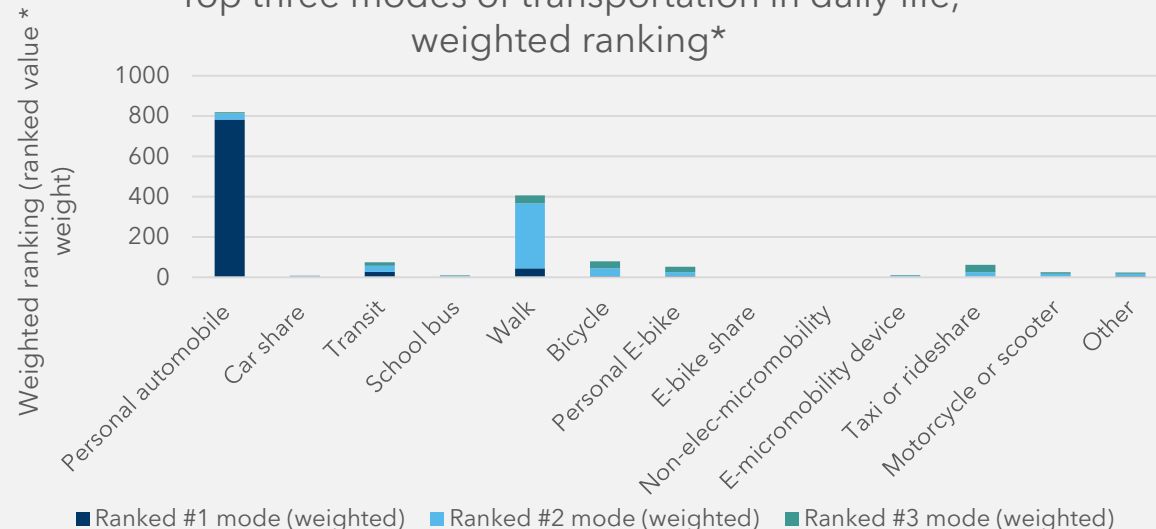
1. Introduction	1.1 Defining E-Mobility 1.2 City Targets 1.3 Study Scope
2. E-Mobility Today	2.1 Current Transportation Landscape
3. E-Mobility Tomorrow	2.1 Approach 2.2 Forecast Uptake 2.3 Key Takeaways
4. Barriers & Opportunities	4.1 Approach 4.2 Findings from Interviews 4.3 Findings from Mail and Public Survey 4.4 Barriers Summary 4.5 Opportunities Summary 4.6 Key Takeaways
5. Role for the City	5.1 Approach 5.2 Findings from Staff Workshop 5.3 Findings from Interviews 5.4 Findings from Mail and Public Survey 5.5 Recommended Options for Role for the City
6. Appendices	6.1 Engagement Summary 6.2 Selected Mail Survey Results

Daily Transportation Mode Preferences

Most common mode of transportation in daily life*



Top three modes of transportation in daily life, weighted ranking*



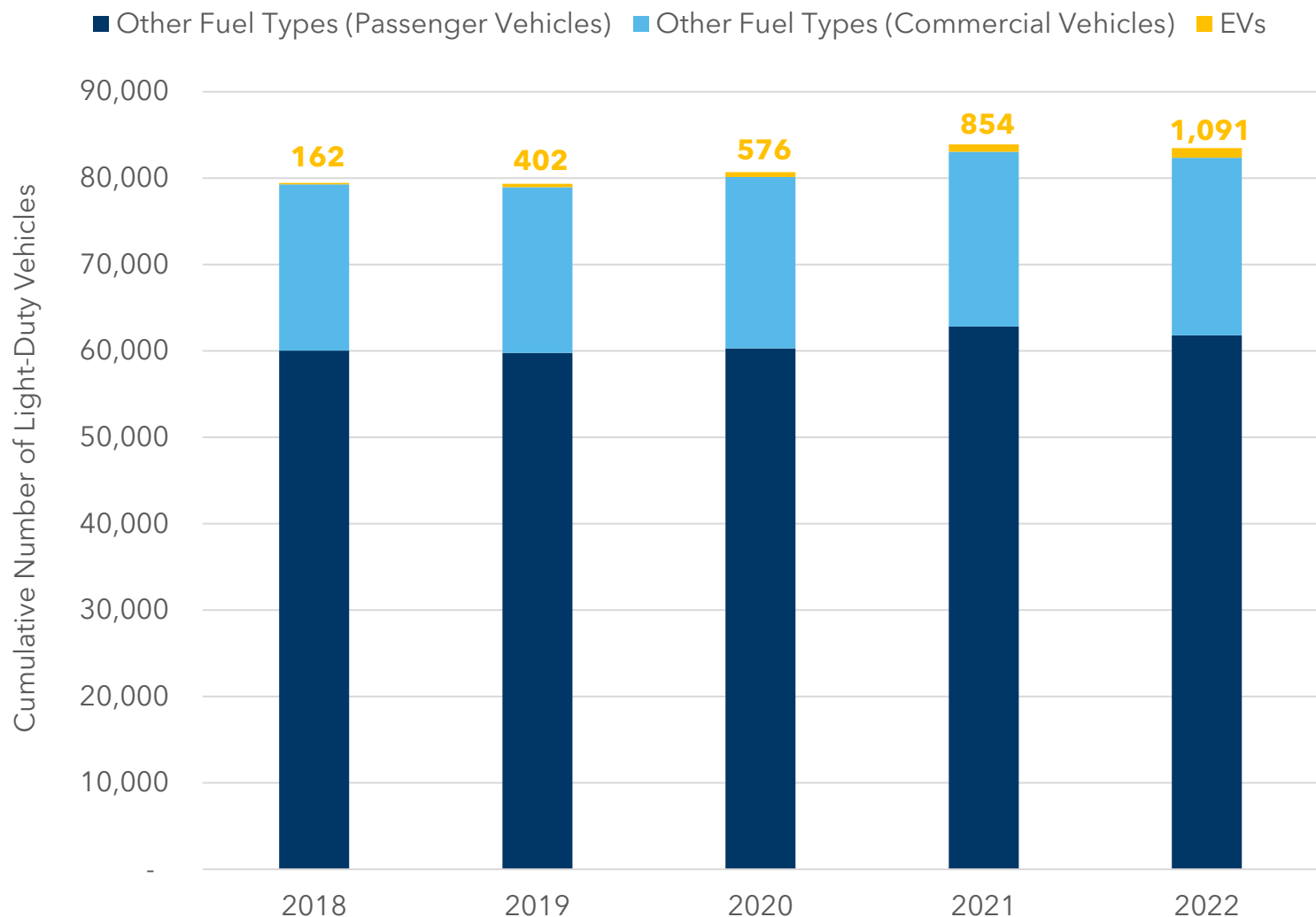
- Personal automobiles are the **first choice** for the **majority** of respondents and leads in the weighted ranking.
- E-bikes** are the #1 mode for **1% of respondents**, ranking similar to conventional bikes.
- Other e-micromobility devices (i.e., e-scooters, e-skateboards) were not indicated as a #1 mode, but as a **second or third choice**.

*Respondents were asked to rank their three most common modes of transportation in daily life.

- The top graph shows the percentage of respondents who ranked the mode as #1.
- The bottom graph shows how the relative importance of each mode based on the weighting in the ranking. The value is based on the number of respondents who ranked the mode, with higher ranks receiving higher weights (i.e., a mode ranked #1 receives more weight than the same mode ranked #3).

Source: Mail-out survey, June-July 2024.

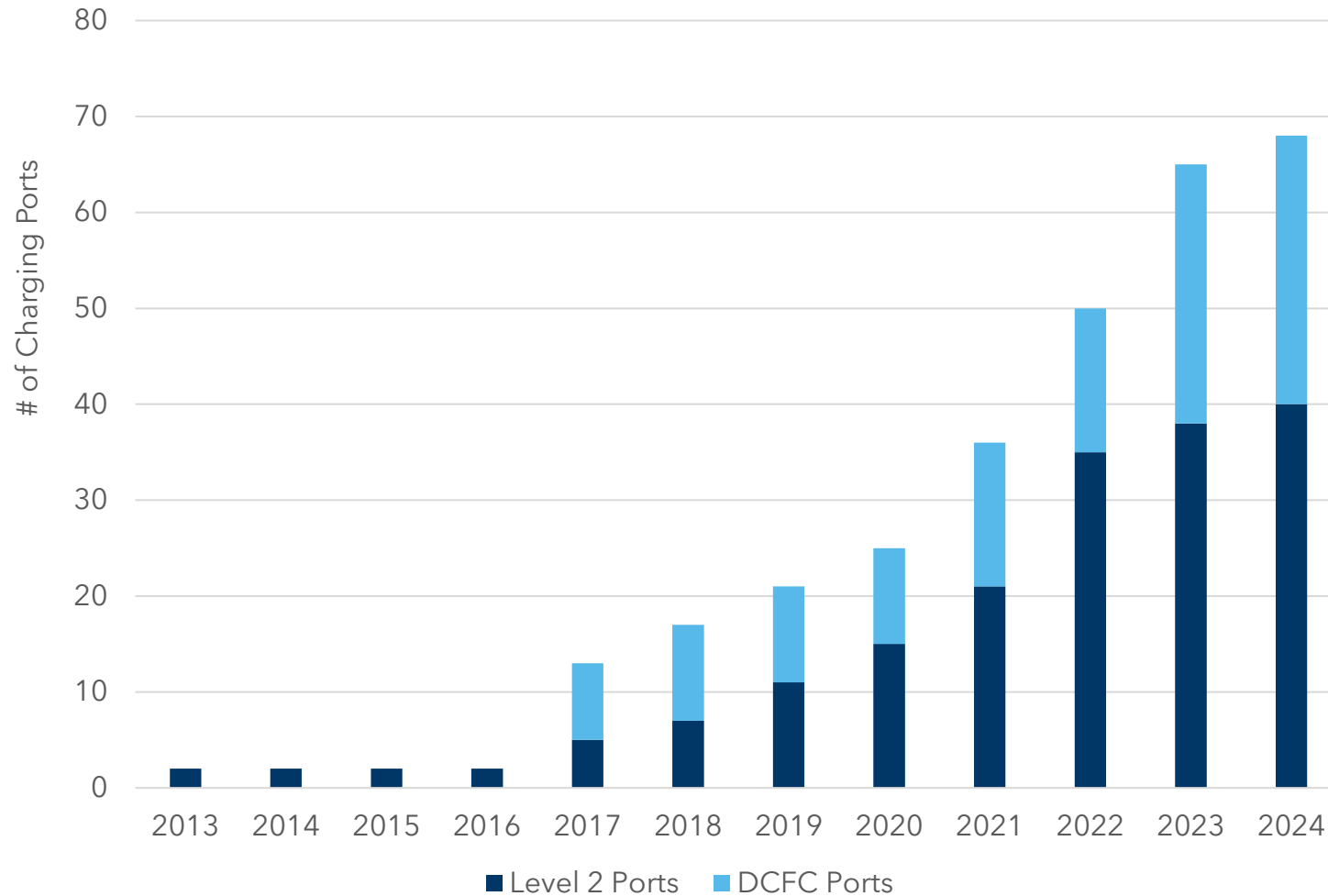
EV Uptake in Nanaimo



Key Insights

- This graph shows the total number of **light-duty** electric vehicles (BEVs and PHEVs) vs. all other fuel types in Nanaimo according to the *Insurance Corporation of British Columbia (ICBC)*.
- The City of Nanaimo has seen a **steady growth** in the number of EVs reaching approx. 1,100 vehicles in 2022, representing **5% of vehicle sales**.
- However, **most light-duty vehicles** in Nanaimo (approx. 82,400) are internal combustion engine (ICE) vehicles, which contribute significantly to Nanaimo's GHG emissions.

Public Charging Station Availability

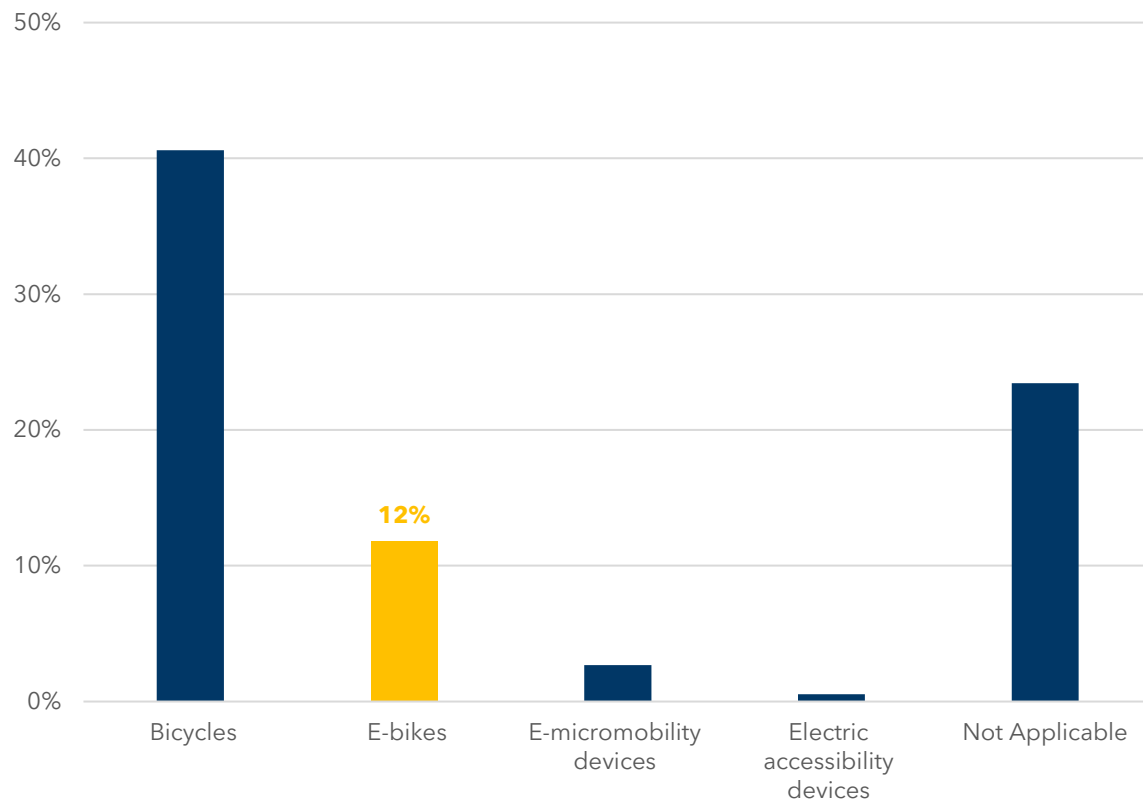


Key Insights

- The graph on the left shows the number of public EV charging ports in the City.*
- There is a **significant share of DCFC** charging compared to other jurisdictions, reaching 40% of all ports.
 - This is primarily due to two Tesla stations with 20 DCFC ports total, accounting for ~70% of DCFC chargers.
 - Other providers include BC Hydro and a mall.
- The City of Nanaimo is the largest provider of L2 ports (14 ports). Other prominent provider groups include shopping centres (8 ports).

E-Micromobility Uptake in Nanaimo

Percentage of adult (age 16+) population with access to mode from City respondents



Number of devices estimated based on on adult population

37,030	10,700	2,430	490	-
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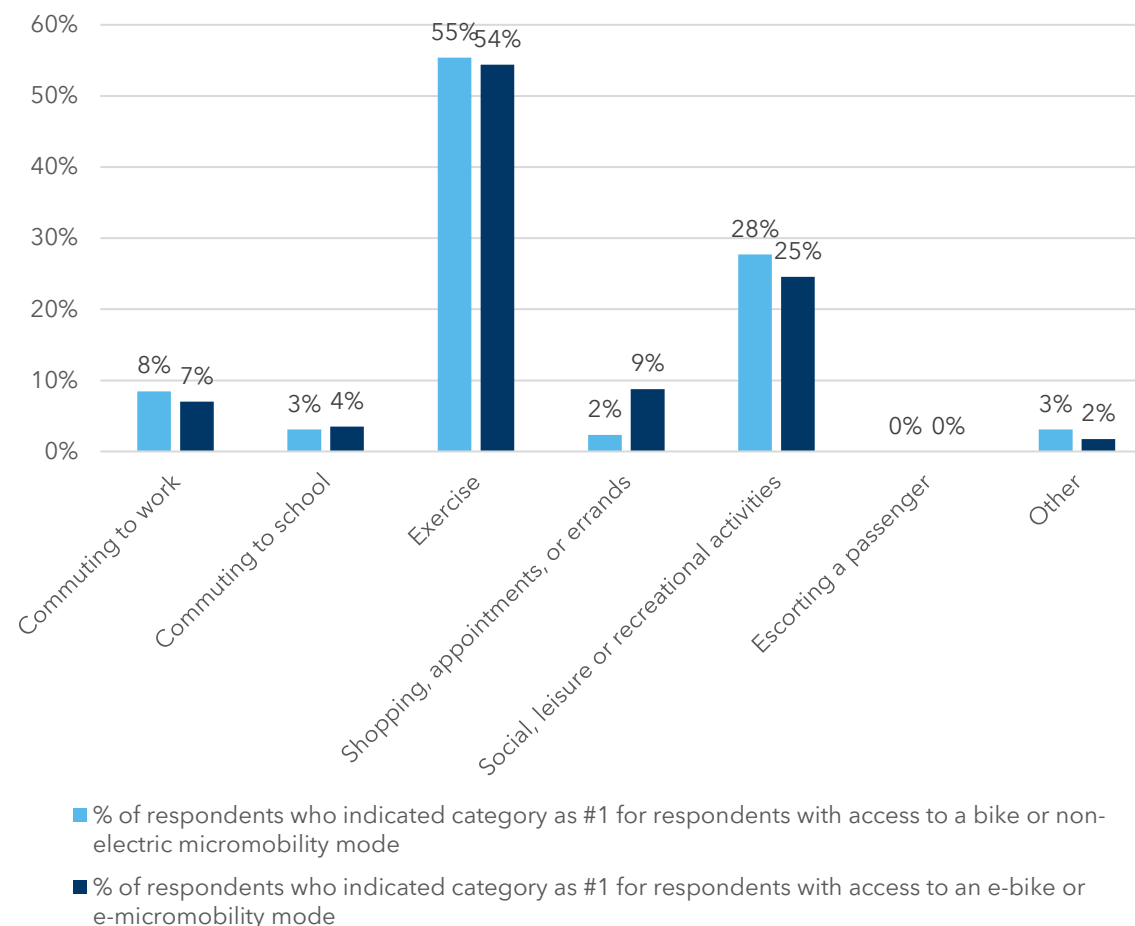
Key Insights

- The graph on the left shows the percentage of adult population with access to micromobility devices in Nanaimo, based on a statistical survey residents.
- E-Bikes are the leading e-Micromobility choice in Nanaimo
 - Conventional bicycles are the most common active mode among residents, but **12% of adults have access to an e-bike**, making e-bikes the most **dominant** e-micromobility device among residents.
 - About **half of the surveyed households** (51%) have at **least one** adult bicycle or e-bike. E-bikes make up 18% of the stock of all bicycles and 23% of adult bicycles.
- Smaller proportions of the population have access to other electric devices, including 3% having access to e-micromobility devices (i.e., e-scooters, e-skateboards, hoverboards) or 1% having access to electric accessibility devices.

Non-Electric & Electric Micromobility Trips

- The most common uses across both electric and non-electric micromobility are **exercise** and **social/leisure activities**.
- While less common than non-electric modes, e-micromobility is used for **commuting** at similar rates to conventional modes and **higher** rates for **shopping, appointments and errands**.

If you have electric or non-electric micromobility mode in your household, what are the top three most common purposes for trips by this mode?



Key Takeaways

- EV adoption is increasing among drivers, but the **majority of the** light-duty population consists of **internal combustion engine vehicles**, contributing to Nanaimo's community emissions.
- Based on the current number of EVs, Nanaimo's has **strong access to public fast-charging** ports, but less access to Level 2 charging.
- **E-bikes** are the dominant e-micromobility mode among residents, and are most commonly used for **exercise and leisure**, but support **commuting and shopping/errands**.

Table of Contents

1. Introduction	1.1 Defining E-Mobility 1.2 City Targets 1.3 Study Scope
2. E-Mobility Today	2.1 Current Transportation Landscape
3. E-Mobility Tomorrow	2.1 Approach 2.2 Forecast Uptake 2.3 Key Takeaways
4. Barriers & Opportunities	4.1 Approach 4.2 Findings from Interviews 4.3 Findings from Mail and Public Survey 4.4 Barriers Summary 4.5 Opportunities Summary 4.6 Key Takeaways
5. Role for the City	5.1 Approach 5.2 Findings from Staff Workshop 5.3 Findings from Interviews 5.4 Findings from Mail and Public Survey 5.5 Recommended Options for Role for the City
6. Appendices	6.1 Engagement Summary 6.2 Selected Mail Survey Results

Approach

- To forecast e-mobility adoption and determine whether Nanaimo can meet its transportation emission goals, we used the following **three-step approach**:

1. Forecast **e-bike adoption**
2. Calculate the impact of e-bike adoption on **reducing vehicle-km travelled**
3. Forecast the **proportion of EVs** in the vehicle population

- We calculated the following targets based on Nanaimo Relmaged goals:

	2010	2030	2050
Emission reduction target (%)	-	50%	100%
On-road transportation emissions (tCO ₂ eq)	448,000	224,000	0
EV share of total population (%)		46%	100%

Scenarios

We forecast e-mobility uptake in Nanaimo under **two scenarios**:

Business as usual (BAU)

- Adoption under current policy landscape and historical adoption trends

Optimal

- -mobility adoption that enables Nanaimo to approach or achieve its 2030 and 2050 emission reduction targets.
- This scenario sees e-bike and EV adoption under optimal conditions where current barriers to adoption are significantly mitigated.

Approach (cont'd)

E-bike Adoption

Given limited data on historical e-bike adoption, we applied a **simplified forecast approach**:

- **Current adoption** rate is assumed to match the mail-out survey results (12%).
- **BAU scenario** sees the same proportion of e-bike adoption to 2030 as population grows.
- **Optimal scenario** sees the current adoption rate double by 2030 (growing to 24%), increasing linearly from a combination of e-bike purchases and subscriptions to the e-bike share program.*

Vehicle-Kilometer Reduction by E-Bike

We determined the **expected portion of e-bike-km that displace vehicle-kms** vs. other modes based on recent studies of e-bike usage.**

Annual vehicle-km reduced was calculated by determining the vehicle-km displaced per year for the e-bike population, and distributing that reduction across the vehicle population.

Notes:

- *We selected this growth rate based on the range of e-bike adoption under various policy efforts and a high-level assessment of modal shift to e-bike ownership), and practical levels of adoption. Range of modal shift based on: Bourne et al. 2020. [The impact of e-cycling on travel behaviour: A scoping review](#). Journal of Transport & Health.
- **Vehicle replacement kilometers based: Elmira Berjisian and Alexander Bigazzi. 2019. [Summarizing the Impacts of Electric Bicycle Adoption on Vehicle Travel, Emissions, and Physical Activity](#); City and County of Denver. [Denver's 2022 Ebike Incentive Program: Results and Recommendations](#).
- Our study is focused on e-bikes and does not incorporate other mode-shift efforts (i.e., transit, non-electric micromobility, reduction in vehicles on the road, etc.) or other e-micromobility modes (i.e., e-kick scooters). Due to uncertainty in e-micromobility data, our e-bike forecast is limited to 2030.

Approach (cont'd)

EV adoption was forecast using Dunsky's EVA Model, including:



TECHNICAL

Assessing the maximum theoretical potential for deployment

- Market size and composition by vehicle class (e.g. cars, SUVs, pickups)
- Model availability for each vehicle powertrain (e.g. ICE, PHEV, BEV)

ECONOMIC

Calculating unconstrained economic potential uptake

- Incremental purchase cost of PHEV/BEV over ICE vehicles
- Total Cost of Ownership (TCO) based on operational and fuel costs

CONSTRAINTS

Accounting for jurisdiction-specific barriers and constraints, which vary by vehicle class, including:

- Range anxiety or range requirements
- Public charging coverage, availability, and charging time
- Home charging access

Incorporating market dynamics and non-quantifiable market constraints

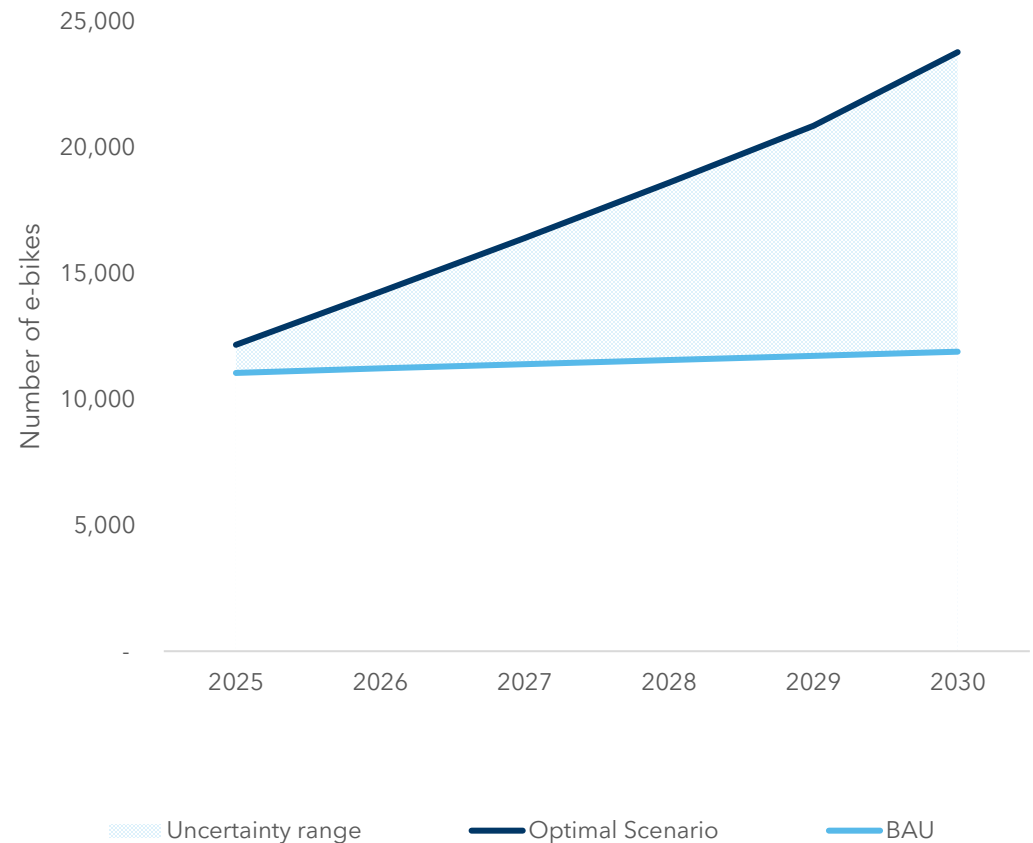
- Use of technology diffusion theory to determine rate of adoption
- Market competition between vehicles types (PHEV vs. BEV)
- Reduction in vehicle-kilometers travelled due to e-bike adoption

MARKET

Forecast Results: E-Bike Uptake

- **Under a BAU scenario**, considering current conditions and barriers, e-bike growth remains at its current rate.
 - 2025 to 2030: **12%** of the adult population has an e-bike
- **Under an optimal scenario**, e-bike uptake could double, resulting in higher levels of vehicle-kilometers shifted from personal automobiles to e-bike kilometers.
 - 2024: 12% of the adult population has an e-bike
 - 2030: **24%** of the adult population has an e-bike

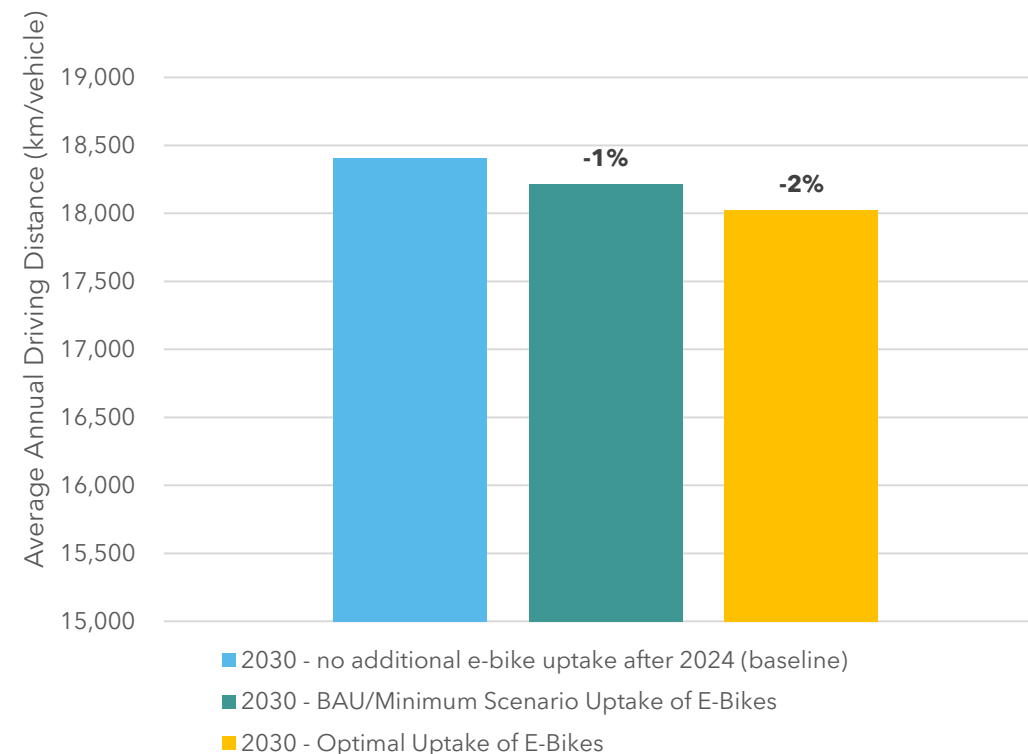
Forecast of e-bike uptake in Nanaimo



Forecast Results: Reduced Vehicle Travel

- As e-bike adoption increases, **e-bike transportation replaces other modes**, including a portion of vehicle traffic.
- For each e-bike owned in Nanaimo, we assessed the impact on average annual vehicle driving distance.
- In 2030, the average annual vehicle driving distance could **drop by 1% (190 km/vehicle) to 2% (or 380 km/vehicle)** across scenarios, reducing vehicle usage and emissions.

