SURREY ELECTRIC VEHICLE STRATEGY

SURVEY #1: BARRIERS AND OPPORTUNITIES

SUMMARY REPORT

CITY OF SURREY
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May 2020

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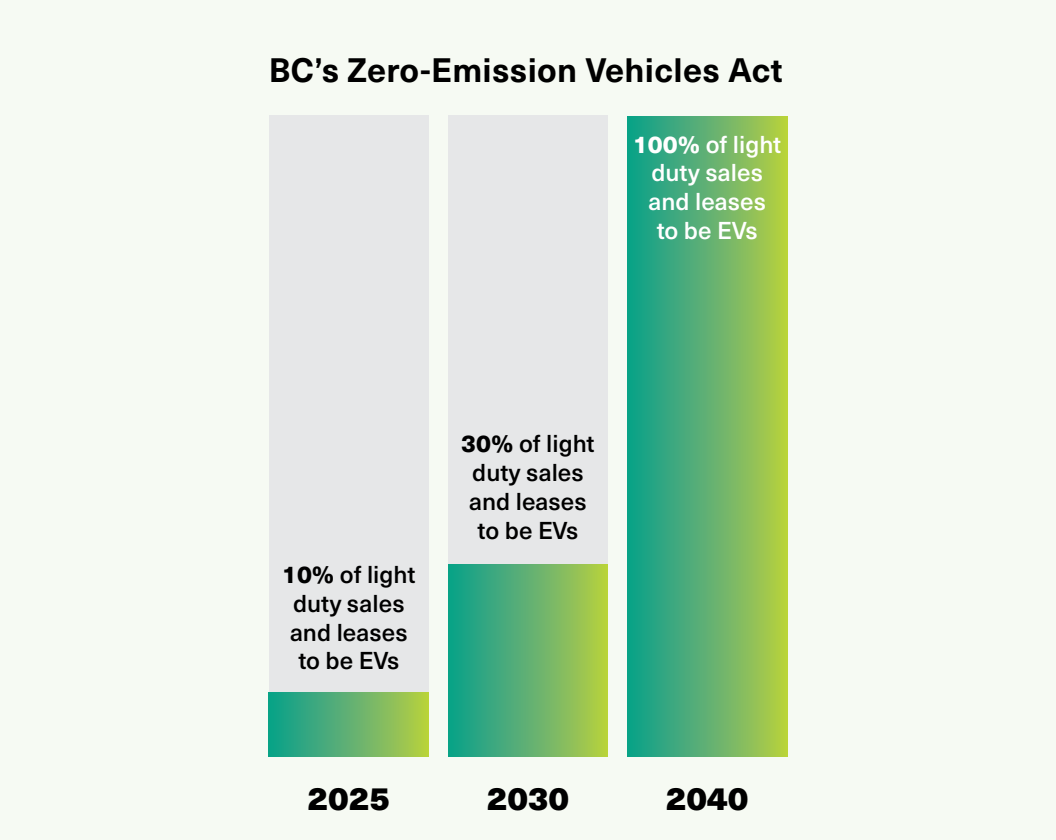
BACKGROUND

The Province of British Columbia passed the Zero-Emission Vehicles Act (ZEV Act) on May 30, 2019. This legislation requires that the percentage of sales and leases of light duty electric vehicles (EVs) reach 10 percent by 2025, 30 percent by 2030 and 100 percent by 2040.

The City of Surrey is developing an Electric Vehicle Strategy describing the City's role in enabling and accelerating this transition by leveraging opportunities and addressing the most significant barriers to EV adoption.

The strategy will identify actions over five years, with a longer term view of enabling a future where 100% of vehicles in Surrey are zero-emission.



ZEV legislation requires that the percentage of sales and leases of light duty electric vehicles (EVs) reach 10 percent by 2025, 30 percent by 2030 and 100 percent by 2040.

This report describes the key findings of Surrey EV Strategy Survey #1: Barriers and Opportunities. Launched online in November 2019, this survey gathered public input on barriers to EV adoption and opportunities to accelerate EV adoption within the City of Surrey.

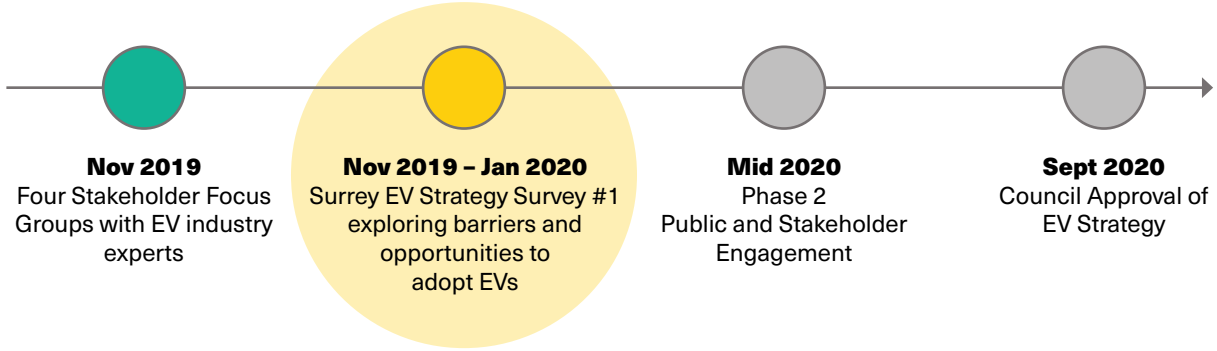
This survey is part of a broader public consultation program designed to inform the development of the EV Strategy, described in the timeline to the right.