Change in annual per vehicle driving distance based on e-bike adoption

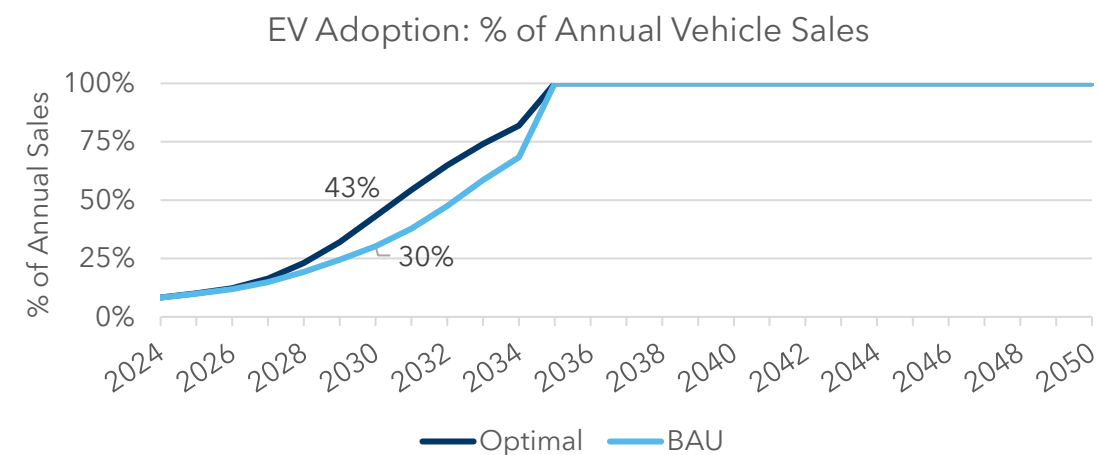
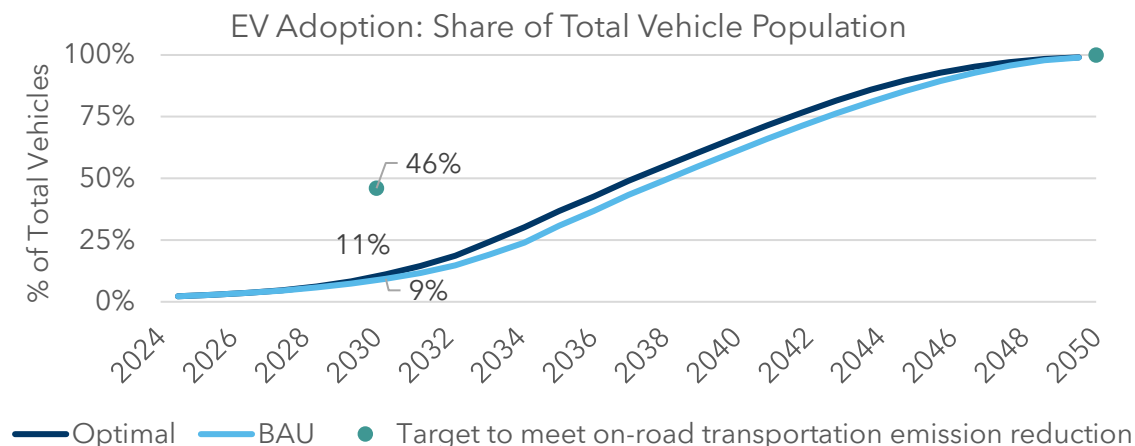


Note:

- E-bike ownership is based on the e-bike access percentage from the public survey response, translated into number of e-bikes in Nanaimo based on adult population forecasts. Only e-bike ownership is considered and does not include other e-micromobility devices or conventional cycling devices.
- Each e-bike owned achieves a certain number annual vehicle replacement kilometers based on literature values (see slide 20), ranging from 36.5 vehicle-km reduced per week in 2024 to 38 vehicle-km reduced per week in 2030 per e-bike, and an e-bike utilization rate of 40 weeks per year.
- Annual vehicle-km calculated based on Table 13 in: Stantec. 2023. [Regional District of Nanaimo 2021 - GPC BASIC+ Community Greenhouse Gas \(GHG\) Emissions Inventory Report](#).

Forecast Results: EV Uptake

- **Nanaimo achieves the 2050 emissions target** under both scenarios primarily due to the ZEV mandate.
- **Nanaimo does not meet the 2030 target** under either scenario; however, the optimal scenario gets closer.
- The optimal scenario results in higher EV adoption in 2030 primarily **due to more home charging access in existing multi-family buildings**.
- **The optimal scenario also results in EV uptake ramping up sooner** (see % of Annual Vehicle Sales) due to more home charging access and market conditions. Earlier adoption achieves emission reductions sooner.



Notes:

- Optimal scenario assumes high levels of home and public charging access and extended incentives, and increased e-bike adoption that reduces vehicle kilometers traveled.
- Achieving Nanaimo's on-road transportation emission reduction targets translates to EVs representing 46% of the fleet in 2030 and 100% in 2050.
- Modelling assumes that light-duty vehicles (EVs + ICE) increase in proportion to population and assumes annual vehicle-km travelled remains constant over time except for e-bike-km reductions.

Key Insights

- E-bike adoption can reduce the reliance on, and emissions from, personal vehicles by **shifting kilometers traveled from vehicles to e-bikes**.
 - When vehicle-owning households adopt e-micromobility, they typically shift a subset of vehicle trips to this mode, but they do not necessarily replace their household vehicle. Therefore, we did not forecast a reduction in vehicle population size from e-bike adoption. Instead, **increased e-bike adoption leads to lower utilization of vehicles** in our model.
- Reaching the **2030** emission reductions target is **challenging** due to the pace of EV adoption and vehicle turnover. However, under the optimal scenario, EV uptake ramps up sooner, **achieving earlier emission reductions**.
 - To enable earlier adoption, improved multi-family home charging access is critical. Public charging, including workplace charging, will be needed to support broader, equitable EV adoption, though there has been some strong initial access due to multiple fast charging sites.
- **Nanaimo achieves the 2050 target** under both scenarios primarily due to the provincial ZEV mandate.

Table of Contents









1. Introduction	1.1 Defining E-Mobility 1.2 City Targets 1.3 Study Scope
2. E-Mobility Today	2.1 Current Transportation Landscape
3. E-Mobility Tomorrow	2.1 Approach 2.2 Forecast Uptake 2.3 Key Takeaways
4. Barriers & Opportunities	4.1 Approach 4.2 Findings from Interviews 4.3 Findings from Mail and Public Survey 4.4 Barriers Summary 4.5 Opportunities Summary 4.6 Key Takeaways
5. Role for the City	5.1 Approach 5.2 Findings from Staff Workshop 5.3 Findings from Interviews 5.4 Findings from Mail and Public Survey 5.5 Recommended Options for Role for the City
6. Appendices	6.1 Engagement Summary 6.2 Selected Mail Survey Results









Approach

We used a **three-step process** to identify and prioritise Nanaimo barriers to eMobility:





1. **Identify potential barriers** to e-mobility based on a desktop scan of academic and grey literature and our experience developing eMobility strategies for other jurisdictions.
2. **Determine relevance** of barriers in the Nanaimo context.
3. **Rate barriers** based on the feedback from the engagement process as **critical**, **moderate** or **low**.

Summary of Barriers and Impacts in Nanaimo





E-micromobility Barriers		Rating
 A Affordability		●
 B Accessibility, comfort, ability, and familiarity		●
 C Access to secure parking and charging		●
 D Access to travel routes and infrastructure designed for micromobility		●
 E Access to safe and appropriate travel routes and infrastructure		●
 F Uncertainty, lack of awareness of definitions, regulations and legislation		●
 G Automobile-dominant culture (culture and perceptions)		●
 H Travel conditions (challenging weather or terrain)		●

EV Barriers		Rating
 A Affordability		●
 B Availability of new and used EVs		●
 C Availability of EV models to persons with disabilities		●
 D Lack of knowledge and experience with EVs		●
 E Ability to install home charging		●
 F Ability to access EV-charging support programs		●
 G Ability to use public charging		●
 H Cost and time burden to use public charging		●





E-Micromobility Barriers & Impacts

	Barrier	Local Context	Impact Rating
 A	<ul style="list-style-type: none"> E-micromobility devices have a higher upfront cost than conventional versions 	<ul style="list-style-type: none"> BC plans to re-offer income-qualified rebates for eligible new e-bikes E-bikes are exempt from PST Nanaimo's pilot e-bike program features a more affordable monthly subscription option but does not include a combined transit + e-bike option 	Critical
 B	<ul style="list-style-type: none"> Potential users are not necessarily familiar or comfortable with new e-micromobility technologies. Devices may be heavier, more physically challenging, or operate at higher speeds which users may not feel comfortable doing without support or training. Shared e-micromobility services often require the use of the internet, a smartphone and/or digital payment and credit cards. 	<ul style="list-style-type: none"> Nanaimo has a large population of seniors aged 65+ (25% in 2019 compared to the national average of 19%) Nanaimo's e-bike pilot requires the use of a smartphone and credit card 	Critical
 C	<ul style="list-style-type: none"> Access to convenient and easy parking and charging is not always available at home or when traveling. Parking access is more challenging due to device size and weight. Secure parking is critical due to the often-higher value of e-bikes and e-micromobility and risk (both real and perceived) of being stolen. 	<ul style="list-style-type: none"> The City offers bike valet services at some City-run special events but does not own or provide permanent secure bike parking facilities for the public. 	Moderate
 D	<ul style="list-style-type: none"> Inadequate infrastructure, including designated multi-modal active transport lanes, safe and convenient crossing points, regional connections, and traffic control measures Limited access to infrastructure can result in e-micromobility users riding on the sidewalk or in unsafe road conditions, leading to conflicts and potential injury with other users, particularly those with accessibility concerns. 	<ul style="list-style-type: none"> The City has invested in several active transport (AT) capital projects Though mainly concentrated downtown and in recreation areas, Nanaimo's e-bike pilot program includes a few parking zones in residential centres 	Critical





E-Micromobility Barriers & Impacts (cont'd)

	Barrier	Local Context	Impact Rating
	E <ul style="list-style-type: none"> Limited or patchwork access to appropriate travel routes (e.g., AAA-grade, multi-use pathways) that are strongly preferred by e-micromobility users. Concerns about e-micromobility devices sharing spaces with pedestrians, conventional bikes due to speed differential. Safety concerns are higher with high traffic volumes and/or poor road conditions, often more frequent in underserved communities 	<ul style="list-style-type: none"> The City created Complete Street Guidelines in 2020, which aimed in part to better plan for and provide safe AT for all ages and abilities. AT priorities include feeling safe from vehicles and creating dedicated cycling routes according to survey respondents in Nanaimo Reimagined engagement. Many bikes are accommodated on BC Transit's buses, but not all e-bikes, limiting active and multi-modal travel. 	Critical
	F <ul style="list-style-type: none"> Absent, ambiguous or restrictive e-micromobility definitions and regulations can limit deployment and operation of e-micromobility and/or increase tension and safety concerns between road and route users 	<ul style="list-style-type: none"> BC provided clarity on e-bikes with new categories of standard and light and outlines minimum rider age, maximum motor-assisted speed and power, and presence of throttle assist 	Moderate
	G <ul style="list-style-type: none"> Certain jurisdictions were built for and rely on car ownership, which has translated into a "car-centric culture" Social stigma associated with riding an e-bike, and concerns about being judged as lazy or "cheating" 	<ul style="list-style-type: none"> Relatively car-centric design centered around major highways; residents can feel reliant on vehicles Legacy tensions between vehicle and AT users and investment priorities, though 75% of survey respondents (public survey only) in Nanaimo Reimagined indicated AT infrastructure is a good use of tax dollars 	Moderate
	H <ul style="list-style-type: none"> Willingness, comfort and ability to travel via micromobility more broadly due to climate, weather conditions and/or terrain 	<ul style="list-style-type: none"> Nanaimo has a typical West Coast climate characterized by significant rainfall and changing and unpredictable daily weather Nanaimo is "stretched out" along highways with hilly terrain 	Low

Electric Vehicle Barriers & Impacts

	Barrier	Local Context	Impact Rating
 A	<ul style="list-style-type: none"> EVs currently have a higher upfront cost than ICE vehicles, limiting access to those with limited funds (i.e., low income) 	<ul style="list-style-type: none"> Auto dependence likely creates high transportation costs particularly for low to moderate income people who could benefit from the reduced EV operational costs but cannot manage the higher upfront cost. 	Critical
 B	<ul style="list-style-type: none"> Too few EV options (number and diversity of makes/models) available in the local new and used vehicle market for drivers looking to transition to an EV 	<ul style="list-style-type: none"> BC has higher availability compared to other jurisdictions in Canada. People with lower incomes cannot easily access other markets (e.g., Victoria) that may have higher availability. SUVs and pickup trucks are a common personal vehicle type in Nanaimo, but they are more expensive as new, and fewer used, models available than for cars. 	Critical (used EVs) Low (new EVs)
 C	<ul style="list-style-type: none"> Limited EVs available that can be modified for wheelchairs with significant additional upfront costs for modifications 	<ul style="list-style-type: none"> Limited EVs available that can be modified for wheelchairs, with significant additional upfront costs for modifications. Availability will be linked to broader local EV availability (limited data currently). 	Moderate
 D	<ul style="list-style-type: none"> EVs are a relatively new technology compared to ICE vehicles and are still unfamiliar to many people 	<ul style="list-style-type: none"> Knowledge and experience gap can extend to supply and service businesses (e.g., local dealerships, garages, mechanics) 	Moderate

Electric Vehicle Barriers & Impacts (cont'd)

	Barrier	Local Context	Impact Rating
	E <ul style="list-style-type: none"> Home charging is challenging for people who have older homes, limited control over changes to their home (e.g., renters; mobile park, MURB and condo residents) or limited funds to do so (e.g., low-income) 	<ul style="list-style-type: none"> Large share of older homes (40% built before 1980) and manufactured homes (2.5%) may require costly electrical upgrades. Renters (33% of private households), and MURB and condo residents, may face barriers to upgrades. The City has 100% EV-Ready requirements for residential new construction buildings as of December 2021, providing low-cost charging future-proofing. EVA™ modelling indicated that charging access in multi-family buildings is a critical barrier, though our engagement findings found the issue to be less urgent at the early stage of adoption. 	Critical
	F <ul style="list-style-type: none"> Programs to support EV charging installation or EV charging rates are more difficult to access for those with limited control or funds. 	<ul style="list-style-type: none"> BC rebate programs require upfront capital MURB/condo residents need support from owners and/or other residents to enable cost and energy efficient design and implementation Low overnight charging under BC Hydro's new time of day rate will not be available to those without home charging 	Moderate
	G <ul style="list-style-type: none"> Public charging is designed for 'mainstream' users and not those who have limited physical abilities, non-English speakers, or those with no or limited access to credit cards/banking systems 	<ul style="list-style-type: none"> Local stations are not reliably designed for physical accessibility Require credit cards and/or SmartPhones Communications primarily in English 	Moderate
	H <ul style="list-style-type: none"> Drivers who do not have charging at home may find it challenging to rely on public charging due to: <ul style="list-style-type: none"> Higher and increasing costs (relative to home charging) Lack of convenience and time burden spent looking for and using public charging (which cannot always be used for other activities such as work, errands, leisure, etc.) 	<ul style="list-style-type: none"> Chargers are mostly located near highways in malls, institutions, parks, and workplaces. Chargers are less common at the neighbourhood level, with notable gaps (e.g., Rocky Point/Lost Lake, Hammond Bay/Stephenson Point, Westwood Lake/Jingle Pot, Chase River, Cinnabar Valley). Time burden associated with public charging compounds existing inequities. Charging fees vary by station, but rates are (or soon will be) higher than those available to home chargers. Rates are time-based (\$/minute). 	Moderate

Key Takeaways

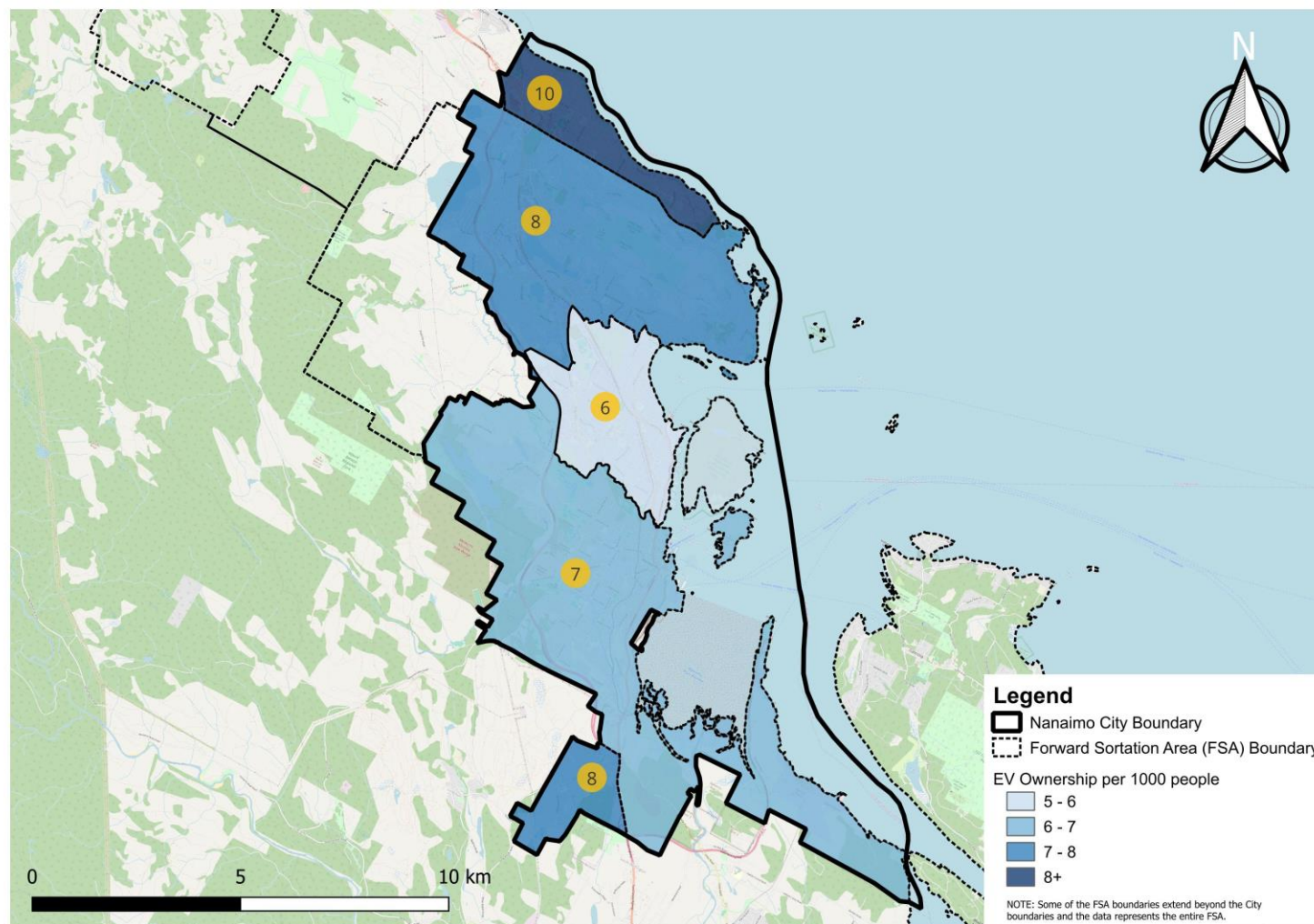
- **Affordability** is the leading barrier for both e-micromobility and EVs, preventing equitable access to e-mobility benefits. **Lack of information** and familiarity are also leading barriers across both e-micromobility and EVs.
- **For e-micromobility, access and safety** of active transportation infrastructure is a leading barrier.
- **E-micromobility trips are also limited by a lack of secure parking** when 'out and about' and at home. For some equity-deserving groups, access to e-micromobility, including through Nanaimo's EVOLVE e-bike pilot, is limited by access to a **smart phone** and **credit card**.
- **EV charging in multi-family buildings** will become an increasingly important as EVs become more affordable and is critical to enabling equitable access to EVs and their benefits. Where multi-family home charging is not feasible, **public charging**, including workplace charging, is important to provide access to EV charging.

*Automobiles, electric or otherwise, remain **out of reach** for many. Car ownership broadly, and EV ownership specifically, is less accessible to many equity-deserving people and families in the communities consulted.*

Note:

- The three organizations consulted in equity-deserving communities represented low-income people and families, racialized people and communities, renters and residents of multi-family buildings. Therefore, the equity findings do not represent all equity-deserving communities, and these communities are not monolithic and, therefore, key findings are general.

Key Takeaways: EV Adoption Across the City



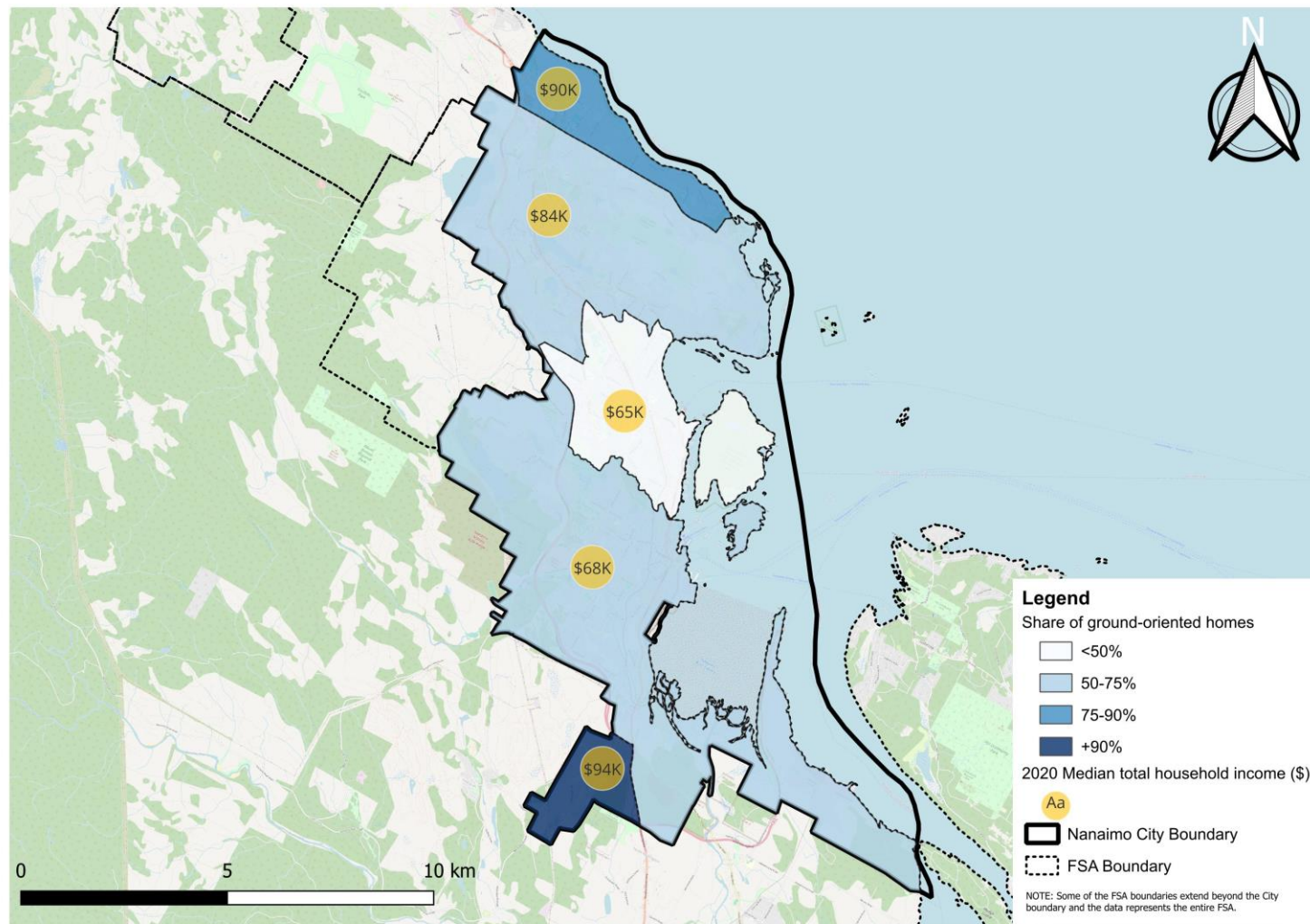
Key Insights

- This map shows EV adoption in 2022 per 1000 people by area of the City of Nanaimo (specifically by Forward Sortation Area or FSA).
- EV adoption is **highest** in North Nanaimo.
- EV adoption is **lower** in the neighbourhoods closest to downtown (including Central Nanaimo, Jingle Pot, University District, South Nanaimo).

Sources:

- Statistics Canada. November 2023. *Census Profile*. 2021 Census of Population. Accessed July 10, 2024.
- Insurance Corporation of British Columbia. July 2024. *Electric Vehicles (2019-2023)*. Accessed July 10, 2024.

Key Takeaways: Home Charging Access & Household Income



Key Insights

- This map shows ease of home charging access overlaid with median household income by area of the City of Nanaimo (by FSA)
- Home is the **preferred** charging location for most people. However, home charging varies by **building type**:
 - Ground-oriented** homes (single family homes, duplexes, etc.) are more likely to have access to, and ownership of, a parking space attached to their living space, simplifying charging installation.
 - Multi-family** buildings typically have shared parking areas, which are more challenging for residents to install EV charging, even when they do have access to a parking spot, due to legal, financial, technical and logistical barriers in both strata and rental.
- Affordability** is a key barrier to adoption, which is linked to household income
- This map shows that the neighbourhoods closest to downtown face **higher barriers to EV adoption** due to charging access with higher proportions of multi-family buildings and lower median income.
- These **key metrics align with the adoption rates** found in the previous map, highlighting the **local reality of these barriers**.

Key Takeaways: Equity Perspective

- **Electric vehicle ownership is not a priority for many individuals in equity-deserving communities.** Car ownership broadly, and EV ownership specifically, is less accessible to many equity-deserving people and families in the communities consulted. Where cars are owned, they may be older and/or purchased used – options that are not often available for EVs. Consulted organizations noted that EV ownership and existing programs (e.g., Provincial incentives) are deeply inequitable and that, as a result, City investments and policies related to electric vehicles are unlikely to benefit their clients.
- **Active transport (including e-micromobility) and transit are critical mobility priorities.** Consulted organizations stressed the importance of investment into active transport and transit infrastructure, services, and programs broadly – as well as increased investment that benefits their communities specifically. The importance of multi-modal planning and services (e.g., e-bike to transit bus) and the value of shared mobility services (e.g., shared e-bikes and e-scooters; carshare) – especially when conveniently and equitably located and accessibly designed – were noted as having potential.
- **Key barriers identified in the initial research broadly aligned with feedback from community organizations.**
 - Equitable e-micromobility barriers: affordability, access to secure parking (especially for low-income people, renters, MURB residents), safety (e.g., lack of clarity and knowledge around e-mobility regulations, routes and norms; policing of racialized, homeless, low-income and/or youth communities), accessibility/comfort/familiarity with the mode (e.g., access to and comfort with a credit card and/or smartphone; heavier devices), a “culture of driving” prevalent in the broader community and less or no culture of active transportation and transit.
 - EV barriers: the most critical barrier is affordability, followed by lower access to existing programs, and accessibility (e.g., the need for a Canadian driver’s license).

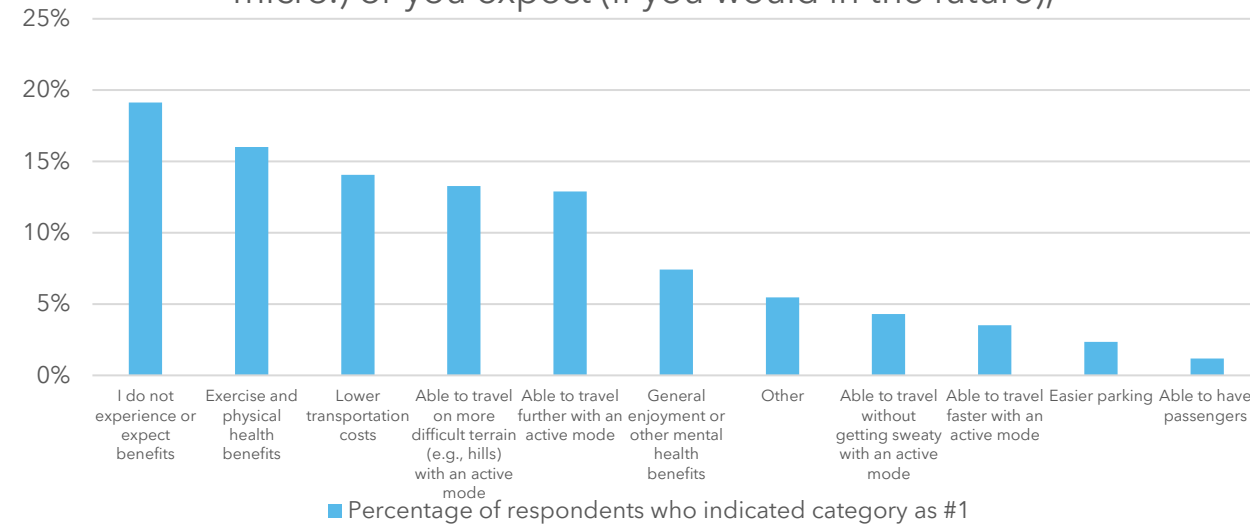
Note:

- The three organizations consulted in equity-deserving communities represented low-income people and families, racialized people and communities, renters and residents of multi-family buildings. Therefore, the equity findings do not represent all equity-deserving communities, and these communities are not monolithic and, therefore, key findings are general.

Opportunities and Benefits for E-mobility

- **Lower transportation costs** are identified as a leading benefit for e-mobility, which can help address the challenge of transportation affordability that was raised among equity-deserving groups and the public survey.
- Lower transportation costs was a leading e-micromobility benefit identified by respondents (second to exercise).
- Lower fuel costs was the leading EV benefit identified by respondents.

Top e-micro. benefits you experience (if you use e-micro.) or you expect (if you would in the future),



Top EV benefits you experience (if you use EV) or expect (if you would in the future)

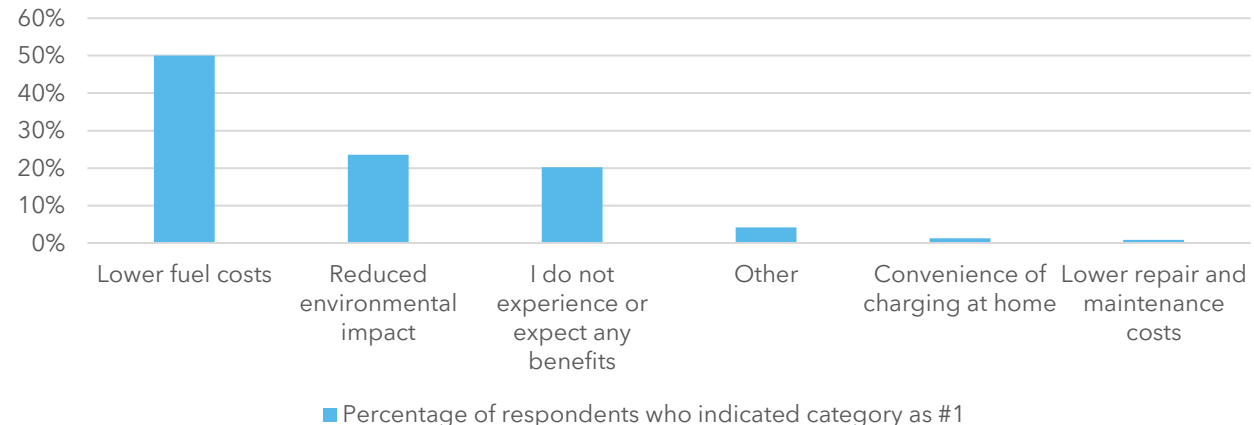


Table of Contents

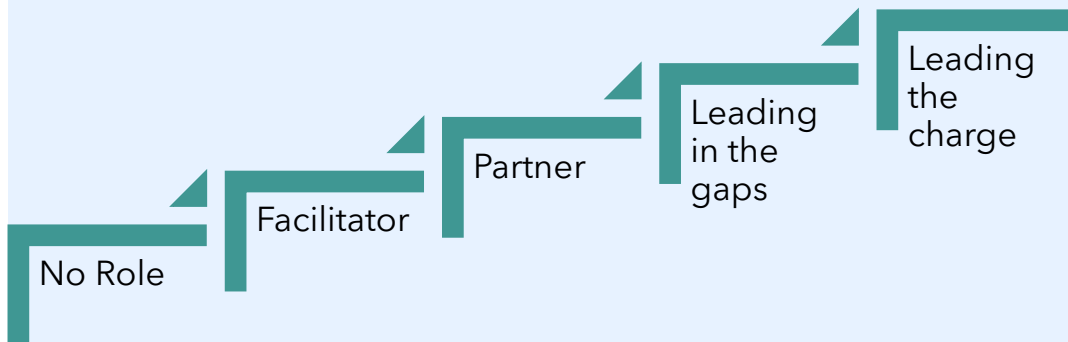
1. Introduction	1.1 Defining E-Mobility 1.2 City Targets 1.3 Study Scope
2. E-Mobility Today	2.1 Current Transportation Landscape
3. E-Mobility Tomorrow	2.1 Approach 2.2 Forecast Uptake 2.3 Key Takeaways
4. Barriers & Opportunities	4.1 Approach 4.2 Findings from Interviews 4.3 Findings from Mail and Public Survey 4.4 Barriers Summary 4.5 Opportunities Summary 4.6 Key Takeaways
5. Role for the City	5.1 Approach 5.2 Findings from Staff Workshop 5.3 Findings from Interviews 5.4 Findings from Mail and Public Survey 5.5 Recommended Options for Role for the City
6. Appendices	6.1 Engagement Summary 6.2 Selected Mail Survey Results

Possible Roles for the City

- Municipalities have an important role to play in supporting eMobility. The role of the City depends on the **level** of engagement and **levers** of engagement they deploy and varies depending on the local context.
- We explored possible roles for the City through a staff workshop, interviews with equity deserving groups, and the public survey.

Levels of Engagement

Municipalities can take varying **levels of leadership** in e-mobility depending on their ambition, resources and local context:



Levers of Engagement

Municipalities can encourage adoption through a variety of **types of actions** (i.e. levers). Typically, a variety of levers are used:



Staff Workshop: Key Findings

Level of Engagement

- Staff were broadly aligned that the benefits outweigh the risks of moving to **higher levels of engagement**.
- Higher level of engagement provides more **control over outcomes and targets**.
- Level should **depend on transport mode** (e.g., likely a lower role for EVs and higher role for e-micromobility).
- Level should **depend on market gaps and barriers** (e.g. facilitator role or leading in the gaps) and **may evolve over time** depending on where other players take action.

Levers of Engagement

- Regulations and Development Approvals are important low-cost tools but **cannot be implemented in isolation** (i.e., considerations for other policy priorities, affordability).
- City assets are in **impactful** locations and are **visible**, which can signal transportation priorities.
- Operational and capital spending is highly impactful but constrained. Must be **tailored to reach the highest need and impact**.
- Advocacy is an important lever, but requires a **strategy** regarding who, what and how to advocate.

Equity-Deserving Groups: Key Findings

Organizations envision numerous roles for the City to increase equitable e-mobility and were united in the **need to prioritize e-micromobility over EV investment to support equity-deserving communities.**

1

Prioritization of e-micromobility infrastructure investment. Ideas include providing secure and accessible public e-micromobility parking, supporting e-micromobility storage in MURBs and rental housing, and building safe and accessible active transport routes and infrastructure.

2

The City should create and support e-mobility programs designed with and for equity-deserving communities. Organizations stressed the importance of well-designed programming and funding that address specific barriers. Examples include multi-modal supports and discounts (e.g., transit + e-bike; carshare + e-bike), education and information sessions customized for youth and newcomers, shared e-mobility pilots and services, and income-qualified e-micromobility purchase incentives.

3

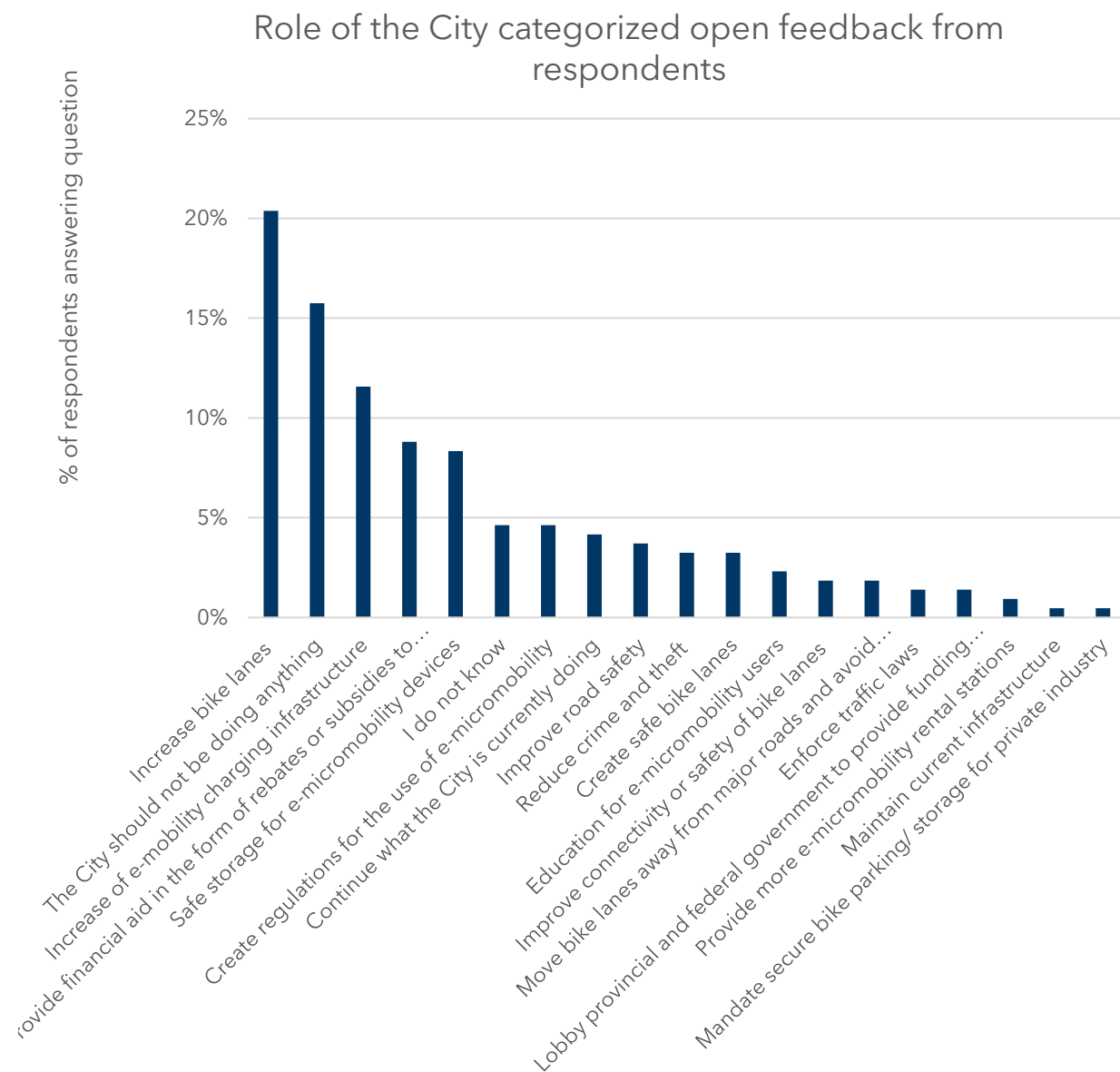
The importance of City land use and development planning and policy when it comes to access and proximity to services, location and accessibility of travel routes and infrastructure, and requirements for new and existing housing and commercial areas.

4

A key role for e-mobility advocacy to the Province, transit agencies, school boards and other partners for centralized mobility funding and programming that considers the unique needs and barriers of local equity-deserving communities and considers intersecting systemic barriers and challenges.

Survey: Key Findings

- Survey respondents provided open feedback on the role of the City which was then categorized.
- The leading role was to **increase bike lanes**, aligning with the e-micromobility infrastructure barrier, from ~20% of question respondents.
- The second most common response was to **'do nothing'**.
- The next set of roles was related to other key barriers:
 - Increasing e-mobility charging infrastructure
 - Addressing E-mobility affordability
 - Enhancing e-micromobility storage



Guiding Principles for Role of The City

We prepared **two options** for the City's role based on the following guiding principles:

- The options put **more emphasis on e-micromobility** over EV as e-micromobility modes were highlighted as a priority in our equity-focused engagement and align with the City's broader active transportation goals.
- However, **strategic support for EVs** is needed to ensure equitable access to EV benefits, as demonstrated in the mapping and engagement. EVs also remain an important tool to achieve **significant, near-term reductions** under Nanaimo's climate targets.
- The options consider, at high-level, **efforts by other actors** to address barriers.¹ Specifically, **affordability** – a critical barrier – is included in only one option and only for e-micromobility because it is being partially addressed by important efforts by other actors (notably the province's e-bike incentive and provincial and federal EV rebates). Similarly, availability of used EVs is being addressed partially by the EV rebate program. Further, there are fewer existing supports for e-micromobility compared to EVs.
- **Investment** (operational and potentially capital) **is required** to move towards City targets, which must be considered in the context of competing priorities and potential **lack of public buy-in**.
- Communities are **not a monolith**. Solutions (i.e., communications, programs, etc.), must be **tailored** to the needs of specific communities to effectively address barriers.

1. Note: a comprehensive landscape scan of actors and barrier mitigation efforts was not in scope

Options for the Role of the City

	Option 1: Lead in the Gaps (recommended)	Option 2: Lead in E-micromobility
Level of Engagement	Lead in the gaps on e-micromobility and EVs	Lead the charge on e-micromobility; Partner on EV efforts
Barriers Tackled	City takes an active role in addressing select critical barriers for e-micromobility and EVs with focus on e-micromobility. City considers addressing other barriers in a partner or facilitator role on a case-by-case basis.	City addresses all barriers for e-micromobility. No action on EV barriers <i>unless</i> in a partner or facilitator role.
Levers for E-Micromobility	All , including spending.	All , including spending.
Levers for Electric Vehicles	Primarily regulatory and advocacy . Limited spending, if any.	None unless jointly led with partner.

Barriers Addressed

	Nanaimo Barriers	Rating ¹	Barriers Addressed	
			1. Lead in the gaps (recommended)	2. Lead on e-micromobility
E-Micromobility Barriers	A. Affordability	●		☑
	B. Accessibility, comfort, ability, and familiarity with mode	●	☑	☑
	C. Access to secure e-micromobility parking and charging	●	☑	☑
	D. Access to travel routes and infrastructure designed for micromobility	●	☑	☑
	E. Access to safe and appropriate travel routes and infrastructure	●	☑	☑
	F. Uncertainty/lack of awareness on definitions/regulations/legislation	●		☑
	G. Automobile-dominant culture	●		☑
	H. Travel conditions (challenging weather or terrain)	●		☑
EV Barriers	A. Affordability	●		
	B. Availability of new and used EVs ²	●		
	C. Availability of EV models to persons with disabilities	●		
	D. Lack of knowledge and experience with EVs	●		
	E. Ability to charge at home ³	●	☑	
	F. Ability to access EV-charging support programs	●		
	G. Ability to use public charging	●		
	H. Cost and time burden to use public charging	●		

1. Rating system: critical, moderate, low

2. Barrier is critical for **used** EVs, low for new EVs; 3. Barrier is critical for **multi-family** buildings.

Conclusion and Next Steps

The research and engagement results summarised in this eMobility technical report reveal that:

- 1. Significant barriers stand in the way of eMobility** in Nanaimo, particularly for equity-deserving groups.
- 2. The City can play an important role** in addressing some of these barriers and supporting more equal access for all community members.
- 3. Further research and engagement is needed** to assess what strategies and actions should be implemented to achieve City goals.

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Appendix 1. Engagement Summary

Process

E-mobility interest, barriers, and potential roles for the City were explored through a multi-part **engagement** process, including:

Interviews

Engaged with **three equity-deserving groups**

Interviewed **seven e-bike users and non-users**, completed by **City staff**

City staff workshop

Seven staff participated across multiple departments

Mail survey

292 responses from City residents.

Statistics will be accurate within 5.7% 19 times out of 20

Public survey

248 responses via Get Involved Nanaimo

Survey analysis led by **City staff**

Engagement Best Practices for Mobility and EV Equity

1

Engage with underserved communities: Identify the mobility needs of specific equity-deserving communities by engaging and collaborating with community-based organizations and advocacy groups. Engaging with groups promoting racial equity and environmental justice can ensure that innovative programs are implemented successfully.

2

Build trust: Decision-makers should foster relationships with community leaders and grassroots organizations to build trust. Engagement efforts should be led by public agencies (including cities) and supported with facilitators that understand or are part of the community being engaged. Cities should follow up and establish continued communications.

3

Compensate time and expertise: Cities and private sector partners should dedicate funding and up-front incentives to pay representative organizations and community leaders to provide input.

4

Design engagement for accessibility: Mobility needs assessment can take many different forms, such as community meetings, surveys or online forums. Include a mix of digital and analog engagement strategies and tools.



**Engagement
Summary**

Interviews

Equity-Deserving Communities for Engagement

The groups and communities identified below face many barriers to participating in e-mobility broadly and are recommended for further engagement to better understand barriers and needs in the Nanaimo region. Local organizations that serve and could represent these communities are noted below for engagement.

	E-Micromobility Barriers	EV Barriers	Organizations for Engagement
Low-income people and families	<ul style="list-style-type: none"> Access to travel routes & infrastructure Safe travel routes & infrastructure Affordability 	<ul style="list-style-type: none"> Ability to install home charging Ability to use home charging Greater time and cost burden Lower access to programs Affordability 	<p>1°: Centre for Family Equity</p> <p>2°: Ballenas Housing Society</p>
Racialized people and communities	<ul style="list-style-type: none"> Access to travel routes & infrastructure Safe travel routes & infrastructure Accessibility, comfort, ability and familiarity 	<ul style="list-style-type: none"> Ability to install home charging Ability to use charging Greater time and cost burden Lower access to programs 	<p>1°: Central Vancouver Island Multicultural Society</p> <p>1°: Tillicum Lelum Aboriginal Friendship Centre</p> <p>2°: Centre for Family Equity</p>
Renters and residents of MURBs	<ul style="list-style-type: none"> Access to secure e-mobility parking and charging 	<ul style="list-style-type: none"> Ability to install home charging Greater time and cost burden Lower access to programs 	<p>1°: Ballenas Housing Society</p> <p>2°: Central Vancouver Island Multicultural Society</p>
People with disabilities	<ul style="list-style-type: none"> Access to travel routes & infrastructure Safe travel routes & infrastructure Accessibility, comfort, ability and familiarity 	<ul style="list-style-type: none"> Ability to use charging Affordability Accessibility of available EV models 	<p>1°: Nanaimo Disability Resource Centre</p> <p>2°: Ballenas Housing Society</p> <p>2°: Centre for Family Equity</p>

Local Organizations for Equity-Focused Engagement

We were able to connect with three of the four contacted organizations, including two 45-minute interviews and one email engagement.

Centre for Family Equity

Communities: Low-income people, including intersection with racialized and Indigenous people, people with disabilities and seniors.

Engagement method: 45-minute interview conducted by Ali Rivers (Dunsky) and attended by Hannah Groot (City of Nanaimo) via Teams virtual platform

Contact: Viveca Ellis, Executive Director,
viveca@centreforequity.ca

Central Vancouver Island Multicultural Society

Communities: Newcomers and refugees, including racialized people and non-English speakers; renters

Engagement method: 45-minute interview conducted by Ali Rivers (Dunsky) via phone

Contact: Mikaela Torres, Executive Director,
mtorres@cvims.org

Tillicum Lelum Aboriginal Friendship Centre

Communities: Indigenous people and communities (*within the broader racialized communities' group*)

Engagement method: None. Our primary contact was on vacation from mid-June to July 2 (almost the full engagement period) and attempts to contact colleagues were not successful.

Contact: Inga Cooper, Program Director,
icooper@tillicumlelum.ca

Ballenas Housing Society

(formerly Nanaimo Affordable Housing Society)

Communities: Renters and residents of MURBs; low-income people and families, people with disabilities and seniors.

Engagement method: Ballenas did not have the capacity within the timeframe for a 45-minute interview. They provided some feedback via email.

Contact: Andrea Blakeman, Chief Executive Officer,
andrea.blakeman@ballenas.ca

Local Organizations for Equity-Focused Engagement

The four community-based groups and organizations below provide services and opportunities to identified priority equity-deserving communities in Nanaimo and are recommended for engagement:

Centre for Family Equity

Purpose: Address family poverty in BC. Carry out community-engaged research... and propose evidence-based public policy solutions.

Relevance to equity and project: Examine and tackle systemic discrimination and poverty that may be rooted in a combination of: racialized identity, Indigeneity, gender identity, trans identity, sexual orientation, health and mental health status, social class, marital status, religion, ability, age, newcomer and refugee status.

Communities: Low-income people, including intersection with racialized and Indigenous people, people with disabilities and seniors.

Central Vancouver Island Multicultural Society

Purpose: Provide support to newcomers and refugees. Community-based agency that works to ensure that all those in our diverse community have equitable access to its services and opportunities.

Communities: Racialized people and communities; non-English speakers; renters

Tillicum Lelum Aboriginal Friendship Centre

Purpose: Promotes justice, fairness and equality for Aboriginal people through a holistic approach to programming and services.

Communities: Indigenous people and communities *(within the broader racialized communities' group)*

Ballenas Housing Society

(formerly Nanaimo Affordable Housing Society)

Purpose: To develop and operate well-maintained rental housing for people with low to moderate income, persons with disabilities and small families, while promoting inclusive and diverse communities.

Communities: Renters, residents of MURBs, low-income people and families, people with disabilities, seniors.

Local Organizations for Equity-Focused Engagement

The community organization below is recommended if the City chooses to engage with additional community-based organizations during this phase.

Nanaimo Disability Resource Centre

Purpose: Non-profit organization that offers programs and services to provide greater independence and community connection for persons with disabilities and seniors.

Communities: People with disabilities, seniors

To note: Two organizations selected for engagement directly support and serve people with disabilities in Nanaimo and the surrounding region through an intersectional approach to their work and services:

- Centre for Family Equity
- Ballenas Housing Society

Check-in on Engagement Best Practices

1

Engage with underserved communities: Identify the mobility needs of specific equity-deserving communities by engaging and collaborating with community-based organizations and advocacy groups. Engaging with groups promoting racial equity and environmental justice can ensure that innovative programs are implemented successfully.

- **Check-in:** Dunsky engaged with three organizations representing and supporting equity-deserving communities in Nanaimo, the RDN and/or BC. Two of these organizations directly work to support and promote racial equity.

2

Build trust: Decision-makers should foster relationships with community leaders and grassroots organizations to build trust. Engagement efforts should be led by public agencies (including cities) and supported with facilitators that understand or are part of the community being engaged. Cities should follow up and establish continued communications.

- **Check-in:** Dunsky's experience and initial project research allowed our team to better understand the systemic barriers preventing or limiting e-mobility in equity-deserving communities going into the engagement process. Dunsky researched each organization in advance - including its mission, services and client communities - to educate ourselves. Building trust now lies in the hands of the City.

3

Compensate time and expertise: Cities and private sector partners should dedicate funding and up-front incentives to pay representative organizations and community leaders to provide input.

- **Check-in:** Dunsky provided both organizations that participated in a 45-minute interview with a \$100 honorarium. In each case, payment was provided promptly and via the preferred method of the organization.

4

Design engagement for accessibility: Mobility needs assessment can take many different forms, such as community meetings, surveys or online forums. Include a mix of digital and analog engagement strategies and tools.

- **Check-in:** Together, Dunsky and the City of Nanaimo provided many options for engagement including phone and virtual interviews, email feedback, targeted mailed surveys with paper and online options, a public online survey and in-person engagement.

Key interview findings – Centre for Family Equity

Low-income people and families

E-Micromobility Barriers

Affordability

- Upfront cost of e-devices

Access to Secure Parking

- MURBs and older homes with stairs and/or no private or secure outdoor storage space increases risk of theft.

Safety

- Aggressive policing of transit systems and public places, common locations for e-micromobility services/options, creates personal safety risks. Risk is higher for racialized people, people experiencing homelessness, low-income people and youth.
- Lack of infrastructure for safe active transport.
- Lack of knowledge of how and where to use devices.

Accessibility, Comfort, Ability and Familiarity

- Heavier, bulkier e-devices combined with difficult home parking/storage (e.g., stairs, no private outdoor space). This barrier is compounded for people with a physical disability, seniors, single parents, parents of young children
- Shared service models that require credit cards or high credit ratings are a barrier.

EV Barriers

General

- CFE does not consider EVs as an equitable or priority piece of a sustainable mobility transition. Rather, transit and active transport (include e-micromobility) are the key priorities.
- CFE noted that, broadly, the families they work with do not have EVs.

Affordability

- No or lower access to cars more broadly. If have a car, often older/used, and financial priority is keeping it working not upgrades
- EVs are “elitist”.
- The financial barriers of car – including EV – ownership systematically prevent EVs from being a realistic option for low-income individuals and families.
- The lack of used EVs is then an additional barrier for those who do have cars and would consider EVs.

Lower Access to Programs

- Existing programs are deeply inequitable. They require upfront capital and equity and are designed for wealthy people.
- EV incentives are not sufficient.

Culture

- Culture of driving among affluent families, not transit or active transport

City Role and Ideas

Infrastructure

- Active transport (routes, parking) & electrical (public charging, housing)
- Purpose-built transit-adjacent affordable housing that provides shared options (e.g., bike, scooter, carshare) so that people can be users of the system and not builders or purchasers of the system

Programs/Incentives

- Shared models for e-micromobility and carshare; remove the need for upfront capital and design equitably (cost, non-credit card payment option, combined transit/e-mobility pass/fares)
- Income-qualified e-bike incentive:
 - IQ process and option should not be onerous, privacy-violating or stigmatizing
 - Large enough incentive, e.g., >50% of cost
- Youth access: nurture existing interest in e-devices and focus on safety and getting youth out of cars (culture change)
- Multi-modal programs (e.g., combined with transit)

Information and Training

- Supporting youth knowledge/training on e-micromobility devices (e.g., how to use, where to use, how to stay safe).
- Work with school boards, transit operators

Policy

- Safe air zones outside schools (anti-idling)

Advocacy

To the Province for increased municipal funding from Ministry of Transport to create centralized funding that municipalities can access for diverse programming suited to local needs and realities.

Key interview findings - CVIMS

Newcomers and refugees; non-English speakers; racialized persons

E-Micromobility Barriers

Affordability

- Upfront cost of e-devices

Access to Secure Parking

- MURBs and older homes with stairs and/or no private or secure outdoor storage space increases risk of theft.
- Lack of public storage/charging infrastructure.
- New construction policies (e.g., required e-bike charging/storage) would not affect majority of CVIMS clients who live and/or rent in older homes and MURBs and stratas; retrofits larger priority.

Safety

- Less knowledge of policies, regulations and social norms can lead to safety risks for users (not wearing helmet; traffic accidents); exacerbated for non-English speakers and newcomers
- Navigating a City or regional map is more challenging for newcomers and non-English speakers, which can lead to safety risks

Accessibility, Comfort, Ability and Familiarity

- Shared service models that require credit cards and/or a certain established credit rating.
- Services that require or assume access to a cell phone or smart phone, as well as the “phone literacy”, comfort and ability to use it to access services.

EV Barriers

General

CVIMS does not see EVs as a priority area of focus for City resources for its clients, given the relative “luxury” of car ownership broadly, and EV ownership specifically. Rather, transit and active transport (include e-micromobility) are important priorities.

Affordability

- No or lower access to cars more broadly.
- The financial barriers of car – including EV – ownership systematically prevent EVs from being a realistic option for many CVIMS clients and families.

Lower Access to Programs

- Existing programs require upfront capital.
- Program materials and processes are often in English, mainly online/phone, and require comfort with Canadian government services and processes.

Accessibility, Comfort, Ability and Familiarity

- EV use/ownership requires a Canadian Drivers License, which newcomers and refugees do not have and may not get/can not get.

City Role and Ideas

Infrastructure

- Active transport infrastructure, including secure parking and charging for e-micromobility devices for people accessing public areas and services (e.g., parks, recreation centres, government services, health services), commercial areas (e.g., malls, shopping areas) and employment (i.e., employers cannot always provide enough space for indoor e-device storage, especially smaller employers with rented spaces)

Programs/Incentives

- Funded education program specific to newcomers to Canada focused on using and operating e-micromobility devices. Ideally, the program would include options for long-term e-micromobility device rentals at reduced or subsidized rates and/or a rent-to-own model and/or incentives to purchase e-micromobility devices.
- Discounted passes for shared e-mobility services similar to rec centre leisure pass discounts.

Information and Training

- Supporting newcomers and non-English speakers in understanding the rules, regulations and cultural norms around e-micromobility device ownership and operation, which may differ from previous countries of residence (e.g., helmet laws; social norms around riding on the sidewalk and/or road, need for licenses, safe travel routes...)

Advocacy

To the Province for how CVIMS clients can transition and integrate into the community of Nanaimo across all City programs and services, including for e-mobility and mobility more broadly.

Key findings – Ballenas (emails)

E-Micromobility Barriers

EV Barriers

City Role

Renters and residents of MURBs

General

- Ballenas noted that there are a “handful” of e-bikes owned by tenants at their locations, meaning e-micromobility use is more common than EV use for low-income renters in their buildings.
- Ballenas provides access to secure parking for e-micromobility devices at many of their housing locations, so access to secure parking is likely not the barrier preventing e-micromobility use and/or ownership for their tenants.

General

- Ballenas confirmed that – despite having charging stations in “many” of their 23 buildings – only one tenant uses EV charging.
- Since Ballenas does provide access to EV charging at many of their housing locations, access to EV charging is likely not the barrier preventing EV use and/or ownership for their tenants.

Infrastructure

- Infrastructure is the top priority
 - Electrical (public charging, adequate services for housing)
 - Active transport (routes, secure public parking)

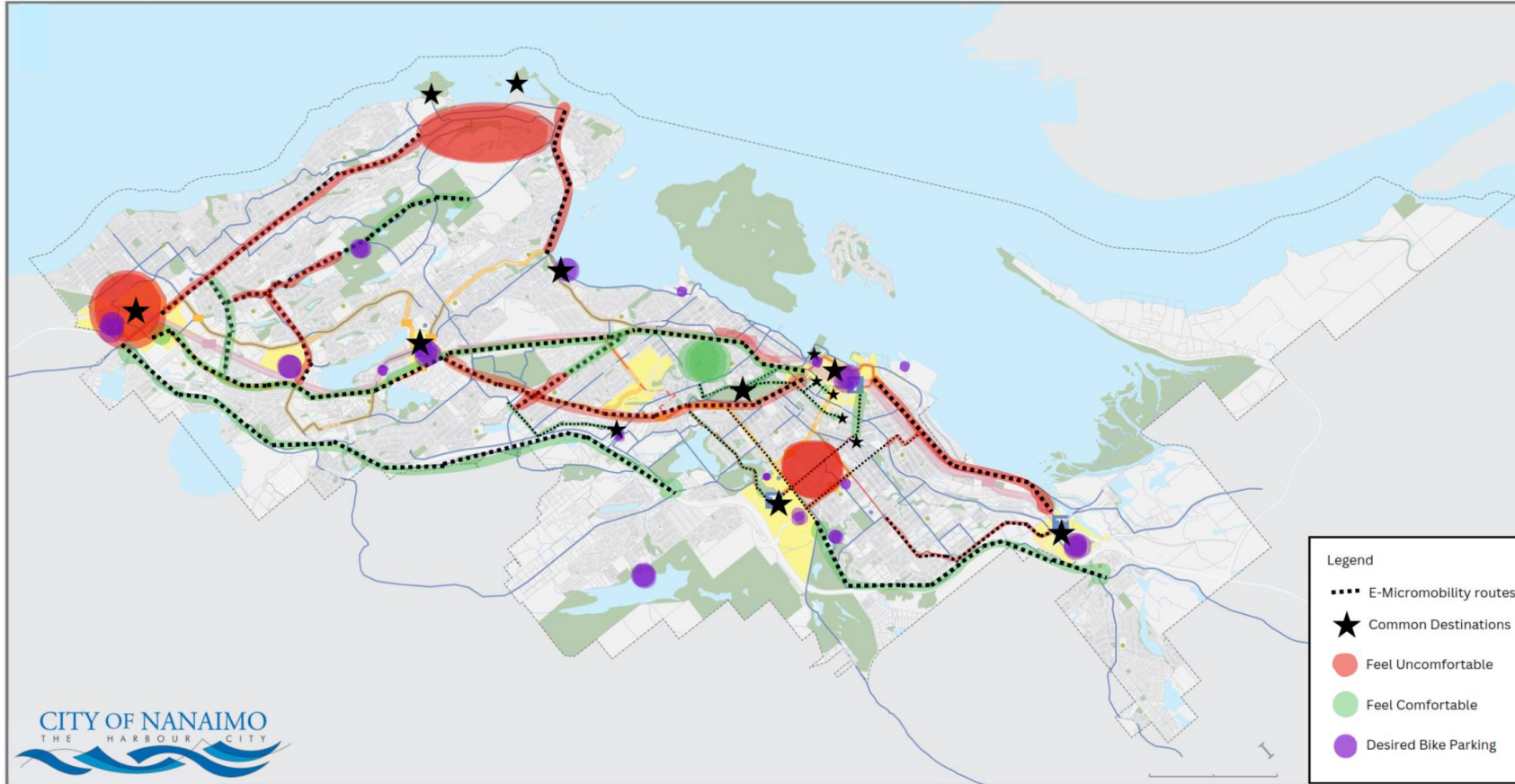
E-Bike Users and Non-Users Engagement

- Interviews with Nanaimo residents were conducted from June 24 to July 5 to build upon the public and mail-out survey. A total of **seven interviews** were conducted with four e-bike users, two non-e-bike users interested in future purchase, and one e-scooter user.
- Key barriers identified in the initial research **broadly aligned** with feedback from e-bike users and non-users, including:
 - Affordability (though some noted that the EVOLVE e-bike pilot improves access and allows people to 'test' e-bikes)
 - Access to safe routes (using dedicated or quieter routes for travel, while avoiding high traffic areas with no or inadequate micromobility infrastructure)
 - Access to secure parking out and about (a lack of secure parking in desired destinations)
 - A lack of secure or easy-to-use parking at home (i.e., a lack of storage or bike storage that is not equipped for e-bike size or weight).

E-Bike Users and Non-Users Engagement

Summary Map of Interviews with E-Micromobility Users

E-Micromobility Routes, Destinations, and Desired Bike Parking Locations



Key Insights

E-bike users were asked to identify the common routes and destinations, summarized in the map to the left.

Interviewees identified multiple locations and routes (shown on map) where they felt uncomfortable or unsafe, which were primarily routes with high traffic, contained little to no bike infrastructure, and had a disconnected network of bike lanes.

One interviewee flagged an e-bike safety benefit of allowing riders more freedom to choose routes with less vehicle traffic, as additional hills or distance is not as major factor as a conventional bike.

Selected Quotes from Interviews

E-bike affordability and access

"That was really fun for me on the opening day of the GobyBike Week was the fact that the EVO **bike share** was there. You could kind of **test the e-bike**, do a little obstacle course that was really engaging and fun and **made me feel confident** to give it a try in the future, which is exactly what I did."

"I think a huge component of [e-bike adoption] would be if the city provided some kind of subsidy, just like the province did to help **support purchasing these bikes.**"

Access to safe routes

"I'd rather go with the E bikes because it doesn't matter, you **can take a detour**. With my regular bike I think I want to probably be on the most direct way, but with the E bike you can go up a hill or do an extra few blocks just to keep it in more of a **safe traffic.**"

"That bike lane is great, but it needs to be 100 feet longer because it eventually just kind of dumps you **out onto the road** and it dumps me out into **oncoming traffic**"

Access to secure and appropriate e-bike parking

"Unless you have two locks, one **you have to find a good bike rack**, which is I find **challenging** at times and then you have to have two bikes locks with you to feel safe to keep your bike there. It would be nice to have **enclosed bike lockers** at these destinations."

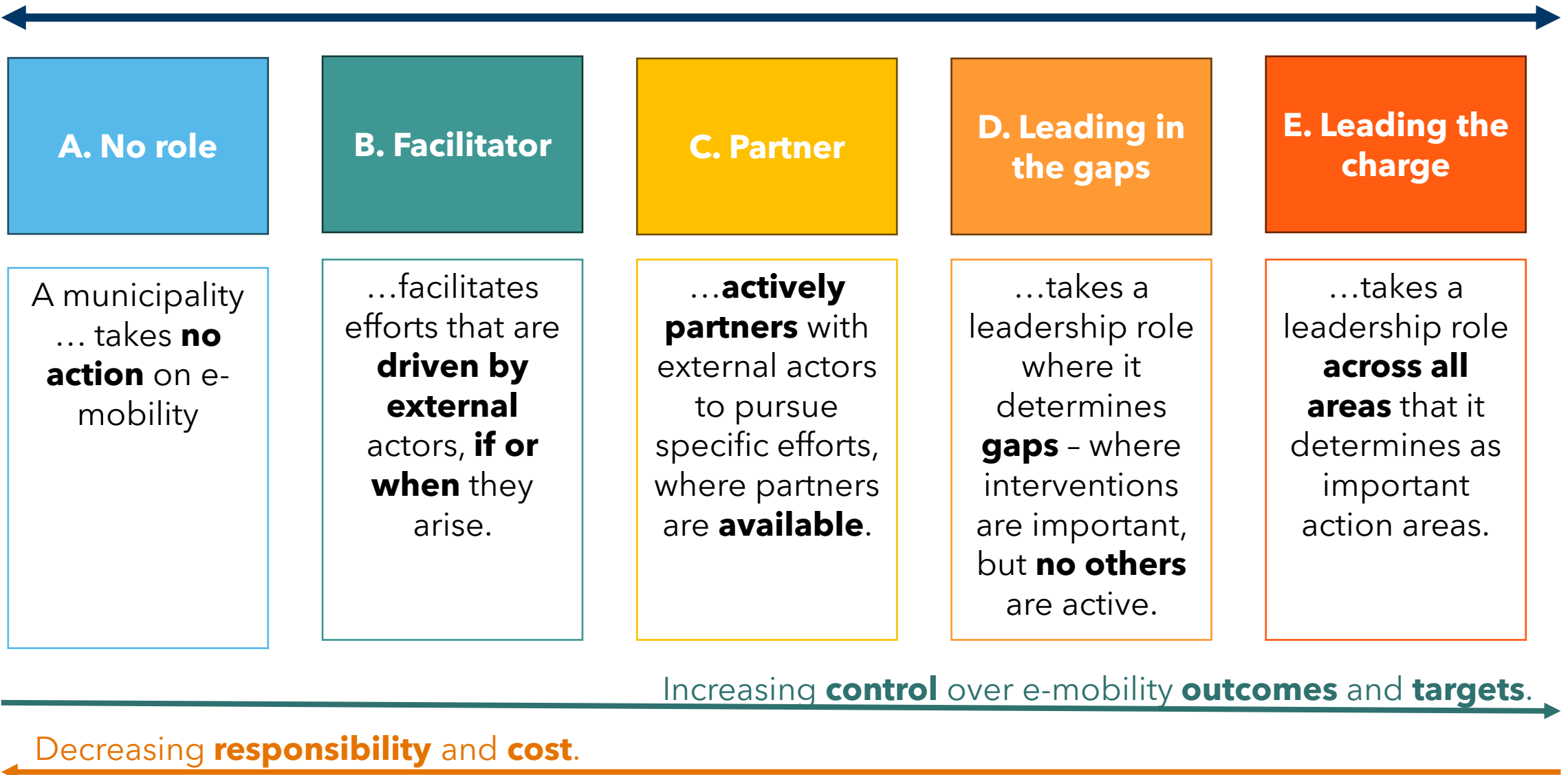
"I've also **injured** myself multiple times, minorly in the bike room because it **is too small**. I have had talked to people who have had bikes fall on them in the bike room and they've been trapped because the bike room is too small."



**Engagement
Summary**

Staff Workshop

Levels of Engagement



Levers of Engagement

A. Regulations

Defining **requirements** to create favourable conditions for e-mobility.

Example:

- Res. EV-Ready requirements in the Off-Street Parking Regulations Bylaw

B. Assets

Leveraging **municipal facilities and land** to support e-mobility

Example:

- E-bike pilot parking areas on City land

C. Development Approval

Integrating e-mobility supports into development **policy** and/or **negotiations**

Potential example:

- Negotiating community benefits incl. EV charging or secure e-micromobility parking

D. Spending

Allocating capital or **operational** budget to support e-mobility

Examples:

- EV Charging top-up rebate to BC Hydro program

E. Advocacy

Advocating to **other levels of government** to take action to support e-mobility.

Potential example:

- Advocating for expanded e-bike or EV charging rebates



Engagement Summary

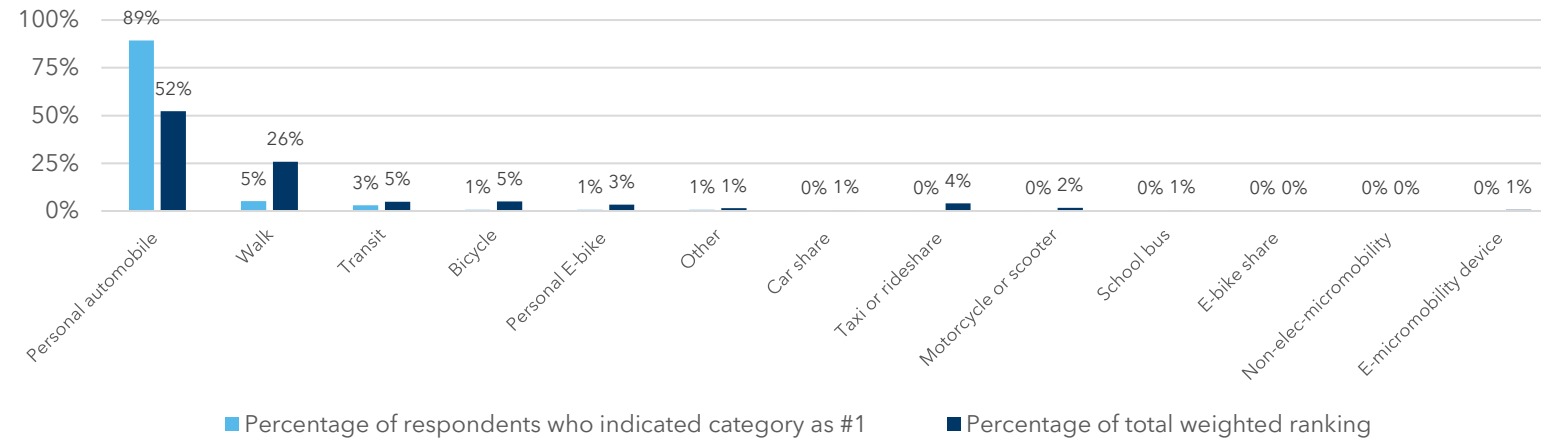
Survey Results: Mail & Public

- A representative mail survey was completed by Discovery Research based on questions developed by Dunsky in collaboration with City staff and Stuckless. The survey was completed from mid-June to early-July 2024.
- The survey covered both City and regional residents. The following summary and all graphs included in the main report include responses from **City residents only**.
- The survey received **292 responses** and the statistics will be accurate **within 5.73% 19 times out of 20** for all questions that were completed by all 292 respondents. Some questions saw lower response rates. As a rule of thumb, questions with responses under 100 should be interpreted with caution because any one response starts to have an outsized effect on the percentages.

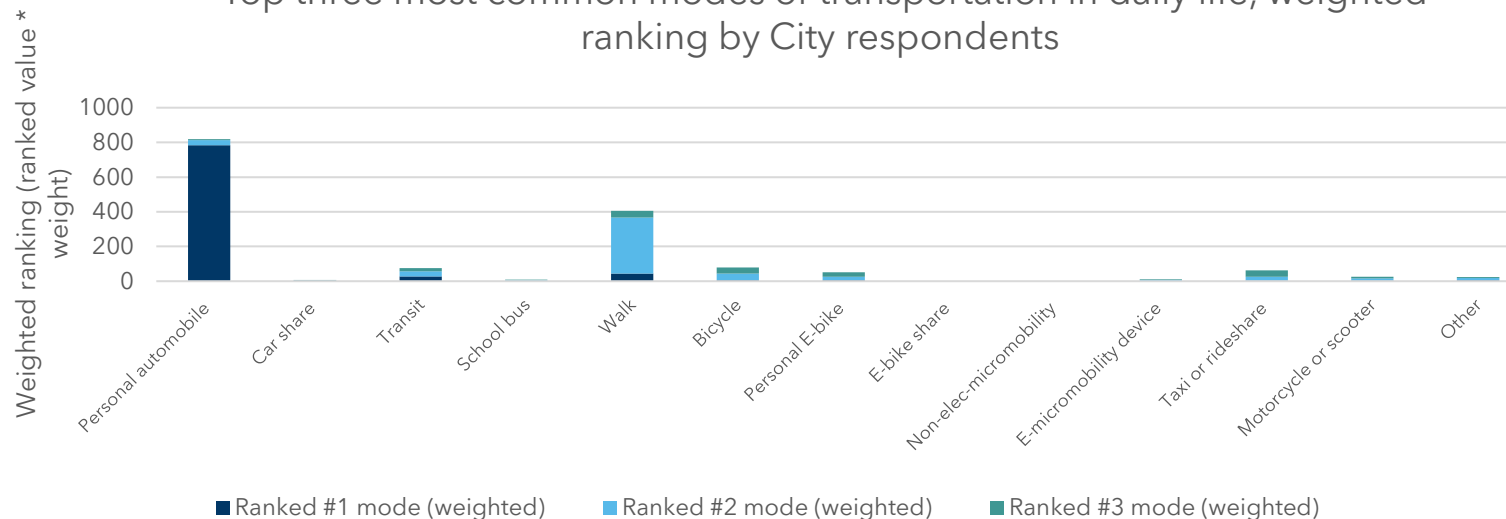
- The **general trends** found in the mail survey were also found in the public survey.
- **Key differences include:**
 - Respondents tended to have high e-mobility user (higher levels of e-bike and EV ownership).
 - Respondents also use or would use e-micromobility at higher rates for commuting compared to the public survey.
- The public survey is not statistical and therefore, statistical representative statistics **cannot** be applied.

Q1: Most Common Mode: Mail Survey

Most common mode of transportation in daily life, by percentage of City respondents and total weighted ranking



Top three most common modes of transportation in daily life, weighted ranking by City respondents



Question: Could you rank the top three most used modes of transportation in your daily life? The item ranked #1 should be the most commonly used mode.

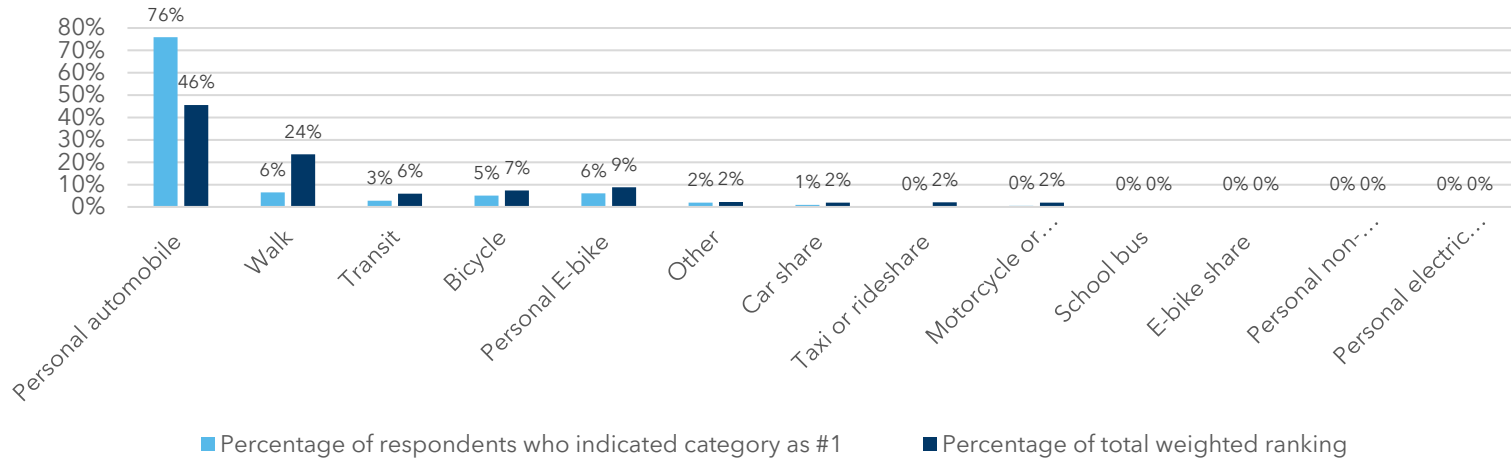
Responses: 292

Respondents were asked to rank their three most common modes of transportation in daily life.

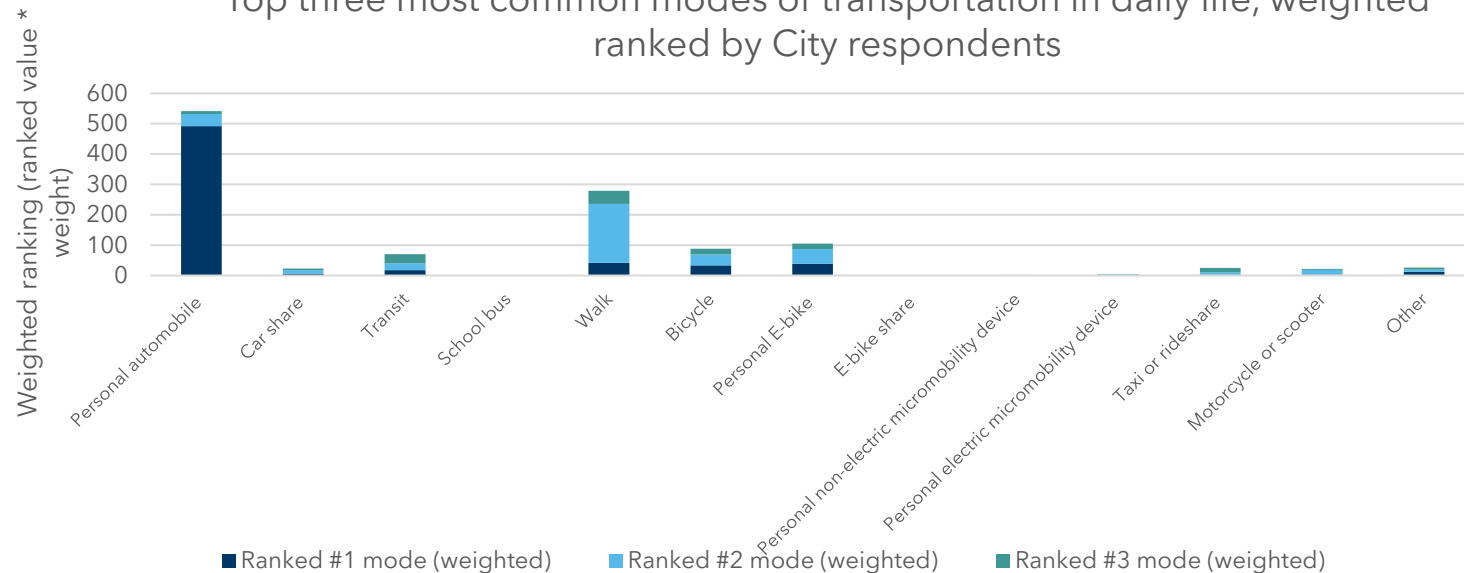
- The **top** graph shows the percentage of respondents who ranked the mode as #1 and the percentage of the total weighted ranking (i.e., the percentage of the bottom graph).
- The **bottom** graph shows how the relative importance of each mode based on the weighting in the ranking. The value is based on the number of respondents who ranked the mode, with higher ranks receiving higher weights (i.e., a mode ranked #1 receives more weight than the same mode ranked #3).

Q1: Most Common Mode: Public Survey

Most common mode of transportation in daily life, by percentage of City respondents and total weighted ranking



Top three most common modes of transportation in daily life, weighted ranked by City respondents



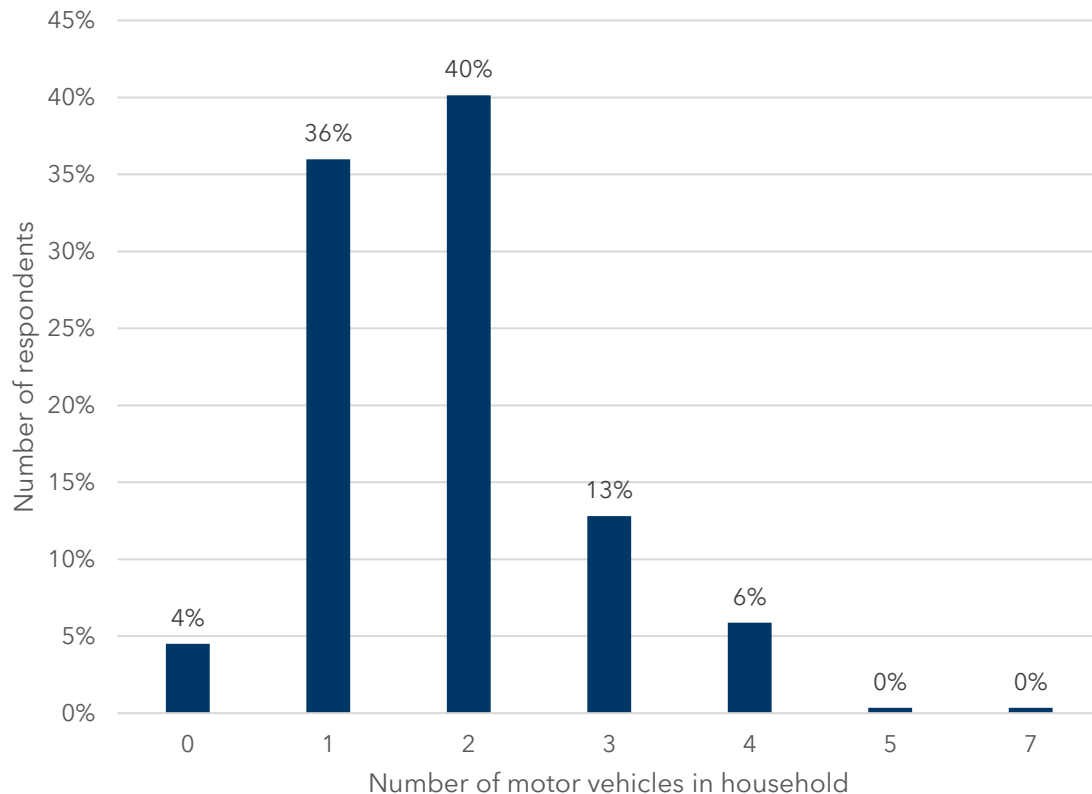
Question: Could you rank the top three most used modes of transportation in your daily life? The item ranked #1 should be the most commonly used mode.

Responses: 216

Q2: Number of Vehicles

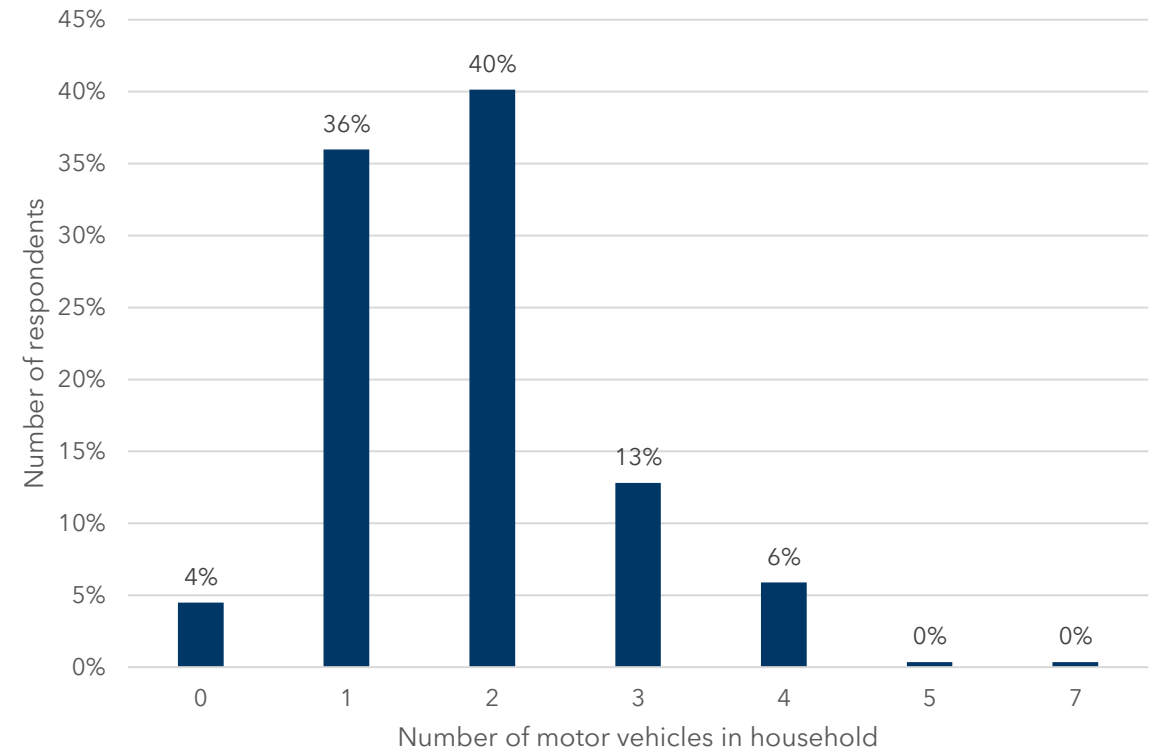
Question: How many licensed (insured) motor vehicles (including cars, light trucks, vans and motorcycles) are available to the members of your household, including yourself?

Number of licensed motor vehicles available to members of household, mail survey



Responses: 298

Number of licensed motor vehicles available to members of household, City respondents, public survey



Responses: 216

Q3: Type of Vehicles

Question: How many of the motor vehicles listed above are the following types: hybrid, Plug-in Hybrid, Battery Electric, Gasoline or Diesel.

Mail

Vehicle Type	Number of vehicles	Percent of all vehicles
Plug-in hybrid	13	2.5%
Battery electric	23	4.3%
All EV (PHEV + BEV)	36	6.8%
Total vehicles (from Q2)	527	100%

Responses: 284

Public

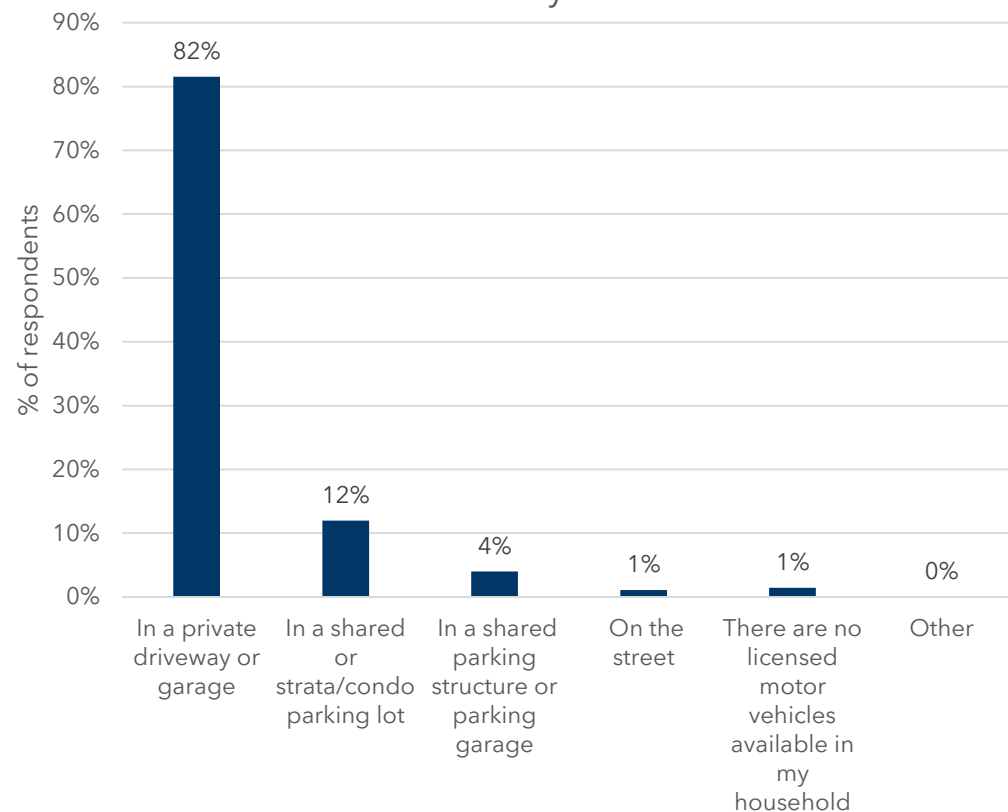
Vehicle Type	Number of vehicles	Percent of all vehicles
Plug-in hybrid	9	2%
Battery electric	51	13%
All EV (PHEV + BEV)	60	15%
Total vehicles (from Q2)	389	100%

Responses: 213

Q4: Vehicle Parking

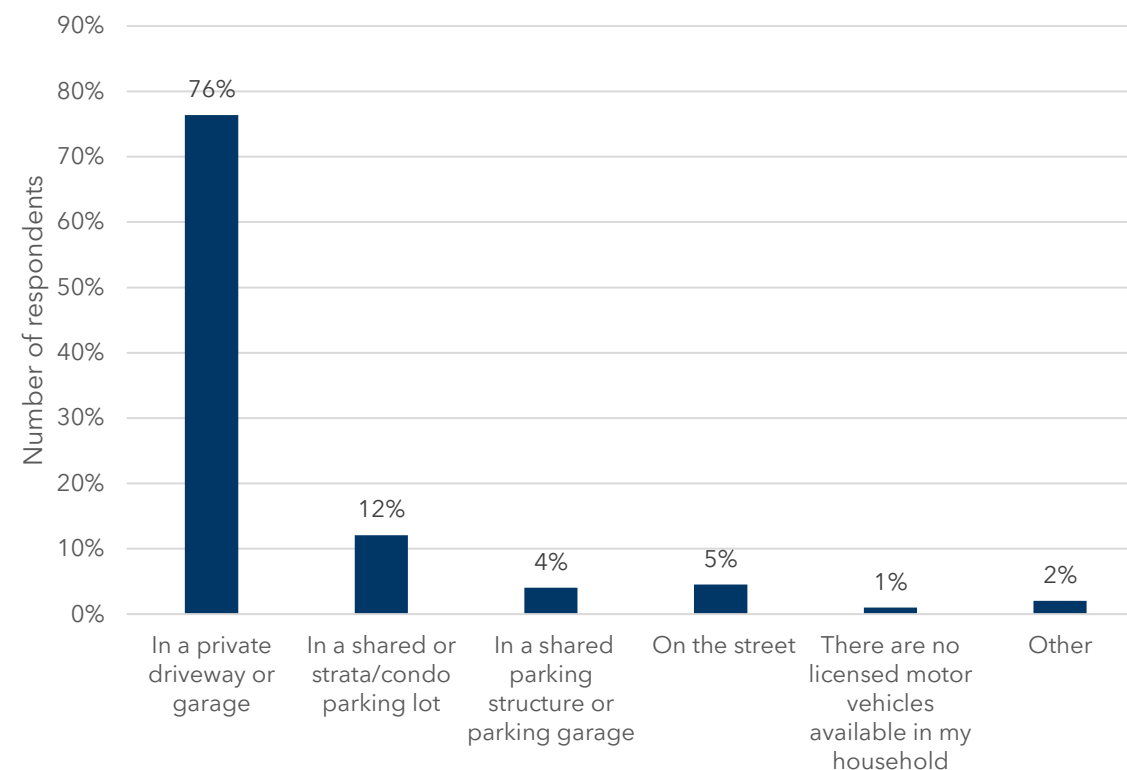
Question: If your household has a licensed motor vehicle, where is the vehicle typically parked?

Typical parking location of motor vehicle, mail survey



Responses: 276

Typical parking location of motor vehicle, public survey

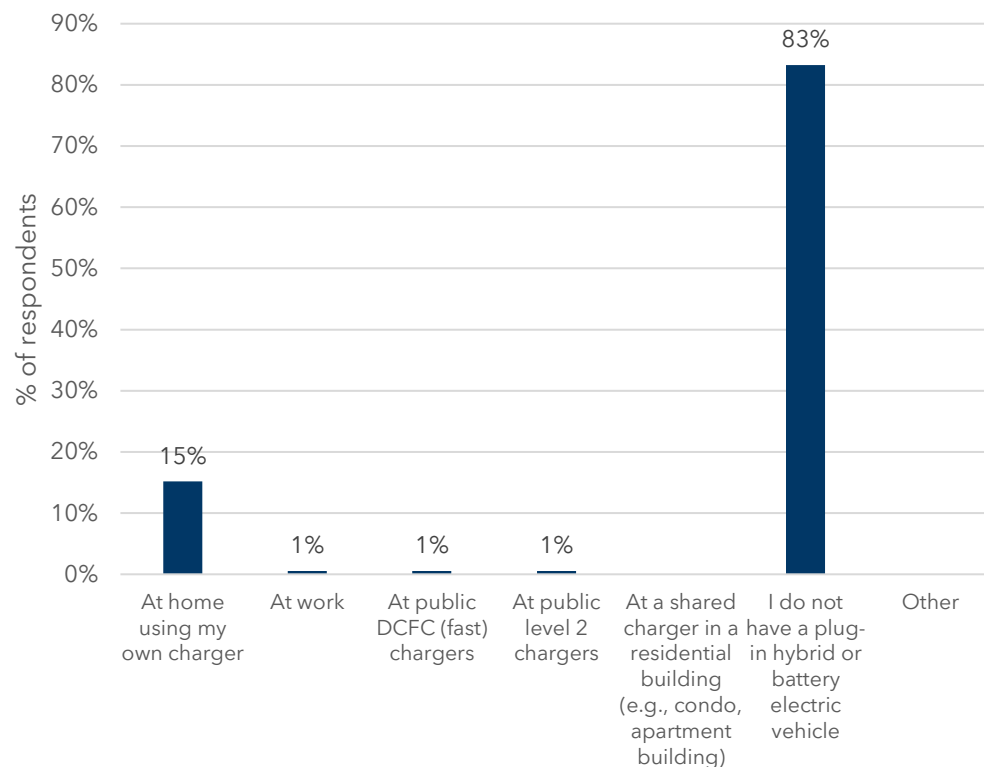


Responses: 199

Q5: EV Charging Location Parking

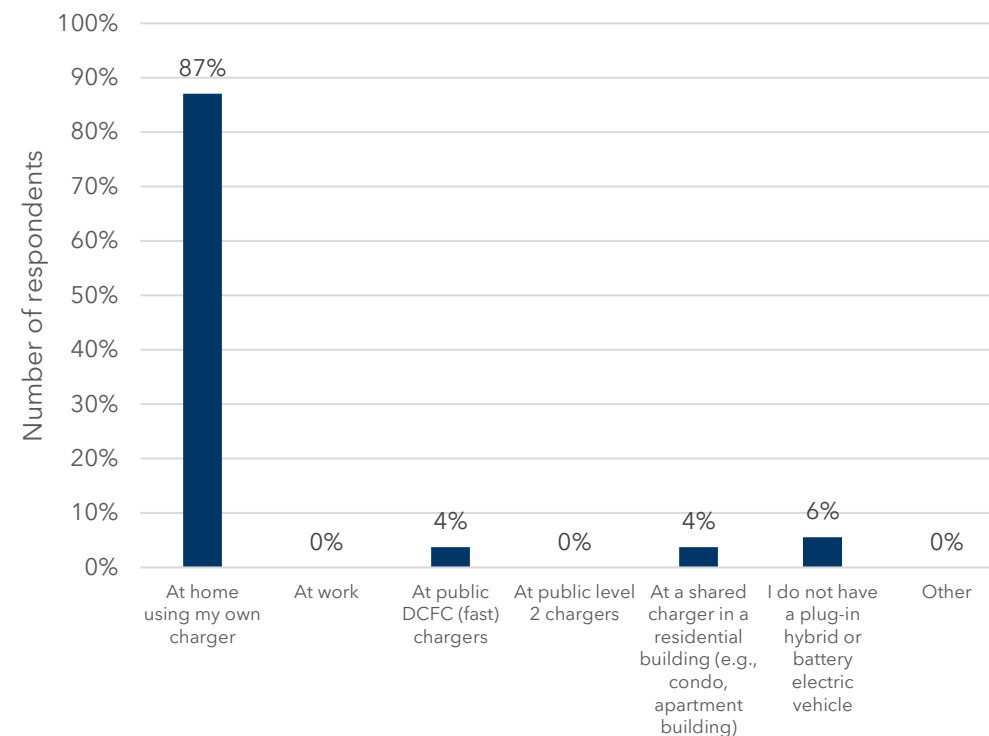
Question: If your household has a plug-in hybrid or battery electric vehicle, where is the vehicle primarily charged for daily use?

Primary EV charging location, mail survey



Responses: 191

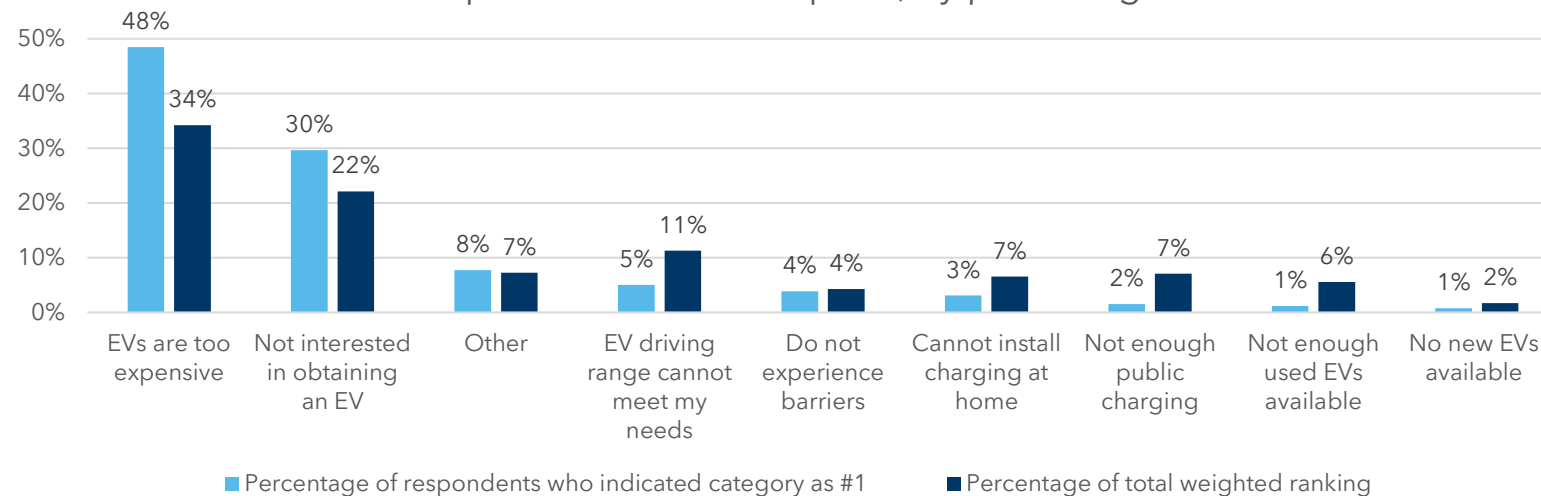
Primary EV charging location, public survey



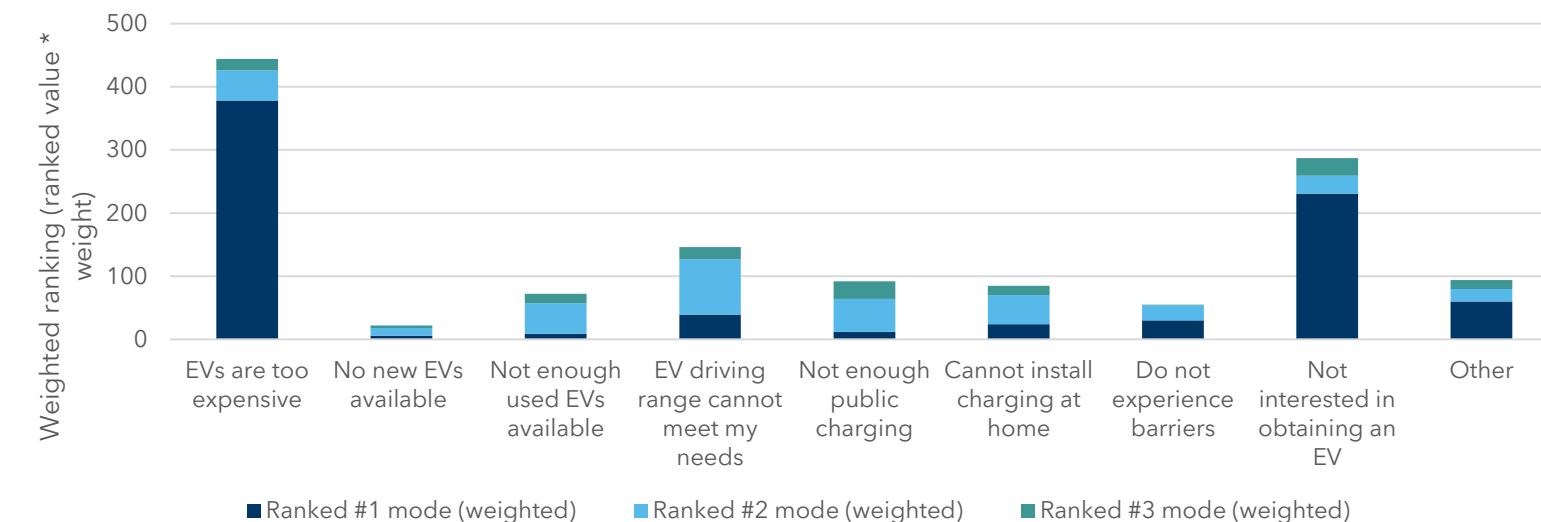
Responses: 54

Q6: EV Barriers: Mail Survey

Top Barriers to EV Adoption, by percentage



Top Barriers to EV Adoption, weighted ranking



Question: If your household does not have a plug-in hybrid or battery electric vehicle, could you rank the top three barriers to your household obtaining an electric vehicle (i.e., plug-in hybrid or battery electric vehicle)? The item ranked #1 should be the greatest barrier.

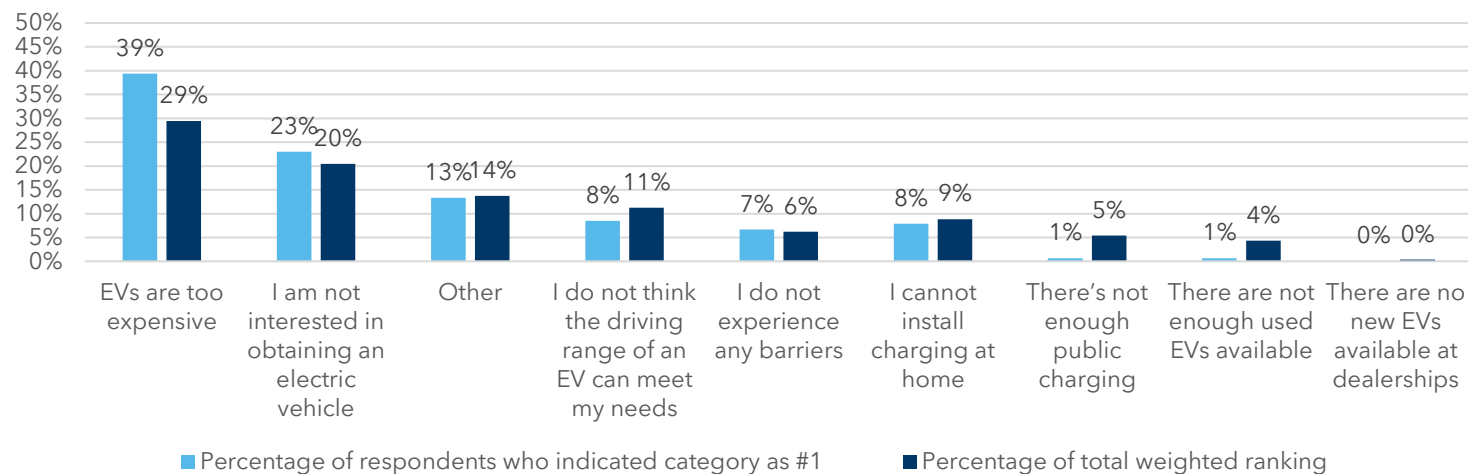
Responses: 260

Respondents were asked to rank their three top categories:

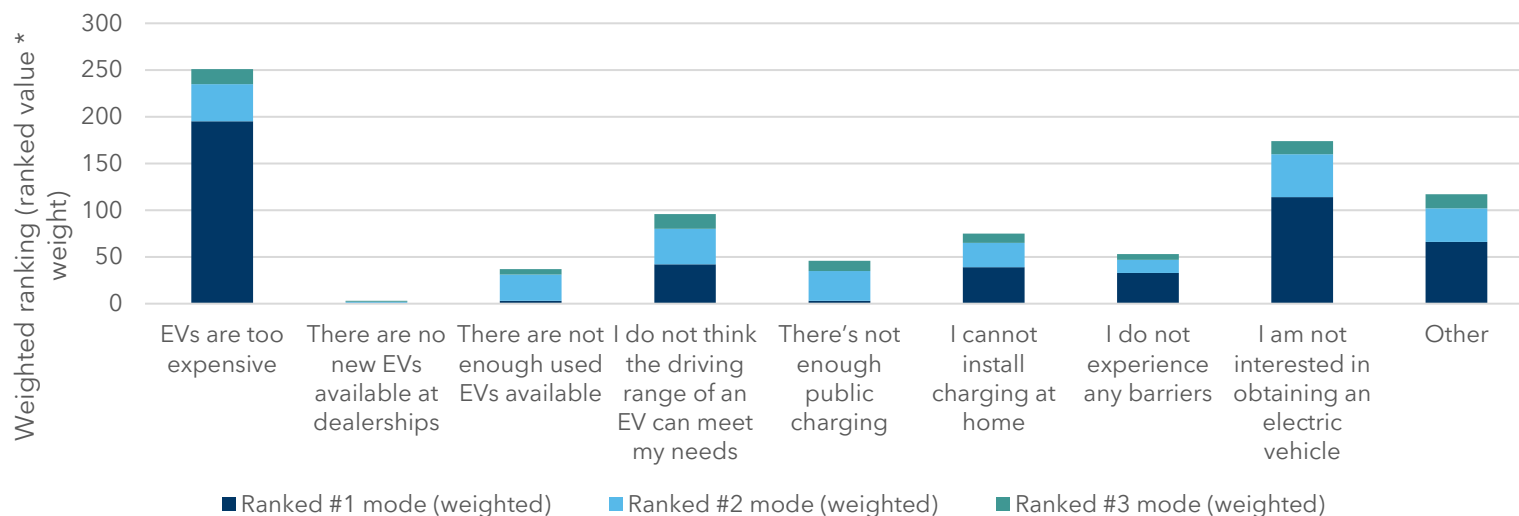
- The **top** graph shows the percentage of respondents who ranked the category as #1 and the percentage of the total weighted ranking (i.e., the percentage of the bottom graph).
- The **bottom** graph shows how the relative importance of each category based on the weighting in the ranking. The value is based on the number of respondents who ranked the category, with higher ranks receiving higher weights (i.e., a category ranked #1 receives more weight than the same category ranked #3).

Q6: EV Barriers: Public Survey

Top Barriers to EV Adoption, by percentage



Top Barriers to EV Adoption, weighted ranking



Question: If your household does not have a plug-in hybrid or battery electric vehicle, could you rank the top three barriers to your household obtaining an electric vehicle (i.e., plug-in hybrid or battery electric vehicle)? The item ranked #1 should be the greatest barrier.

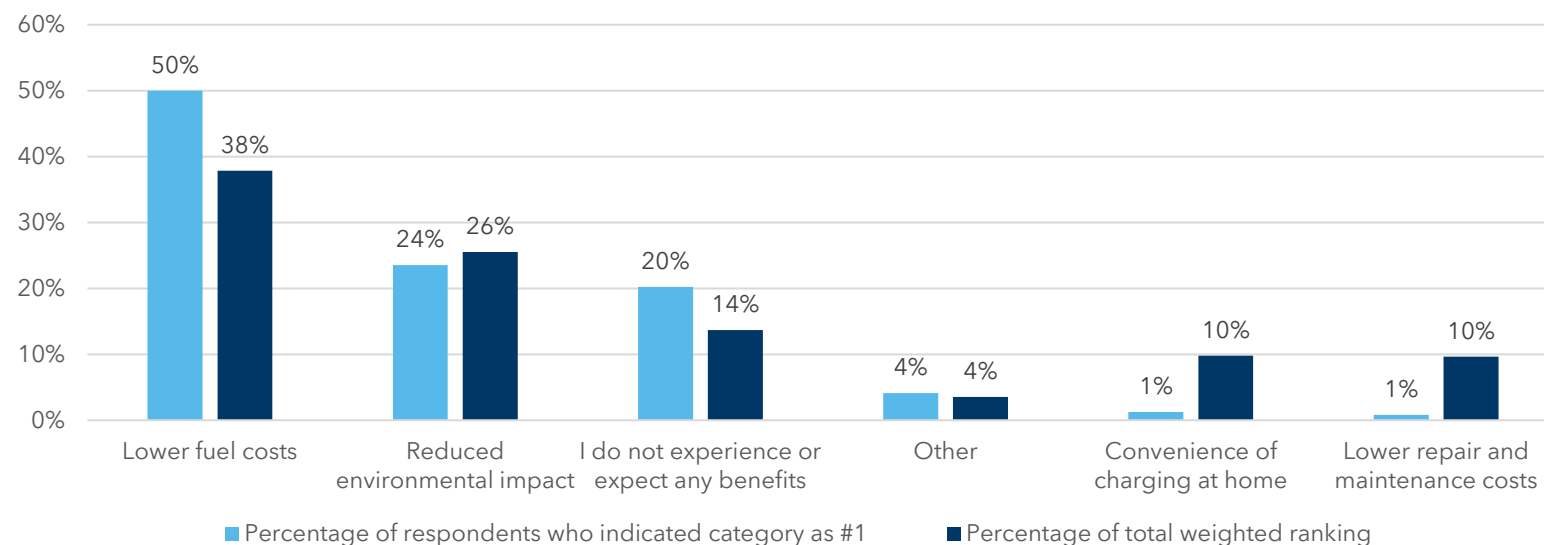
Responses: 165

Respondents were asked to rank their three top categories:

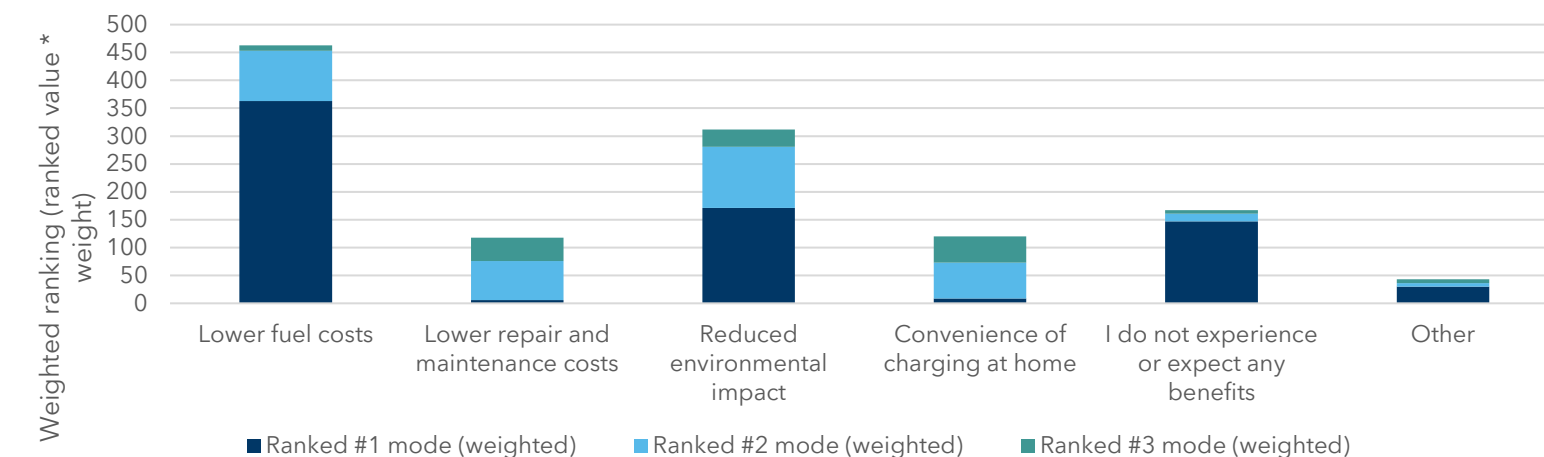
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Q7: EV Benefits: Mail Survey

Top three benefits you experience or you expect



Top three benefits you experience or you expect weighted rank



Question: Could you rank the top three benefits you experience (if you own plug-in hybrid or battery electric vehicles), or you expect (if you obtain a plug-in hybrid or electric vehicle in the future). The item ranked #1 should be the greatest benefit.

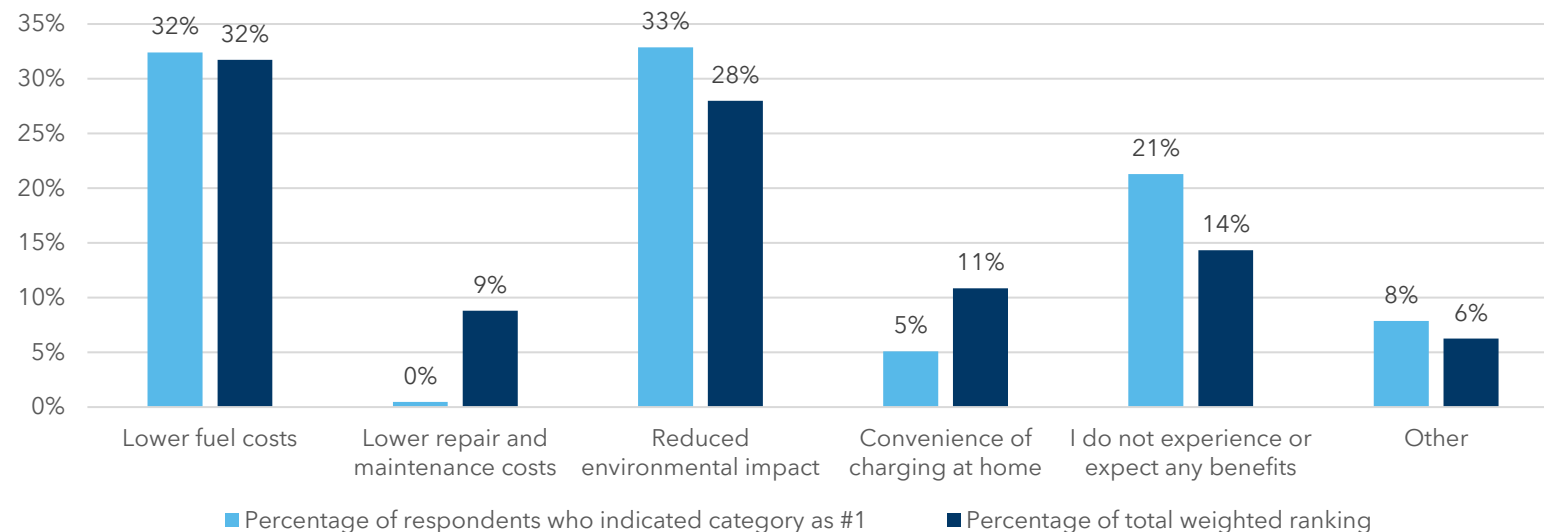
Responses: 242

Respondents were asked to rank their three top categories:

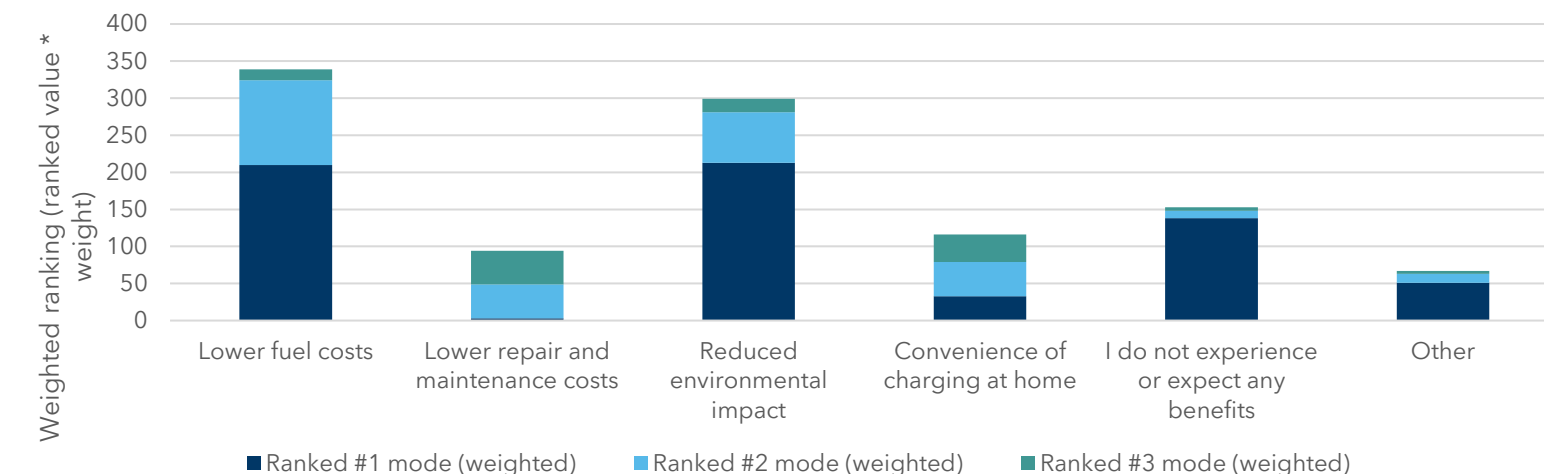
- The **top** graph shows the percentage of respondents who ranked the category as #1 and the percentage of the total weighted ranking (i.e., the percentage of the bottom graph).
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Q7: EV Benefits: Public Survey

Top three benefits you experience or you expect



Top three benefits you experience or you expect, weighted rank



Question: Could you rank the top three benefits you experience (if you own plug-in hybrid or battery electric vehicles), or you expect (if you obtain a plug-in hybrid or electric vehicle in the future). The item ranked #1 should be the greatest benefit.

Responses: 216

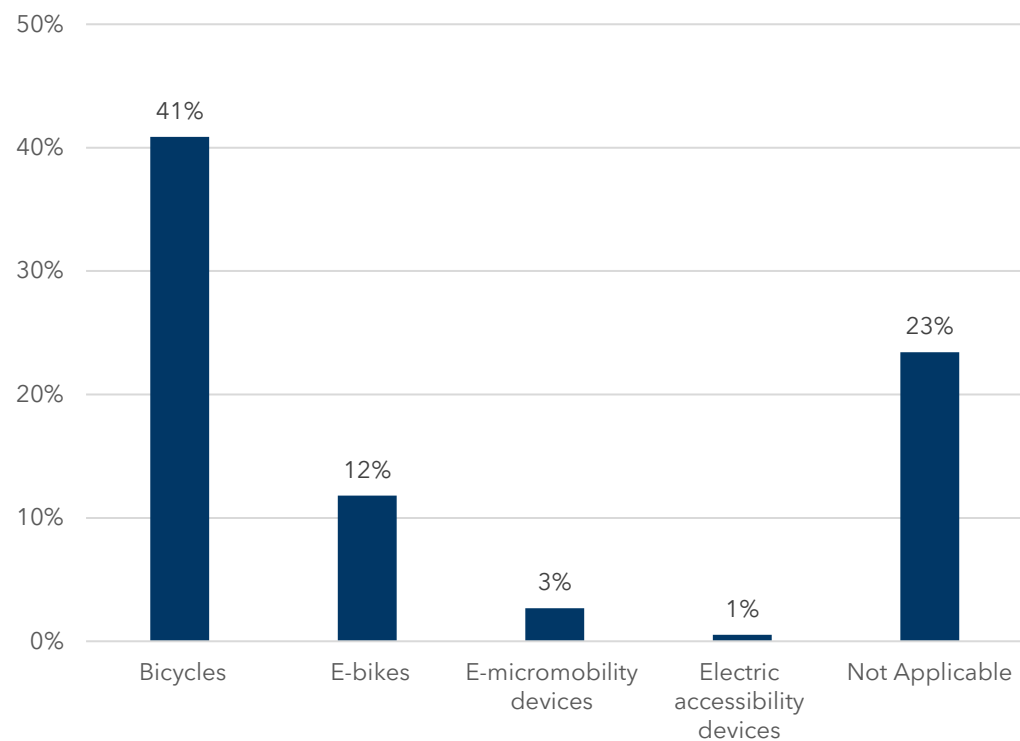
Respondents were asked to rank their three top categories:

- The **top** graph shows the percentage of respondents who ranked the category as #1 and the percentage of the total weighted ranking (i.e., the percentage of the bottom graph).
- The **bottom** graph shows how the relative importance of each category based on the weighting in the ranking. The value is based on the number of respondents who ranked the category, with higher ranks receiving higher weights (i.e., a category ranked #1 receives more weight than the same category ranked #3).

Q8: Micromobility Modes

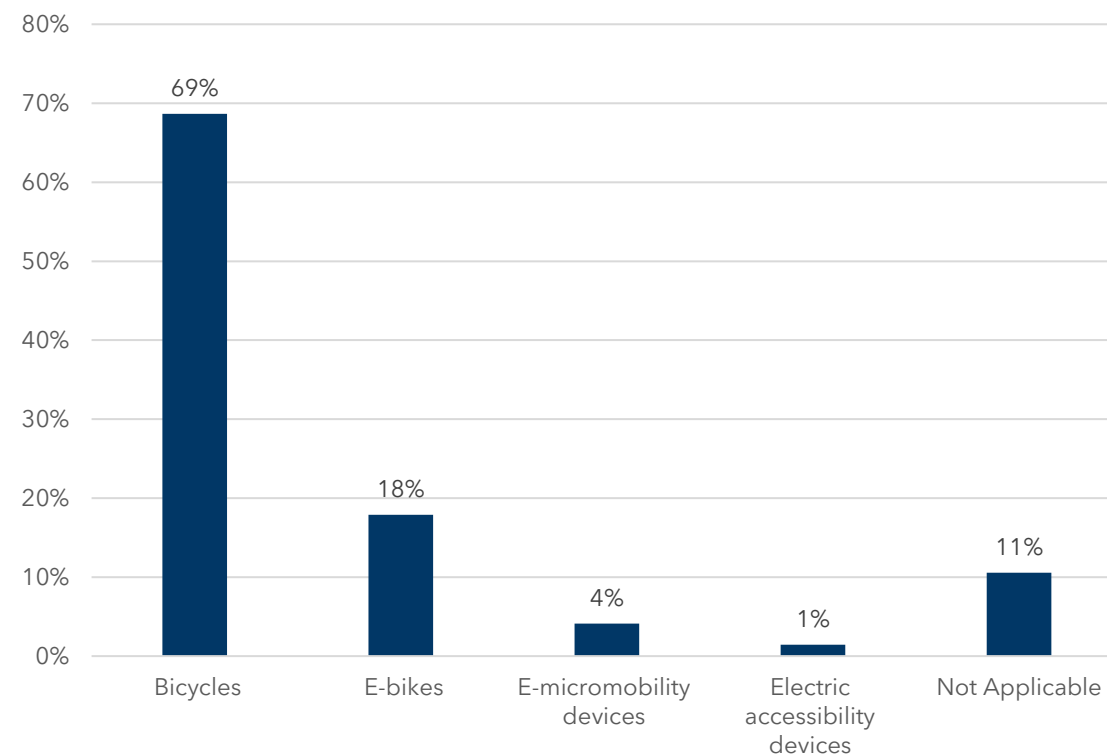
Question: How many working children's and adult bicycles and electric bicycles (e-bikes) are available to members of your household, including yourself? How many electric micromobility devices such as e-scooters, e-skateboards, hoverboards? How many electric accessibility devices?

Percentage of adult (16+) population with access to mode, mail survey



Responses: 286

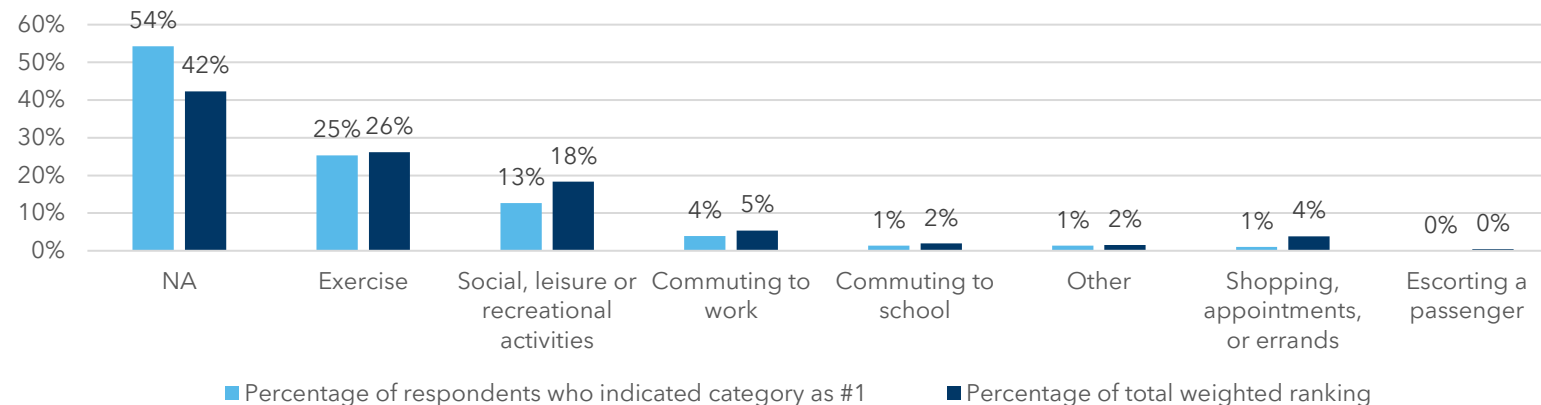
Percentage of adult (16+) population with access to mode, public survey



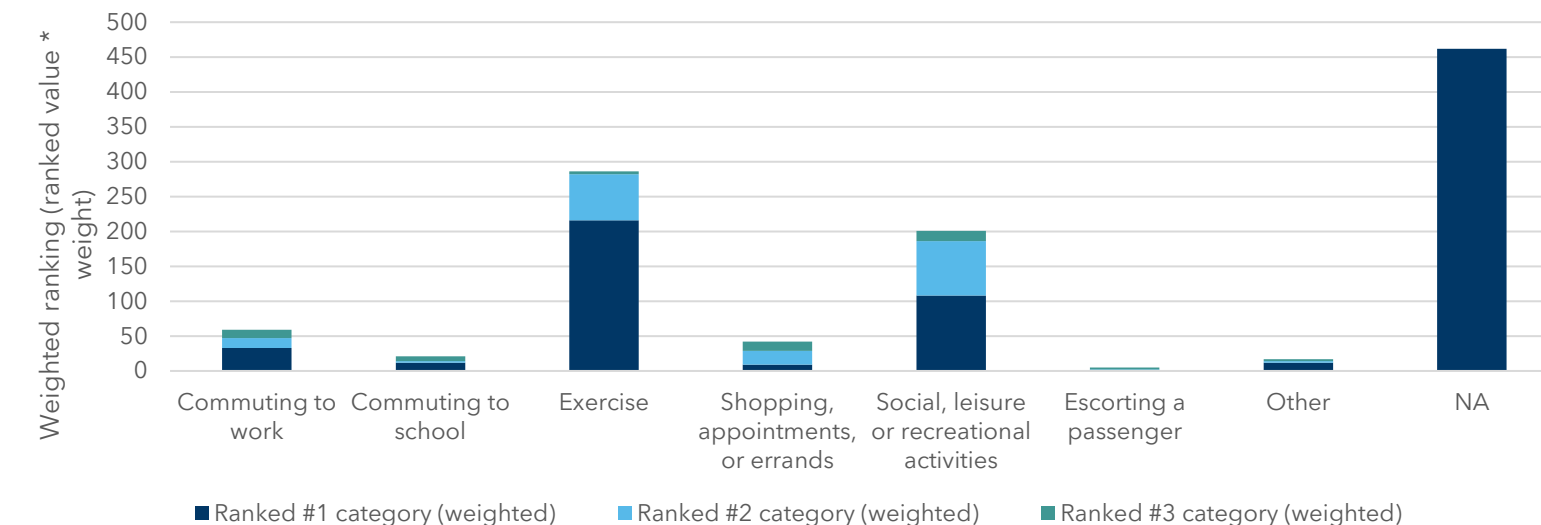
Responses: 216

Q9: Bike/Non-Electric Trip Purpose: Mail Survey

Most common purposes for trips



Most common purposes for trips, weighted ranking



Question: If you have a bicycle or other non-electric micromobility device (kick scooter, skateboard, inline skates) in your household, could you rank the top three most common purposes for trips by this mode? The item ranked #1 should be the most common purpose.

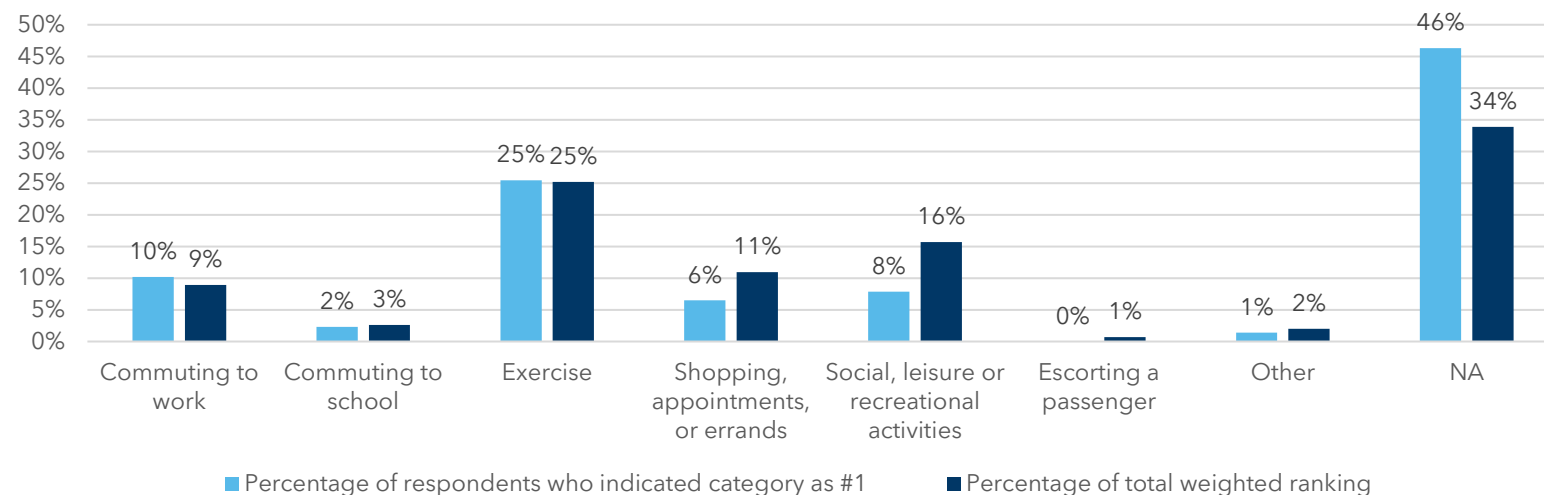
Responses: 284

Respondents were asked to rank their three top categories:

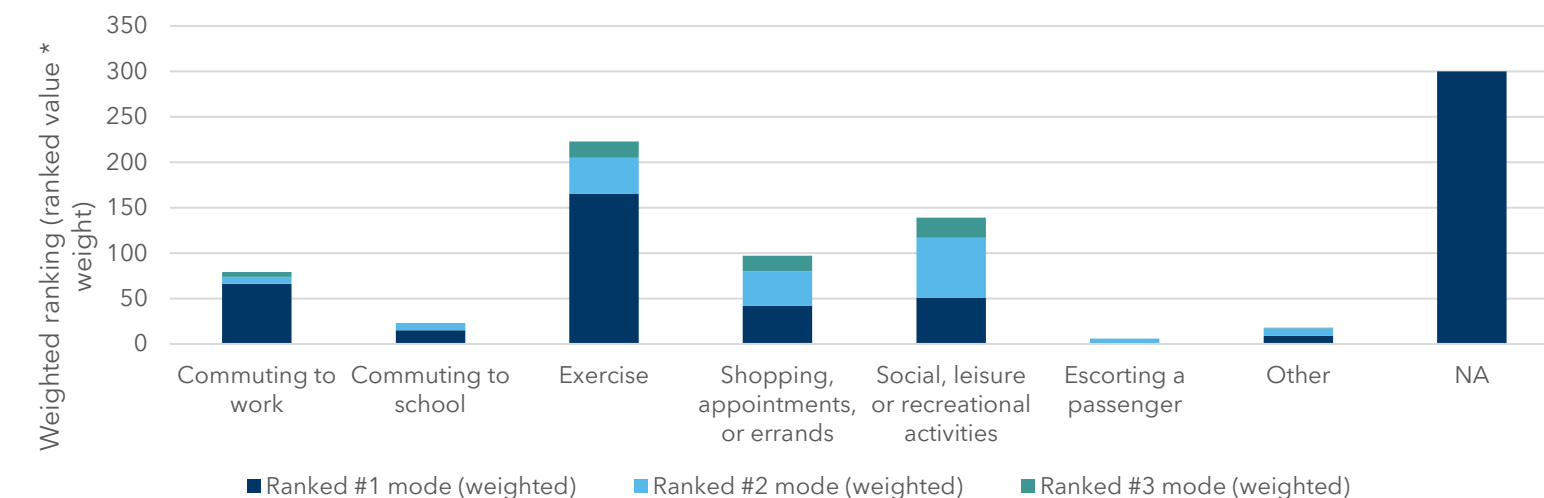
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Q9: Bike/Non-Electric Trip Purpose: Public Survey

Most common purposes for trips



Most common purposes for trips, weighted ranking



Question: If you have a bicycle or other non-electric micromobility device (kick scooter, skateboard, inline skates) in your household, could you rank the top three most common purposes for trips by this mode? The item ranked #1 should be the most common purpose.

Responses: 216

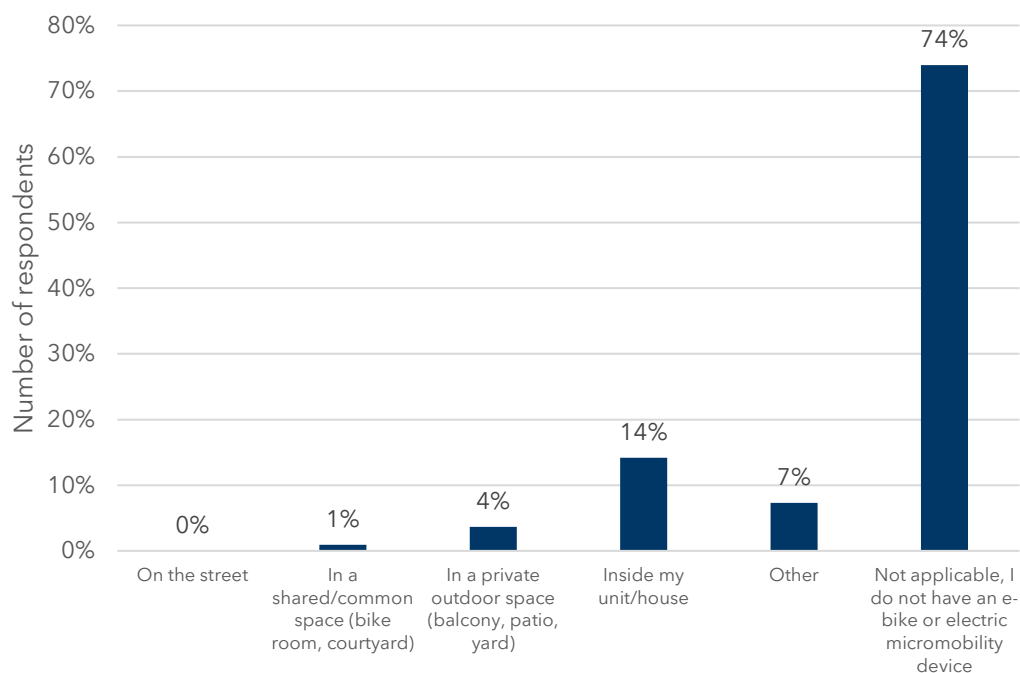
Respondents were asked to rank their three top categories:

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Q10: E-Micromobility Parking

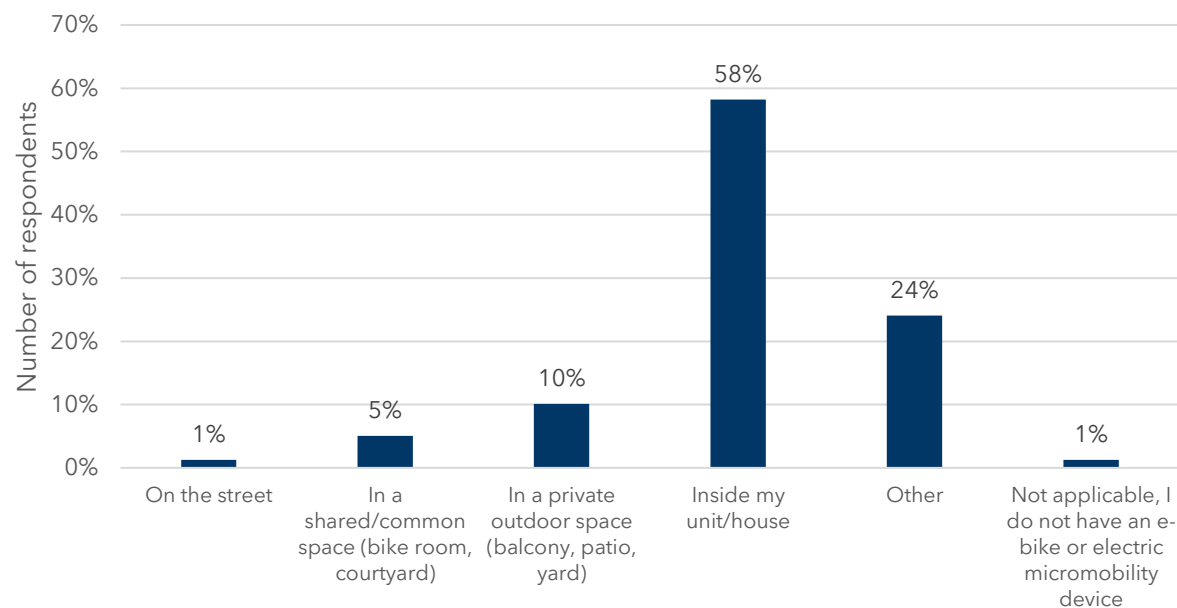
Question: If you have an e-bike or other electric micromobility device in your household, where do you normally park your e-bikes or electric micromobility devices at home?

Primary e-bike parking location, mail survey



Responses: 216

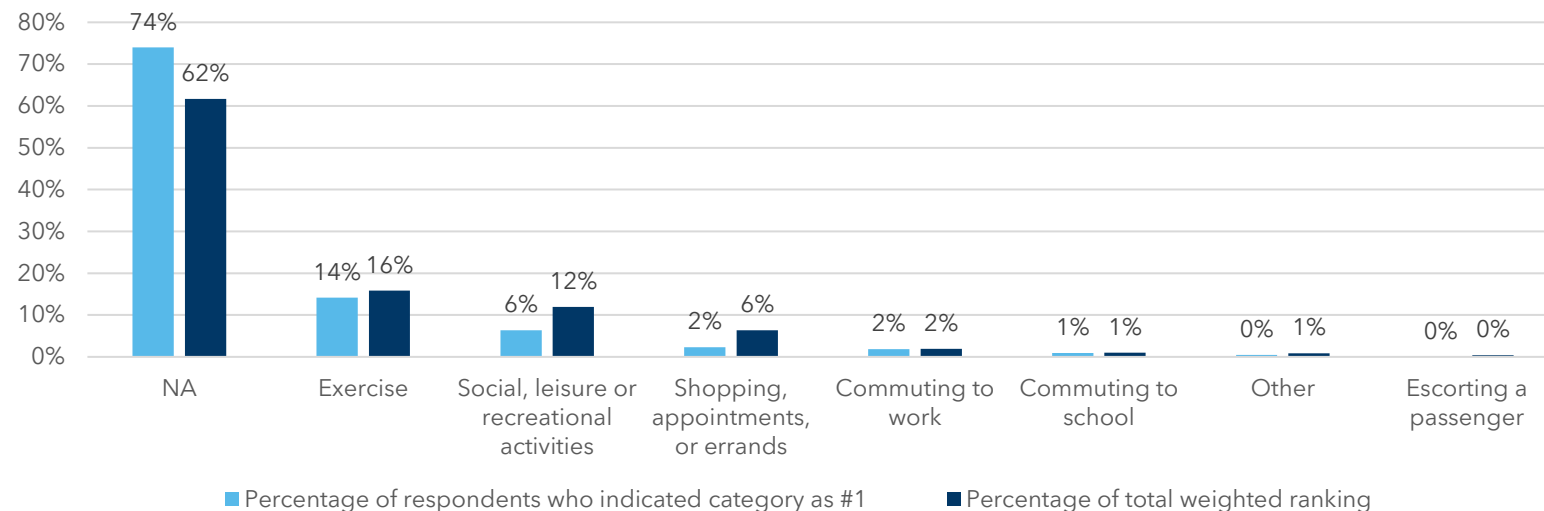
Primary e-bike parking location, public survey



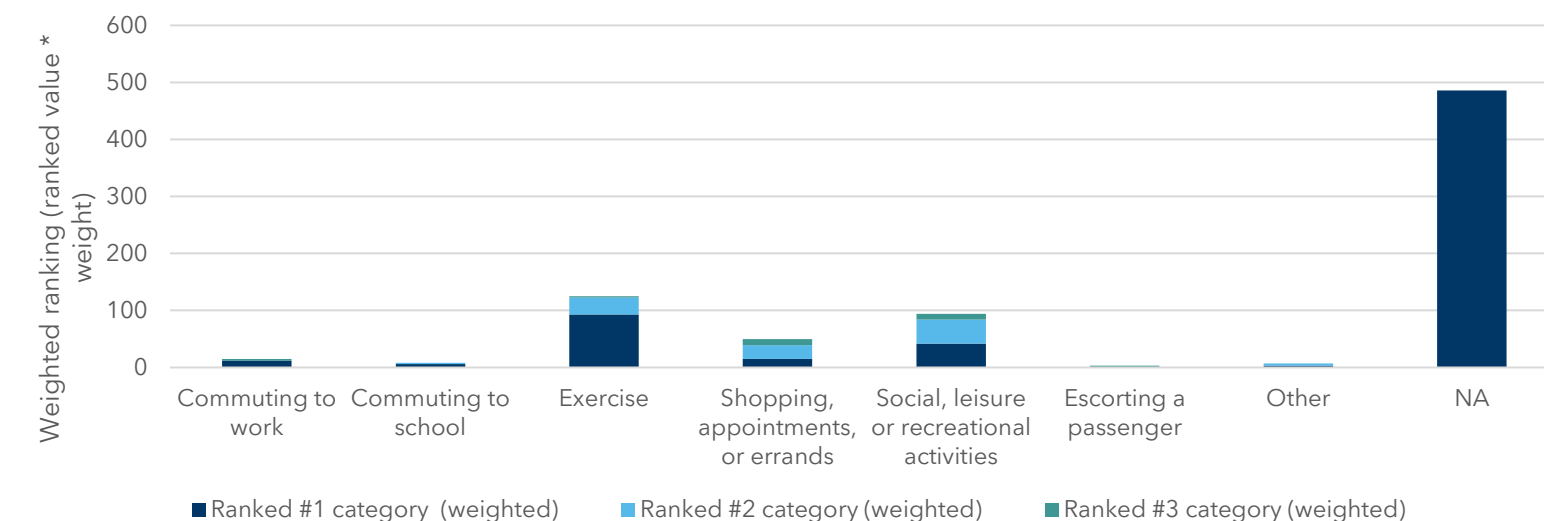
Responses: 79

Q11: E-Bike/E-Micromobility Trip Purpose: Mail Survey

Most common purposes for trips



Most common purposes for trips, weighted ranking



Question: If you have an e-bike or other electric micromobility device in your household, what are the top three most common purposes for trips by this mode? The item ranked #1 should be the most common.

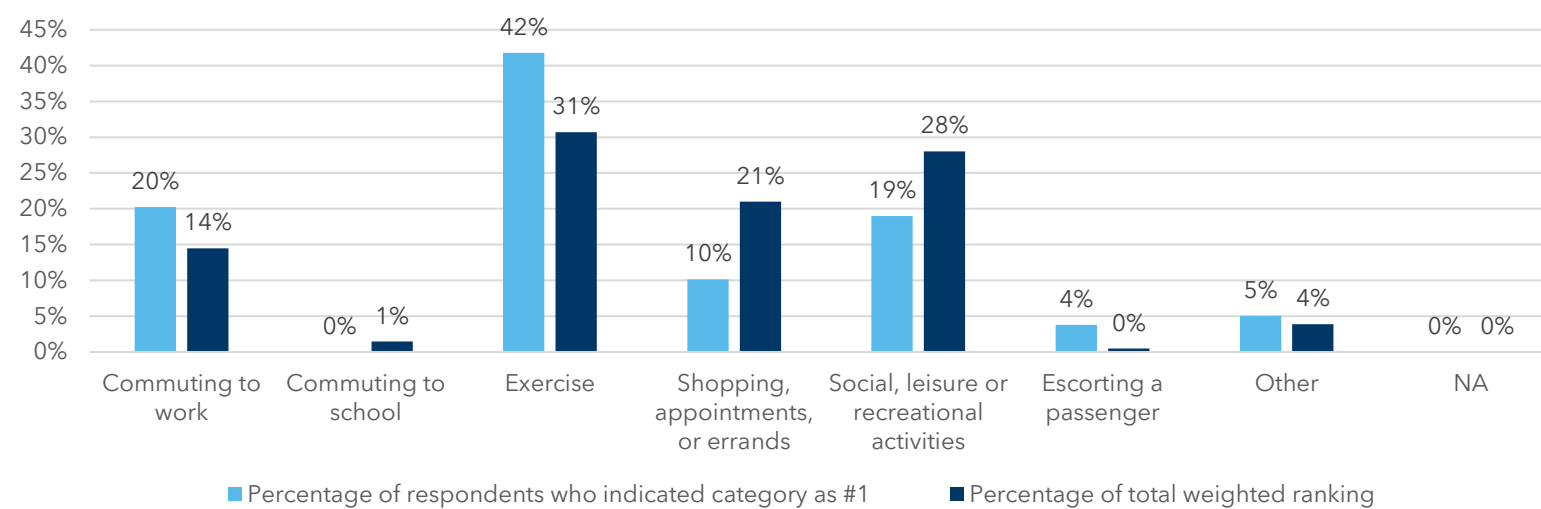
Responses: 219

Respondents were asked to rank their three top categories:

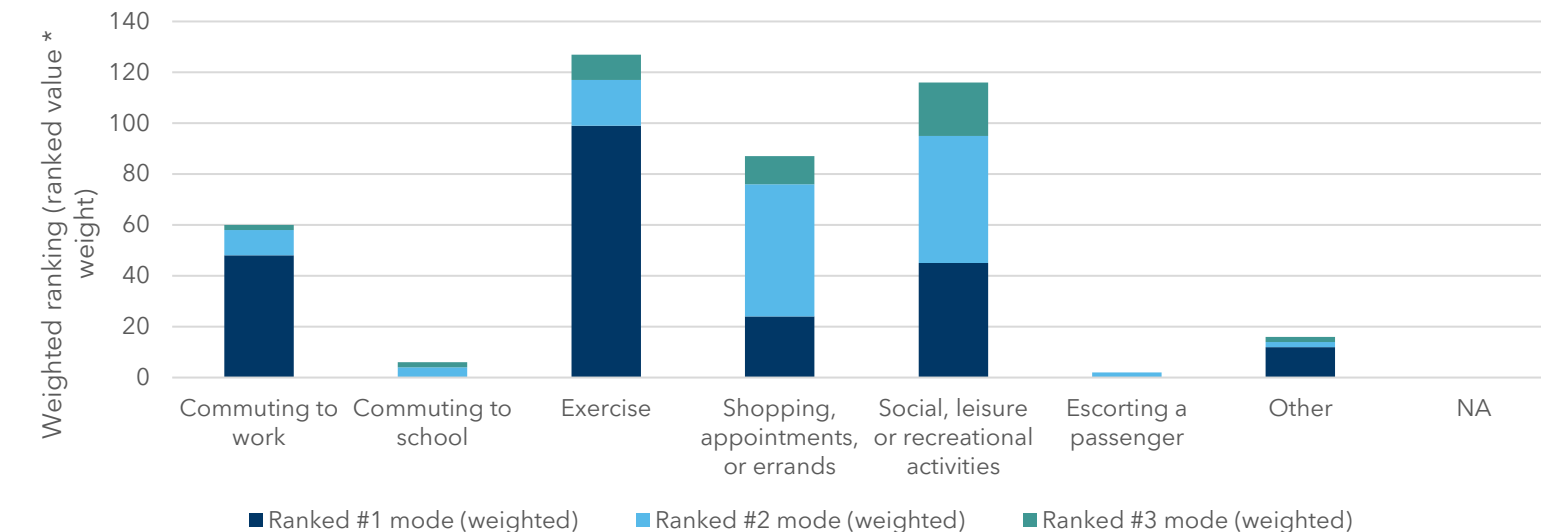
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Q11: E-Bike/E-Micromobility Trip Purpose: Public Survey

Most common purposes for trips



Most common purposes for trips, weighted ranking

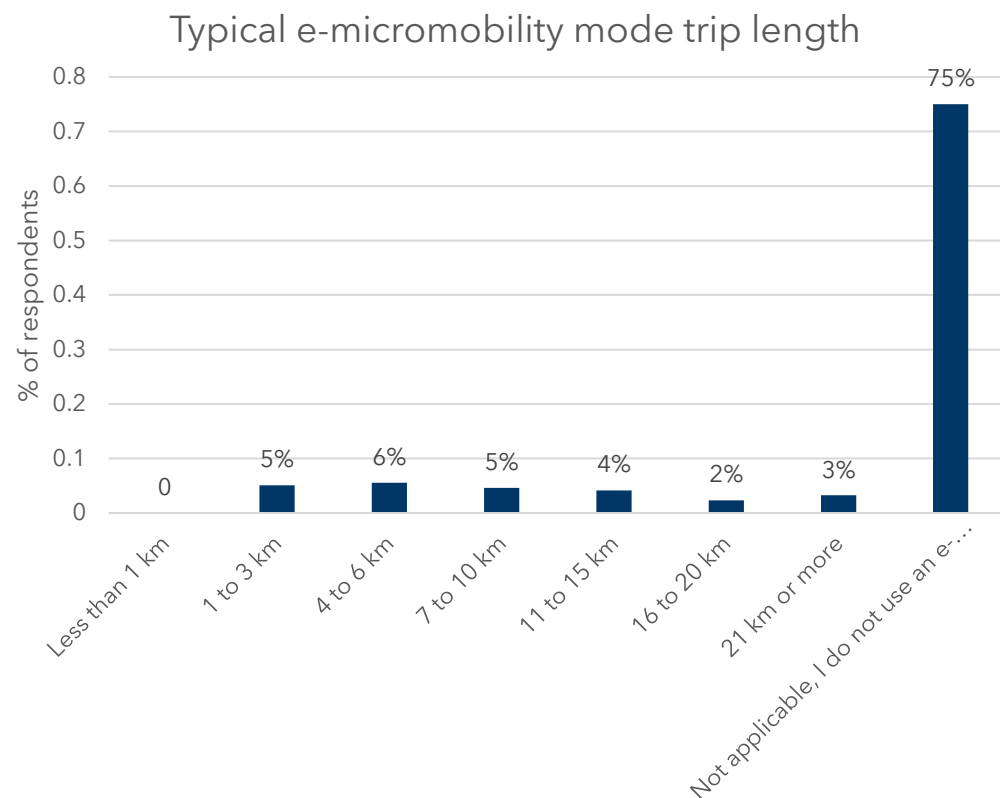


Question: If you have an e-bike or other electric micromobility device in your household, what are the top three most common purposes for trips by this mode? The item ranked #1 should be the most common.

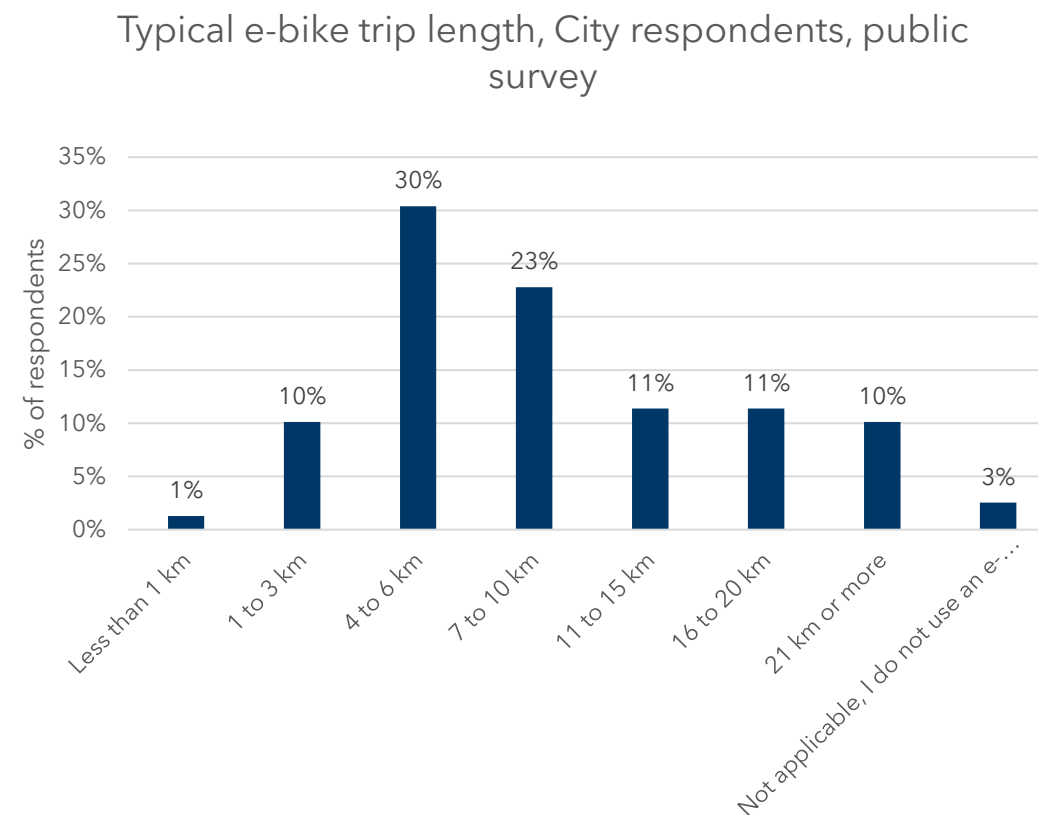
Responses: 79

Q12: E-Micromobility Trip Length

Question: If you have an e-bike or electric micromobility device in your household, what is the typical trip length (in kilometers)?



Responses: 216

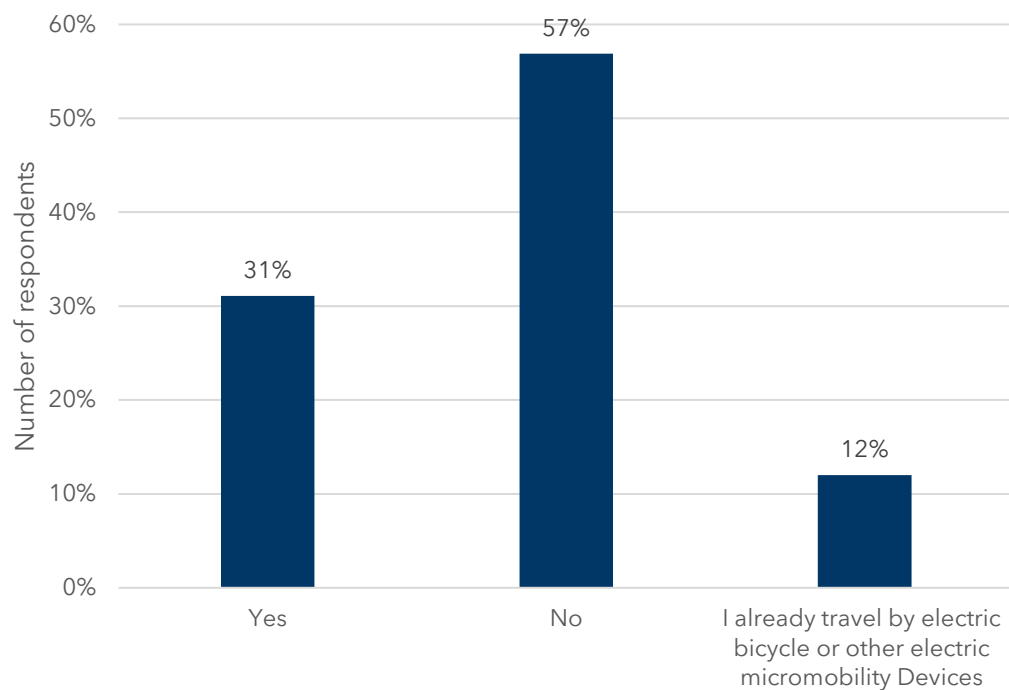


Responses: 79

Q13: Considered E-Micromobility

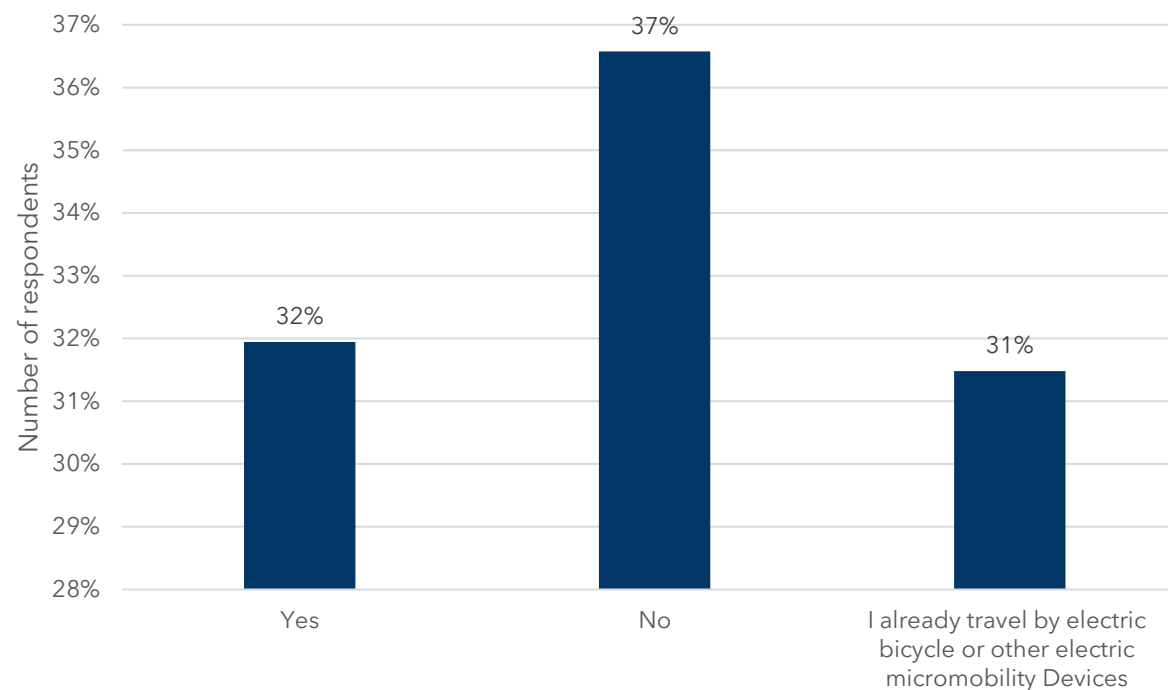
Question: If you have not already done so, have you considered travelling by electric bicycle or other electric micromobility devices?

Considered travelling by e-bike or other e-micromobility device, mail survey



Responses: 283

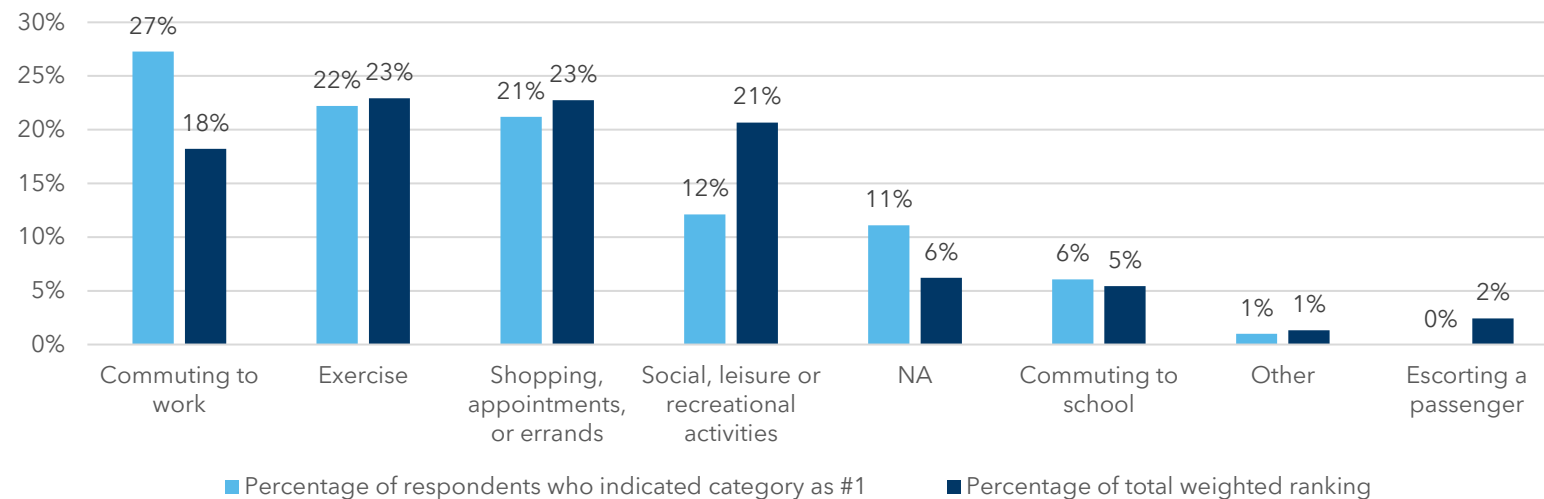
Considered travelling by e-bike or other e-micromobility device, public survey



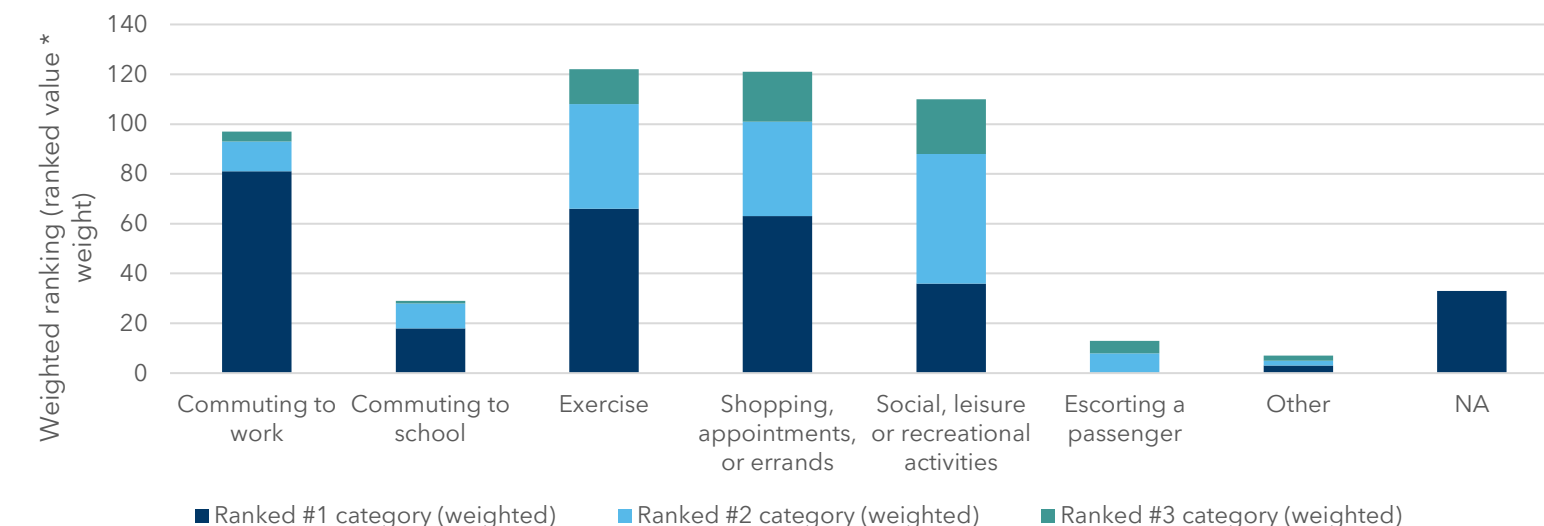
Responses: 216

Q14: Non-User E-Bike/E-Micromobility Trip Purpose: Mail

Most common purposes for trips



Most common purposes for trips, weighted ranking



Question: If you answered yes to Question 13, could you rank what you would expect to be your three most common purposes for trips by e-bike or other e-micromobility device? The item ranked #1 should be the most common. Please write the numbers next to the items.

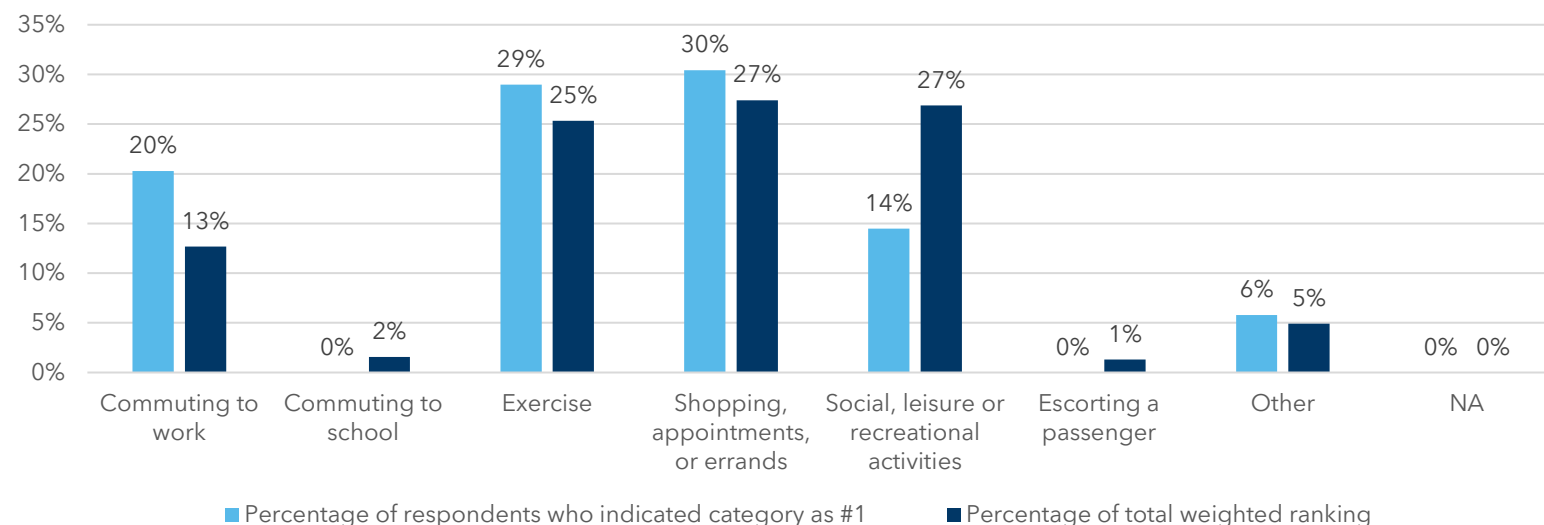
Responses: 99

Respondents were asked to rank their three top categories:

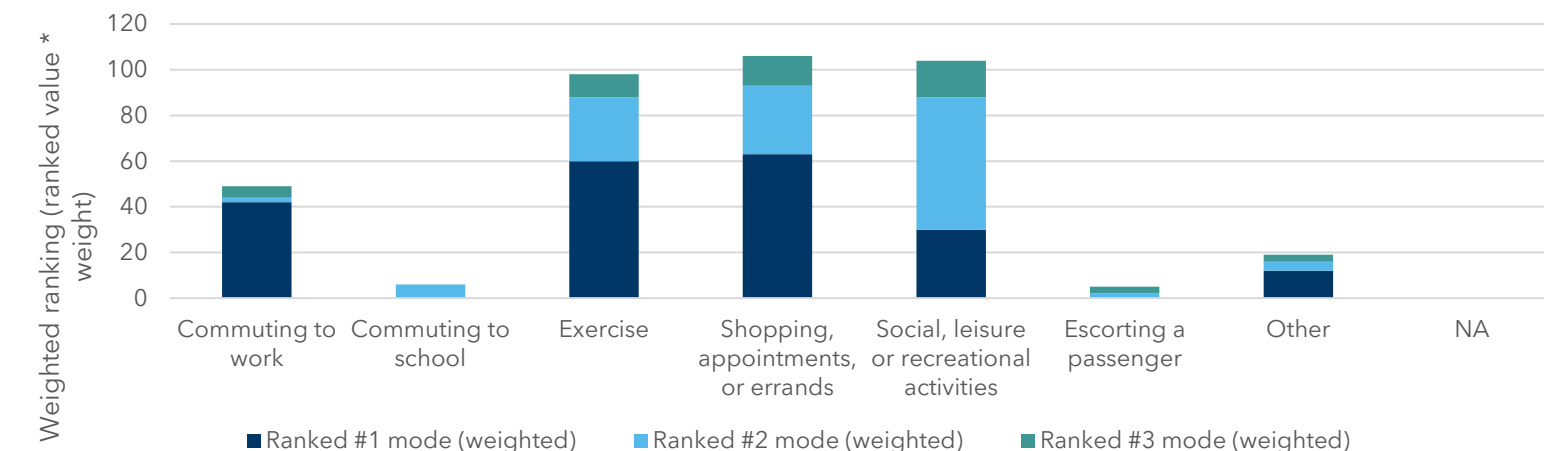
- The **top** graph shows the percentage of respondents who ranked the category as #1 and the percentage of the total weighted ranking (i.e., the percentage of the bottom graph).
- The **bottom** graph shows how the relative importance of each category based on the weighting in the ranking. The value is based on the number of respondents who ranked the category, with higher ranks receiving higher weights (i.e., a category ranked #1 receives more weight than the same category ranked #3).

Q14: Non-User E-Bike/E-Micromobility Trip Purpose: Public

Most common purposes for trips



Most common purposes for trips, weighted ranking



Question: If you answered yes to Question 13, could you rank what you would expect to be your three most common purposes for trips by e-bike or other e-micromobility device? The item ranked #1 should be the most common. Please write the numbers next to the items.

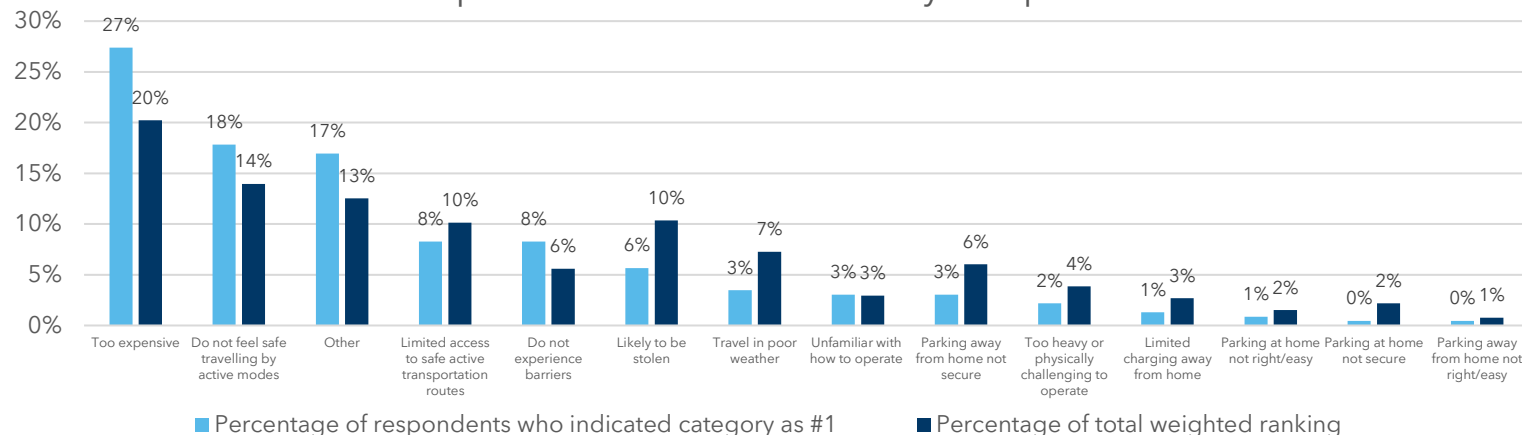
Responses: 69

Respondents were asked to rank their three top categories:

- The **top** graph shows the percentage of respondents who ranked the category as #1 and the percentage of the total weighted ranking (i.e., the percentage of the bottom graph).
- The **bottom** graph shows how the relative importance of each category based on the weighting in the ranking. The value is based on the number of respondents who ranked the category, with higher ranks receiving higher weights (i.e., a category ranked #1 receives more weight than the same category ranked #3).

Q15: E-Micromobility Barriers: Mail Survey

Top Barriers to E-micromobility Adoption



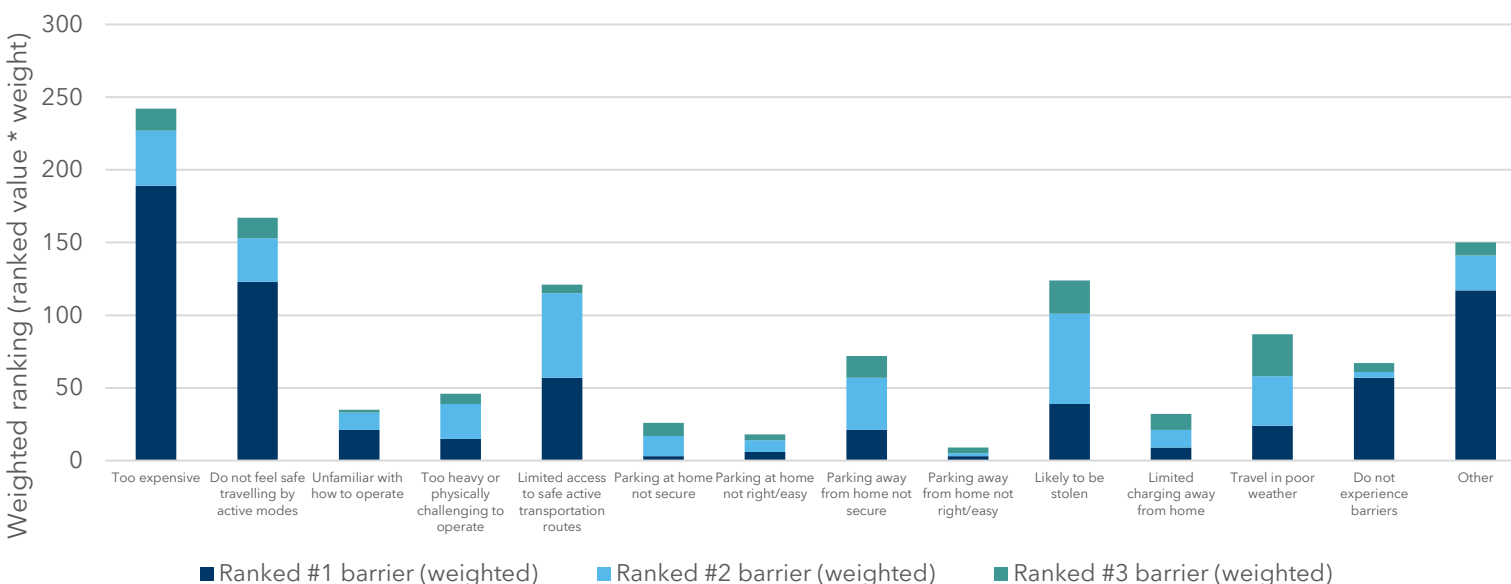
Question: If you do not have an e-bike or other micromobility device in your household, could you rank the top three barriers to your household obtaining an e-bike or other electric micromobility device? The item ranked #1 should be the greatest barrier.

Responses: 230

Respondents were asked to rank their three top categories:

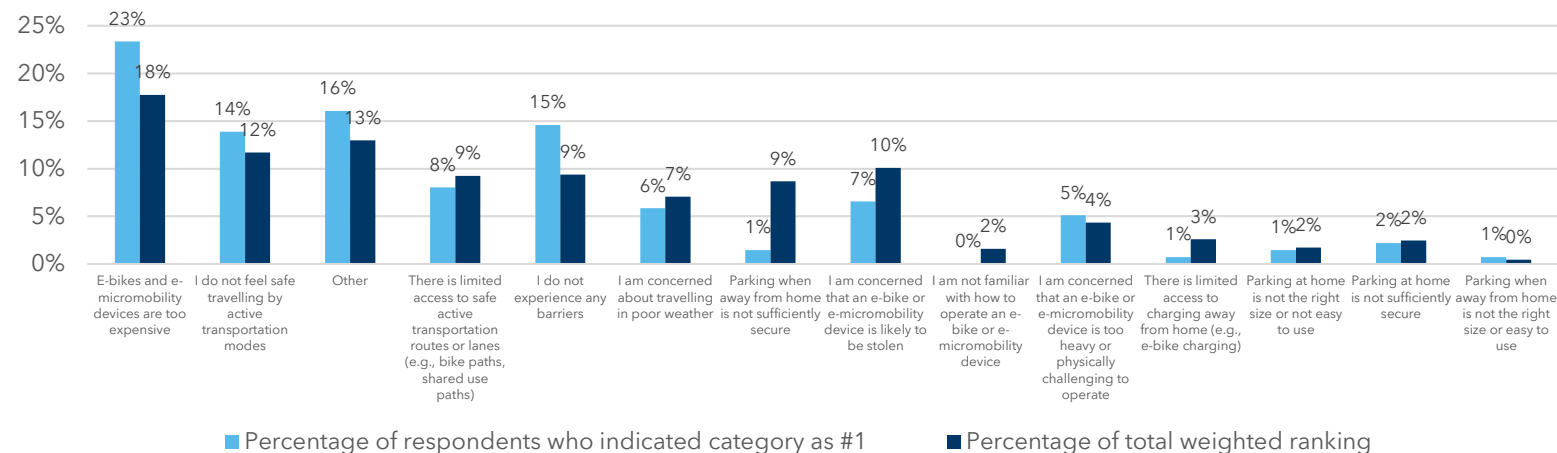
- The **top** graph shows the percentage of respondents who ranked the category as #1 and the percentage of the total weighted ranking (i.e., the percentage of the bottom graph).
- The **bottom** graph shows how the relative importance of each category based on the weighting in the ranking. The value is based on the number of respondents who ranked the category, with higher ranks receiving higher weights (i.e., a category ranked #1 receives more weight than the same category ranked #3).

Top Barriers to E-micromobility Adoption, weighted ranking

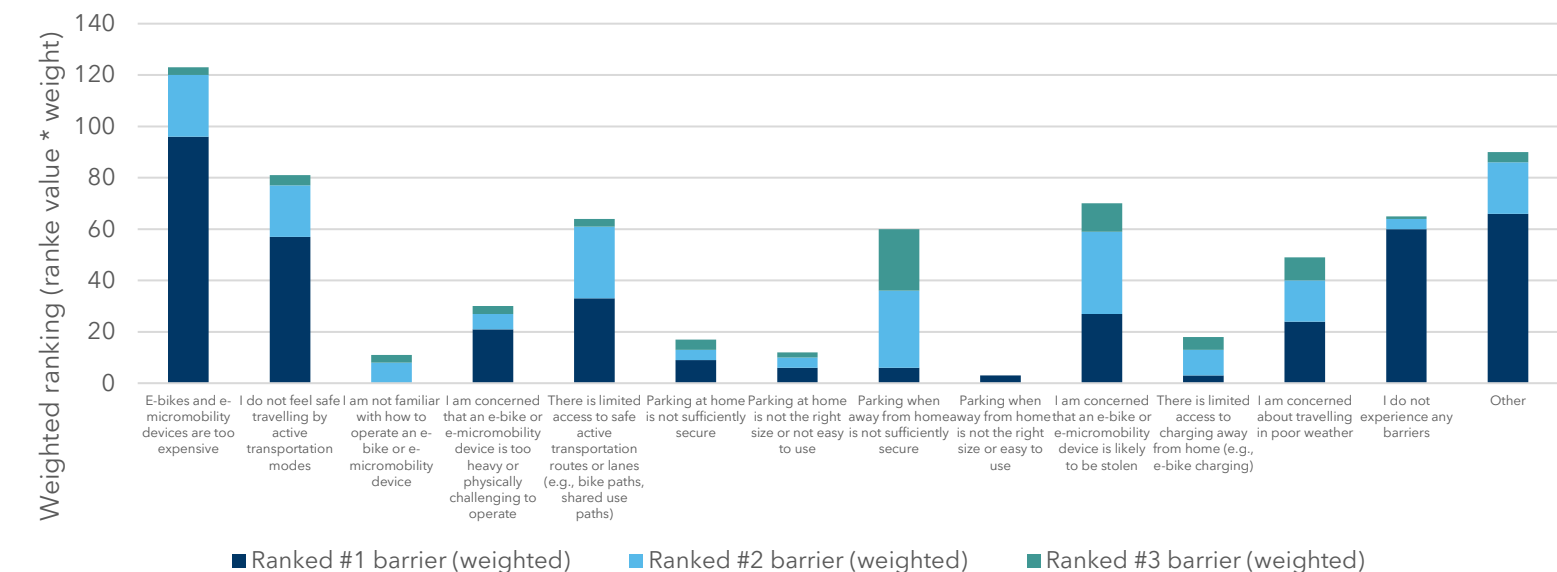


Q15: E-Micromobility Barriers: Public Survey

Top Barriers to E-micromobility Adoption



Top Barriers to E-micromobility Adoption, weighted ranking



Question: If you do not have an e-bike or other micromobility device in your household, could you rank the top three barriers to your household obtaining an e-bike or other electric micromobility device? The item ranked #1 should be the greatest barrier.

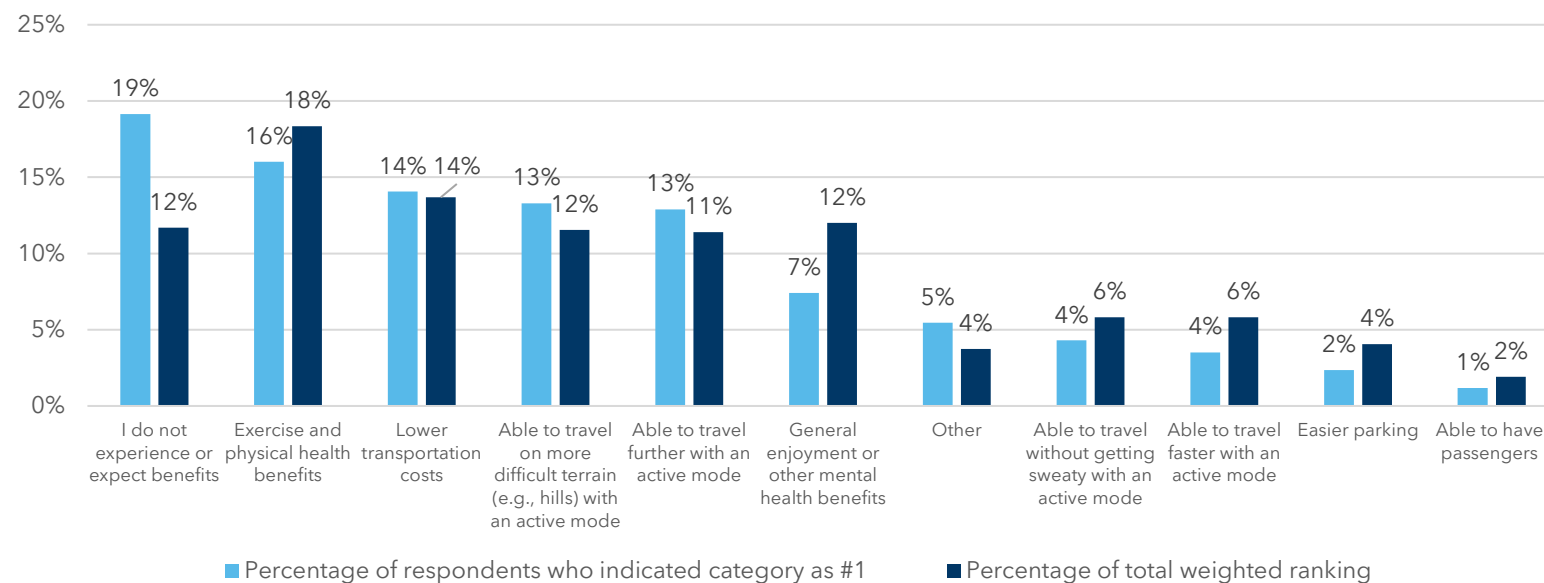
Responses: 137

Respondents were asked to rank their three top categories:

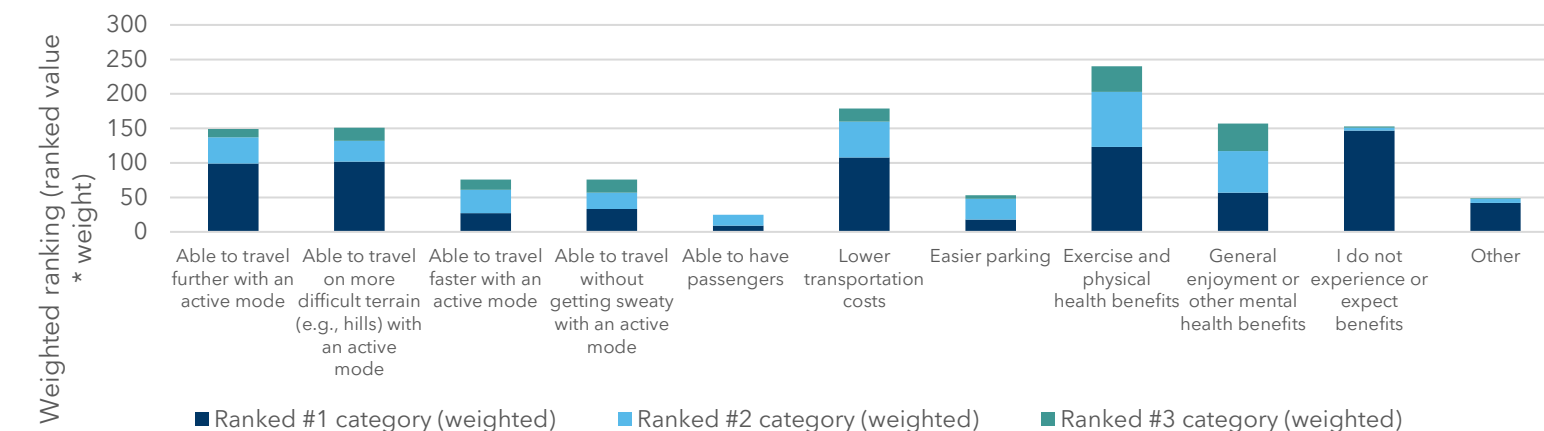
- The **top** graph shows the percentage of respondents who ranked the category as #1 and the percentage of the total weighted ranking (i.e., the percentage of the bottom graph).
- The **bottom** graph shows how the relative importance of each category based on the weighting in the ranking. The value is based on the number of respondents who ranked the category, with higher ranks receiving higher weights (i.e., a category ranked #1 receives more weight than the same category ranked #3).

Q16: E-Micromobility Benefits: Mail Survey

Top benefits you experience or you expect



Top benefits you experience or you expect, weighted ranking



Question: Could you rank the top three benefits you experience (if you use an e-bike or e-micromobility device) or you expect (if you would use an e-bike or e-micromobility device in the future). The item ranked #1 should be the greatest benefit.

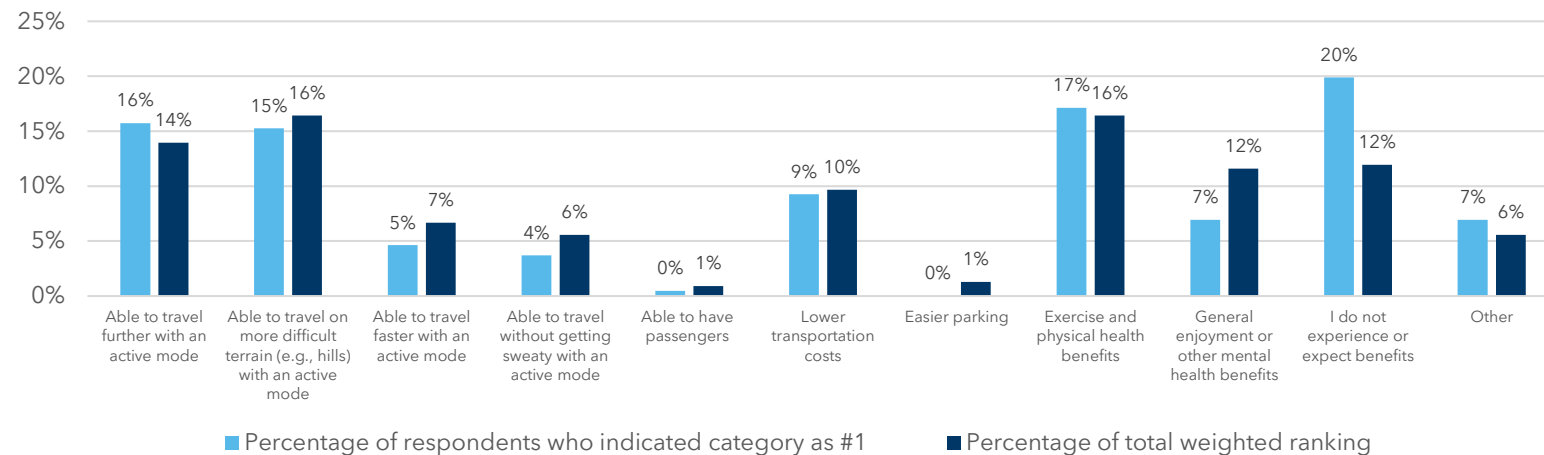
Responses: 256

Respondents were asked to rank their three top categories:

- The **top** graph shows the percentage of respondents who ranked the category as #1 and the percentage of the total weighted ranking (i.e., the percentage of the bottom graph).
- The **bottom** graph shows how the relative importance of each category based on the weighting in the ranking. The value is based on the number of respondents who ranked the category, with higher ranks receiving higher weights (i.e., a category ranked #1 receives more weight than the same category ranked #3).

Q16: E-Micromobility Benefits: Public Survey

Top benefits you experience or you expect



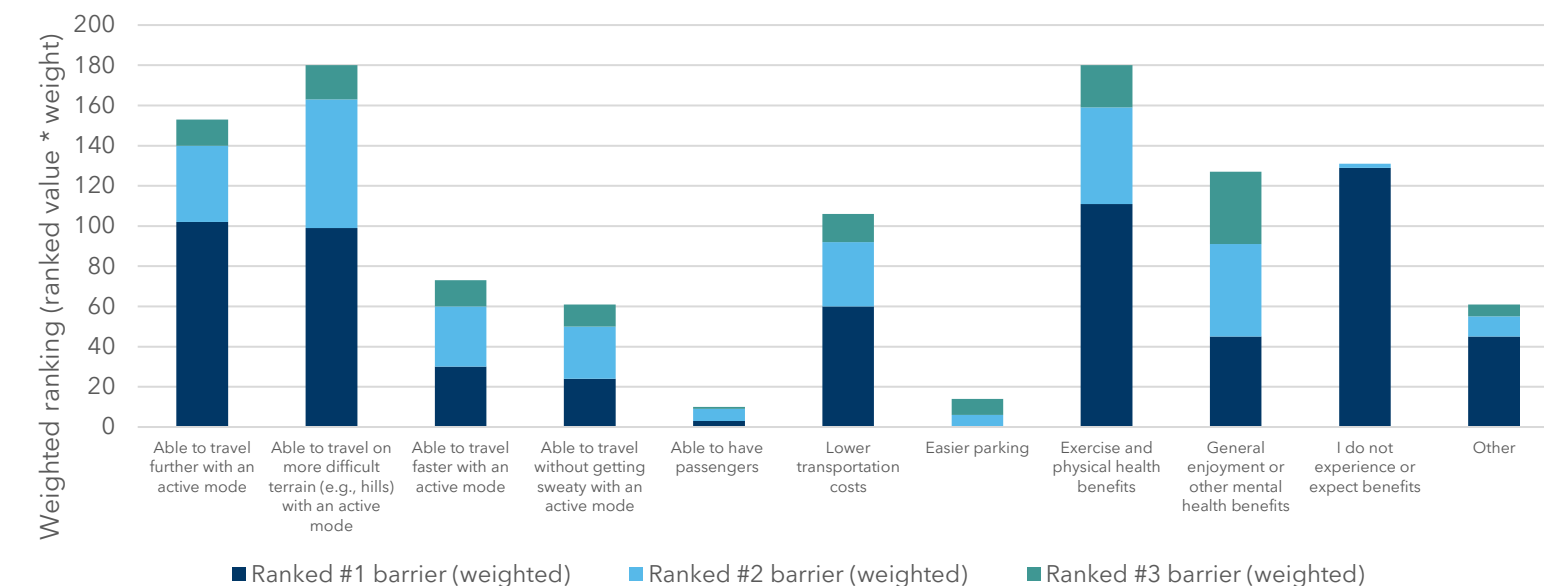
Question: Could you rank the top three benefits you experience (if you use an e-bike or e-micromobility device) or you expect (if you would use an e-bike or e-micromobility device in the future). The item ranked #1 should be the greatest benefit.

Responses: 216

Respondents were asked to rank their three top categories:

- The **top** graph shows the percentage of respondents who ranked the category as #1 and the percentage of the total weighted ranking (i.e., the percentage of the bottom graph).
- The **bottom** graph shows how the relative importance of each category based on the weighting in the ranking. The value is based on the number of respondents who ranked the category, with higher ranks receiving higher weights (i.e., a category ranked #1 receives more weight than the same category ranked #3).

Top benefits you experience or you expect, weighted ranking



Q17 and Q18 E-Mobility More Appealing

Question 17: What, if anything, would make travel with an electric vehicle (i.e., plug-in-hybrid or battery electric vehicle) more appealing than it is today?

Mail Responses: 216 ; **Public Responses:** 216

Question 18: What, if anything, would make travel with an e-bike or other electric micromobility devices more appealing than it is today?

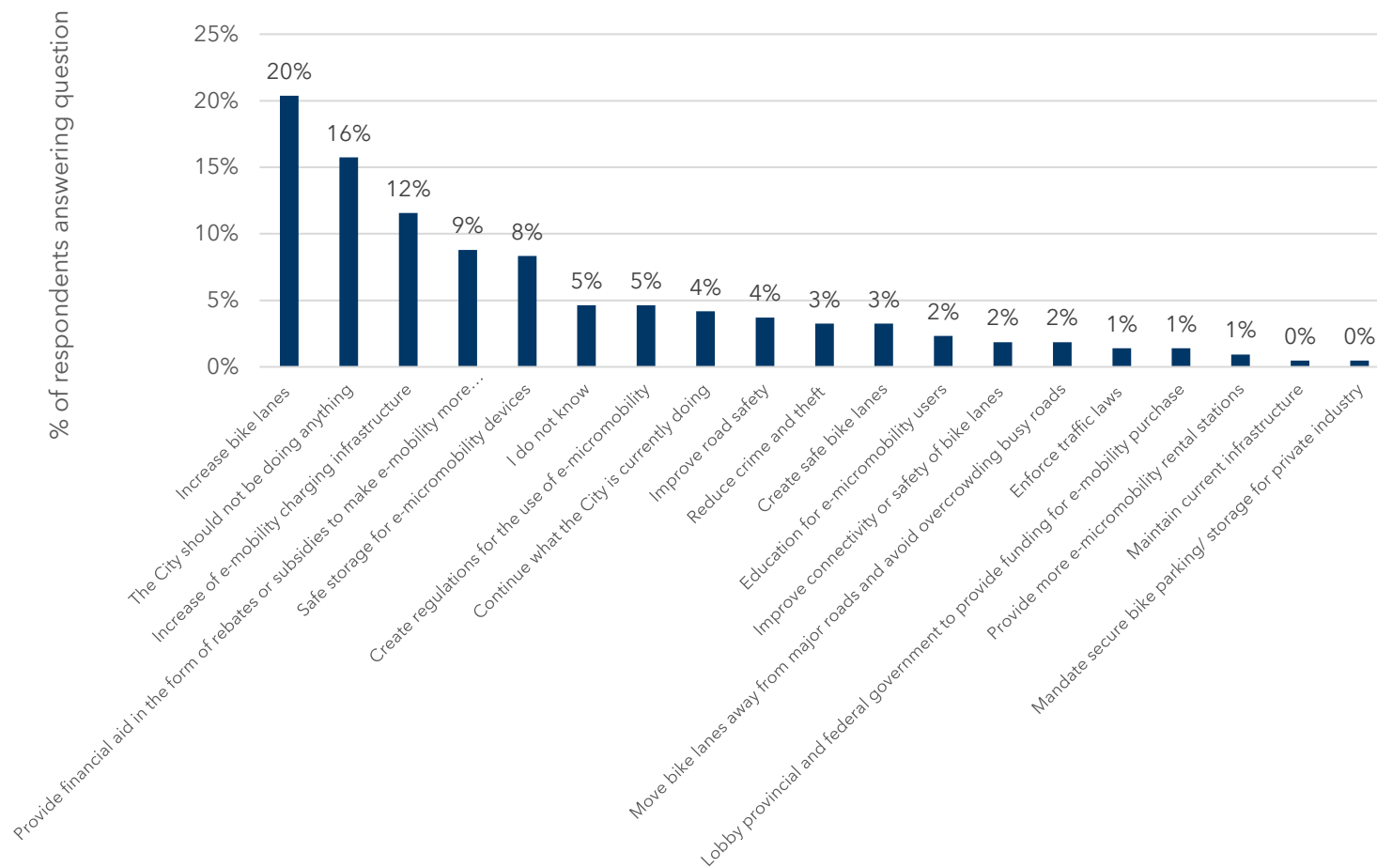
Mail Responses: 232; **Public Responses:** 215

Key Insights

- A high-level scan of the open responses to these questions determined that broadly, **the feedback aligned** with the barriers identified.

Q19: Role of the City: Mail Survey

Role of the City categorized open feedback from respondents



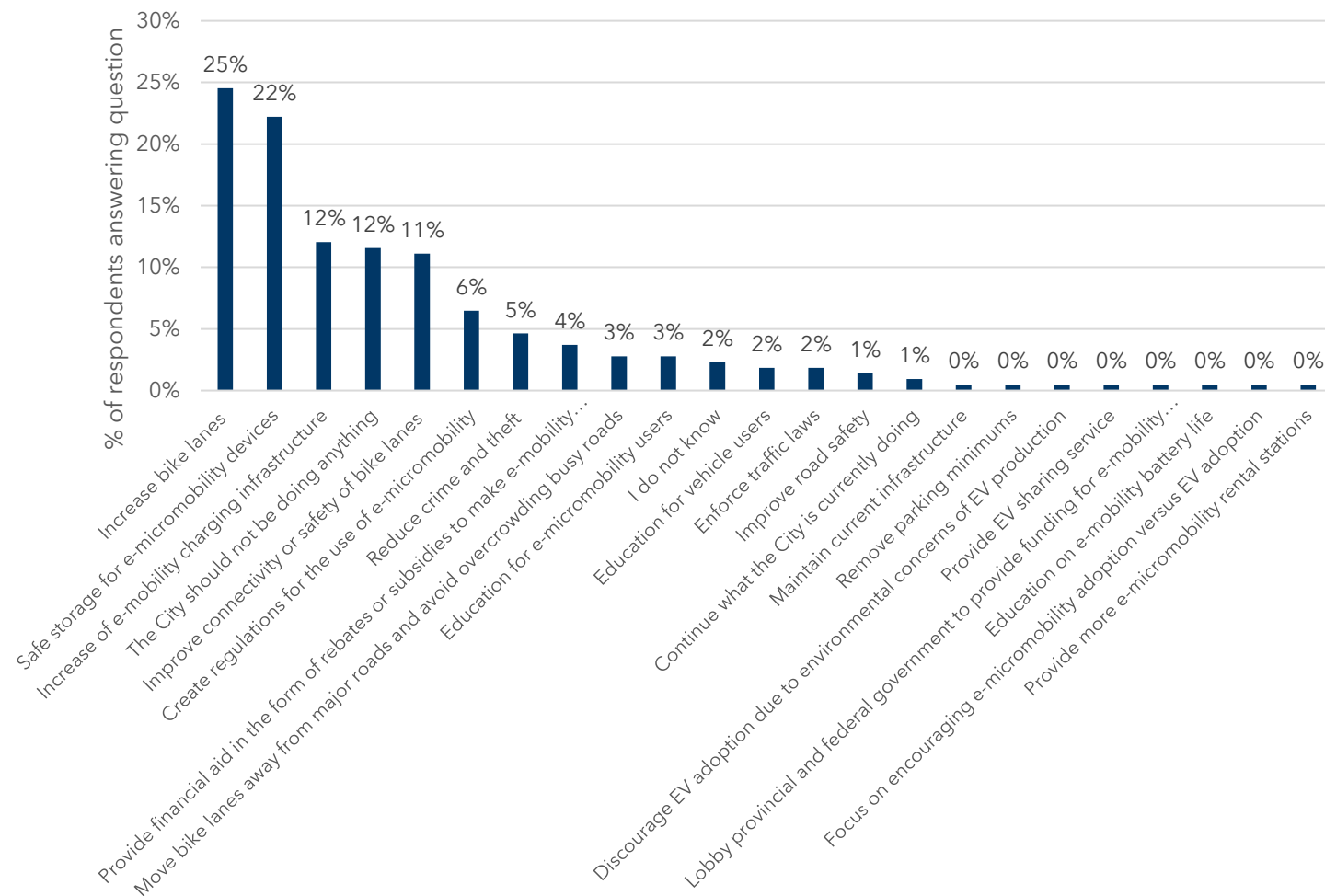
Question: What, if any, would you like the City of Nanaimo to do to support travel by electric vehicles, e-bikes and other electric micromobility devices?

Responses: 224

Note: Some responses included multiple actions that the City should take

Q19: Role of the City: Public Survey

Role of the City categorized open feedback from respondents



Question: What, if any, would you like the City of Nanaimo to do to support travel by electric vehicles, e-bikes and other electric micromobility devices?

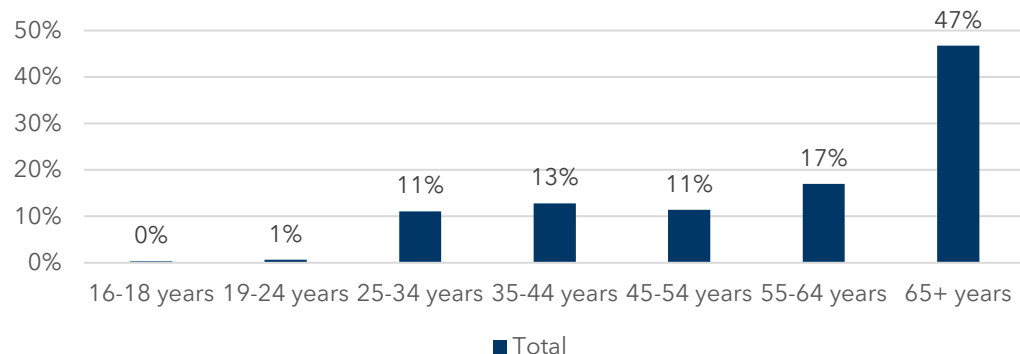
Responses: 216

Note: Some responses included multiple actions that the City should take

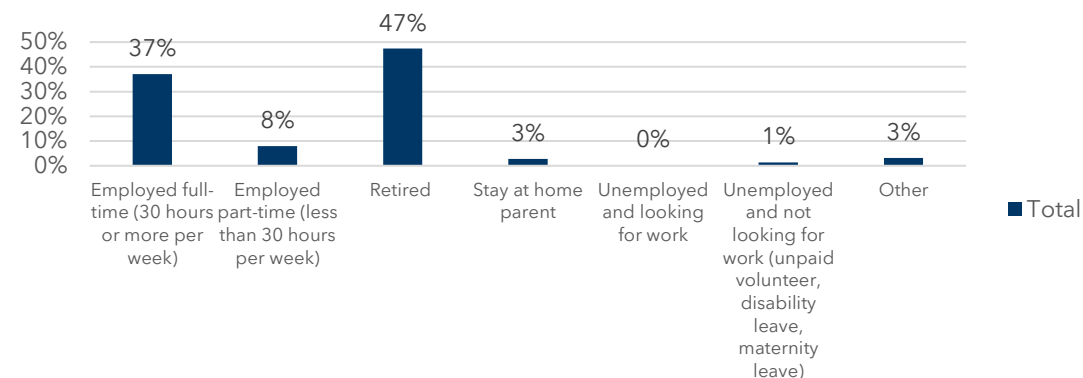
Demographics 1: Mail Survey

The respondents tend to be **older** and **retired** at **higher** proportions than may be expected in the typical population.

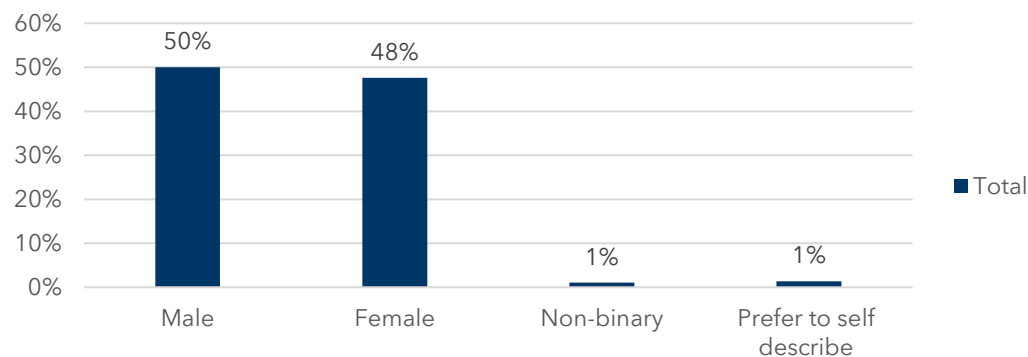
Age Range



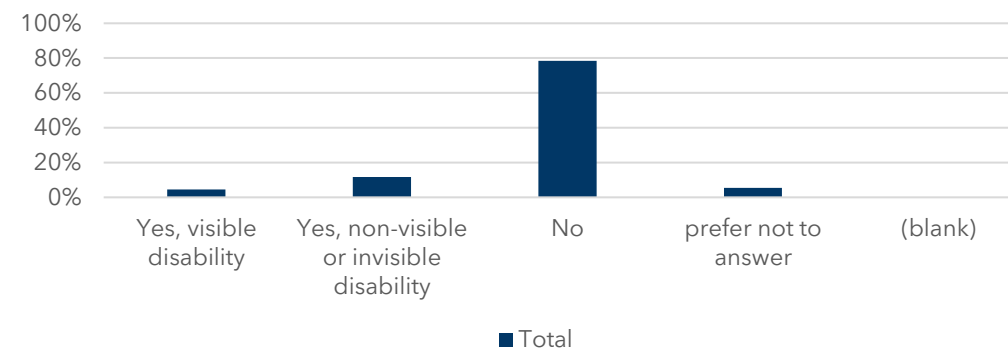
Current Employment Status



Gender Identity

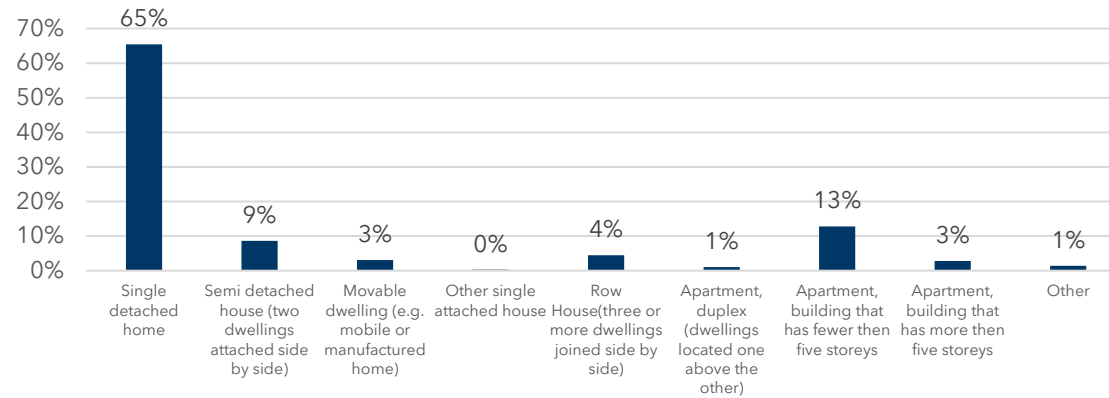


Consider themselves having a disability

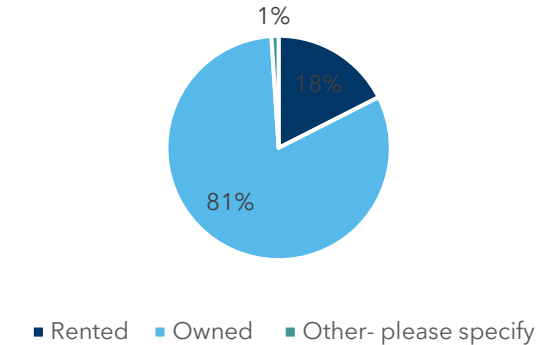


Demographics 2: Mail Survey

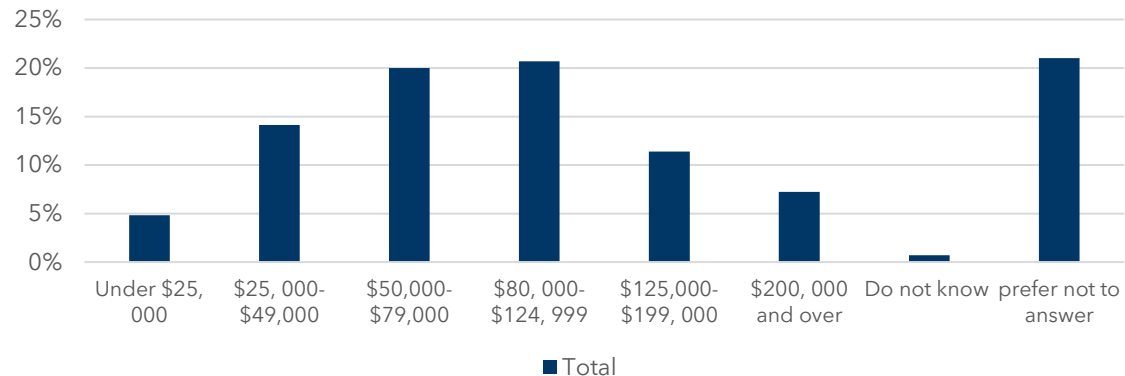
Housing Type



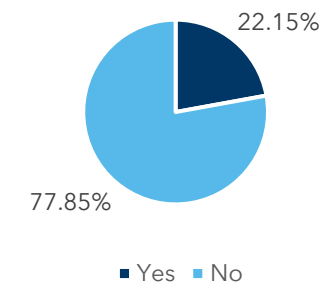
Rent or Own



Gross Household Income

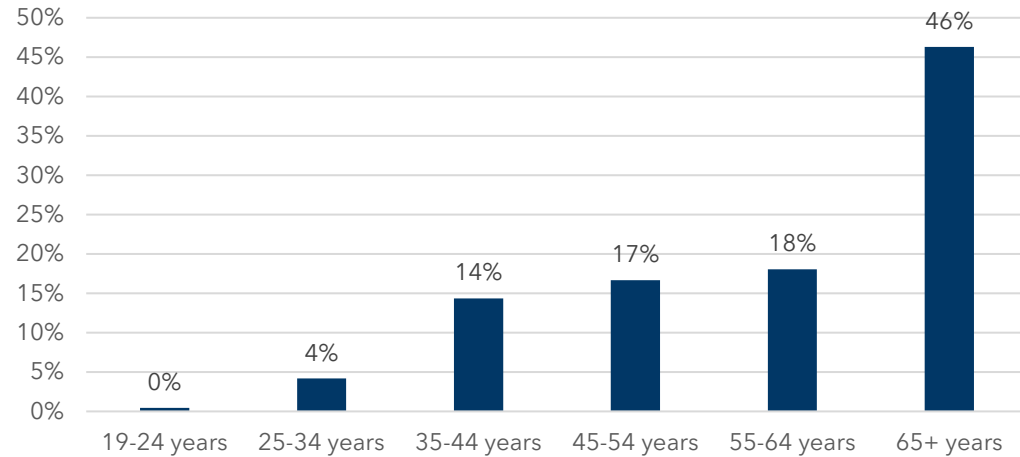


Respondents with one or more children at home

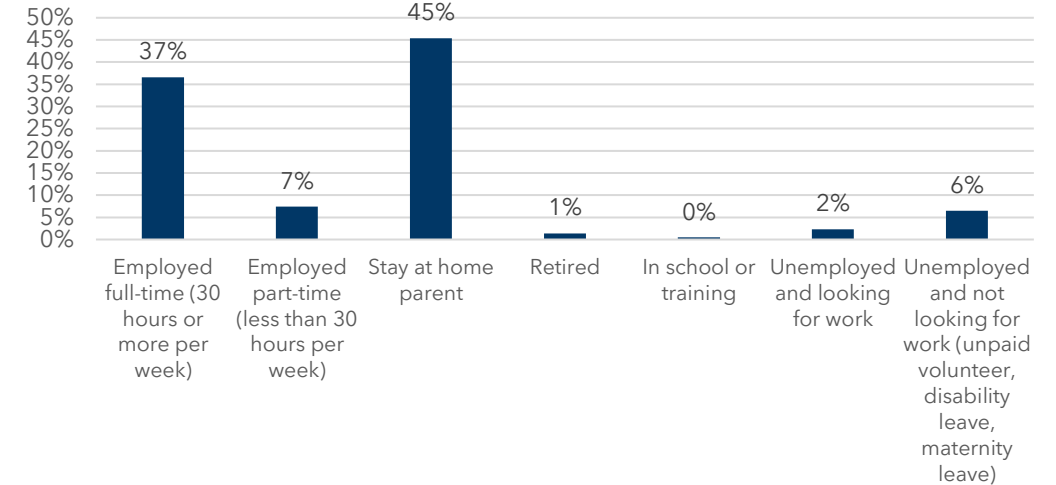


Demographics 1: Public Survey

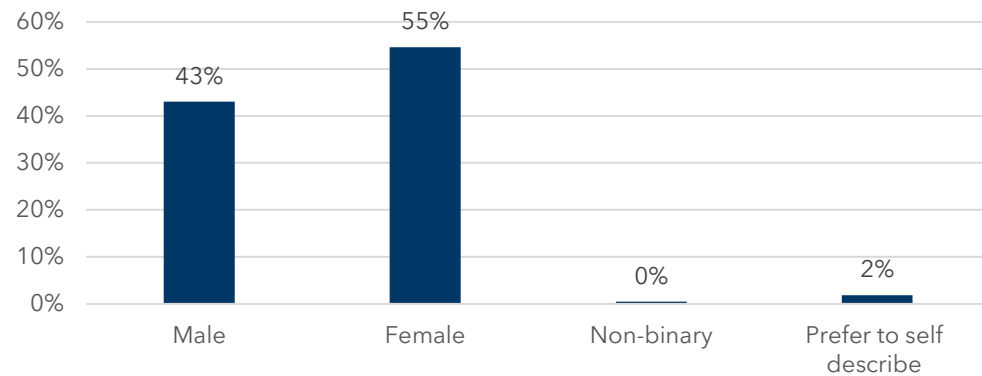
Age Range



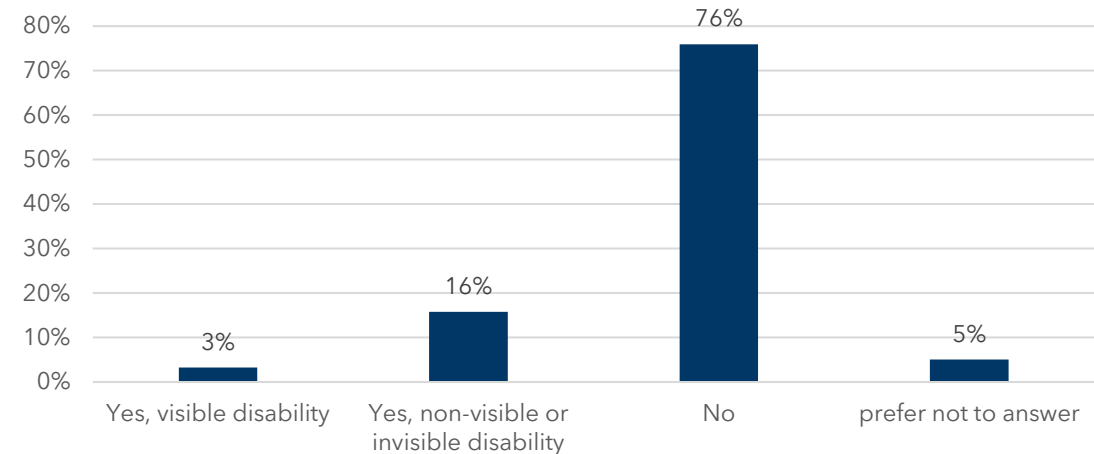
Current Employment Status



Gender Identity

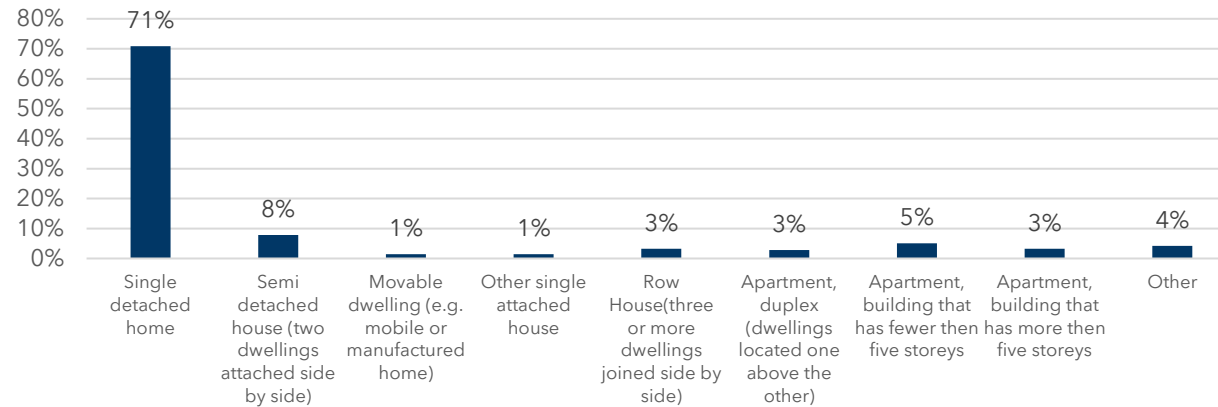


Persons considering themselves having a disability

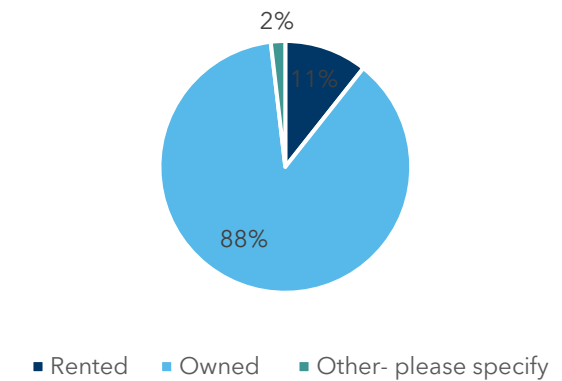


Demographics 2: Public Survey

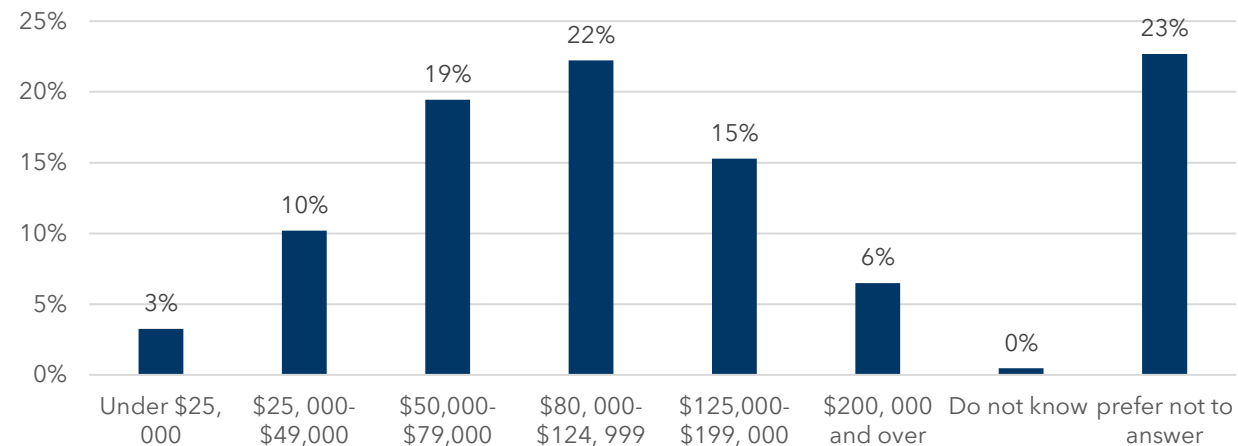
Housing Type



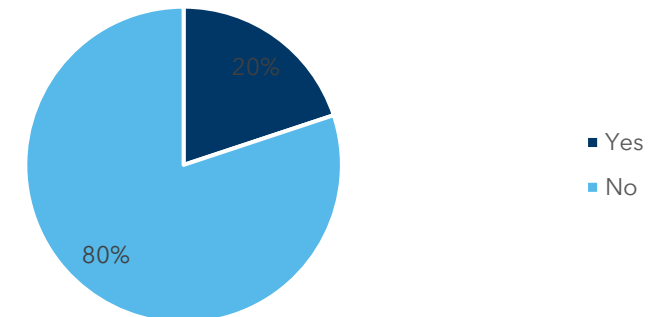
Rent or Own



Gross Household Income, public survey



Respondents with one or more children at home



Appendix 2. ICBC Query

Approach to ICBC Data

- Geographic filter: Municipality = Nanaimo
 - Note: ICBC includes some areas outside of the City boundary, based on a review of FSAs. Due to limited data to disaggregate the results based on the City boundary, our data reports all vehicles that are defined as Nanaimo Municipality by ICBC.
- All light-duty vehicles insured are included in the vehicle totals.
 - Passenger vehicles = includes Personal, Business and Other vehicles that match the Body Style filter for light-duty vehicle
 - Commercial vehicles data = includes Personal, Business and Other vehicles that match the Body Style filter for light-duty vehicle
- Body Style filters included as light-duty vehicles:
 - Electric Vehicles: crew cab, four door coupe, four door fastback, four door sedan, four door station wagon, hatchback, two door convertible, two door coupe, two door fastback, two door hardtop, two door station wagon.
 - Plug-in Hybrid Vehicles: All; in lieu filter by "Model" and only include model names with "plug-in".
 - Passenger Vehicles: four door convertible, four door coupe, four door fastback, four door hardtop, four door sedan, four door station wagon, hatchback, sports convertible, taxis, two door convertible, two door coupe, two door fastback, two door hardtop, two door sedan, two door station wagon, work utility passenger vehicle.
 - Commercial Vehicles: crewcab, pickup, truck, van, window van.



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