The survey was live for a total of 46 days between November 19, 2019 and January 3, 2020 and received 1802 responses.

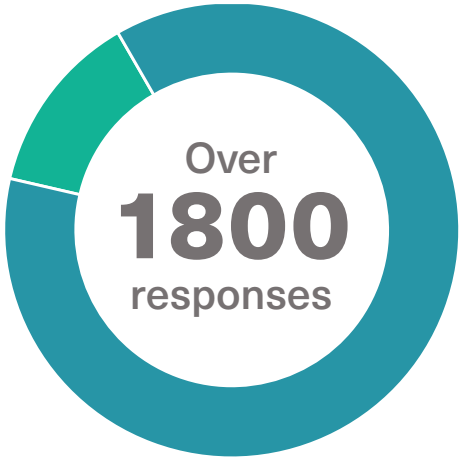
Survey questions covered topics such as:

- Familiarity with EVs
- Considerations around purchasing EVs
- Ongoing benefits and challenges to EV ownership
- Charging behaviour at home and in public
- Preferred types and locations of public chargers
- EV Strategy actions that the City of Surrey is proposing to take to accelerate electric vehicle adoption

Public Consultation Program to Inform City of Surrey EV Strategy



Surrey EV Strategy Survey #1: Barriers and Opportunities – Highlights



13% of respondents own an EV

87% of respondents do not own an EV

93% of respondents live in Surrey

42% of respondents work in Surrey

Understanding Familiarity with EVs

The majority of EV owners surveyed **have owned their EV for 3 years or less**.

73% of non-EV owners surveyed **have never driven an EV**.

Driving a friend or family member's EV or **taking a test drive** are the most common ways that the remaining 27% of non-EV owners have gained exposure to EVs.

Making Purchasing Decisions

Saving money on gas and **reducing impact on the environment** were identified as the top reasons to purchase an EV by both EV owners and non-EV owners.

Lower vehicle cost and **better access to public charging** were identified as top factors that would convince non-EV owners to purchase an EV.

Over half of EV owners surveyed (54%) identified **issues with access to and availability of public charging** as their primary ongoing challenge to owning an EV.

Exploring Charging Behaviour

Survey respondents who own EVs reported that **they do the majority of their vehicle charging at home** with a third of EV owners surveyed relying on **Level 1 charging** at home.

61% of EV owners surveyed indicated that **they access public EV chargers less than once a week**. 31% use public chargers every few days.

There are differences in perception between EV owners and non-EV owners about the **impact of vehicle range** on charging behaviour, with fewer EV owners ranking range anxiety as a main factor that impacts the frequency with which they charge.

City EV Strategy Actions

73%

of survey respondents feel that it is important or very important that the City invest in **increasing the number of publicly available EV chargers**.

73%

of survey respondents feel that it is important or very important that the City play a role in **increasing awareness and educating the public about EVs**.

65%

of survey respondents are supportive or very supportive of the City **introducing a fee for charging** at City-owned facilities.

EV OWNERS

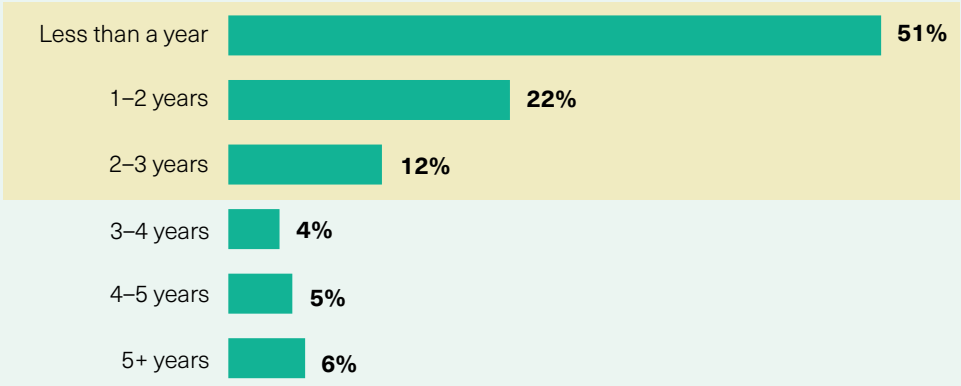
Length of time EV owners have owned their EVs

Of survey respondents who currently drive electric vehicles, the majority indicated that they have **become EV owners within the last three years**.

Over half (51%) of these respondents indicated that they became EV owners in the past year.

A smaller portion of respondents (15%) indicated that they have been an EV owner for three or more years.

Length of EV Ownership (EV Owners)



Question: *How long have you owned an EV?* (236 responses)

NON-EV OWNERS

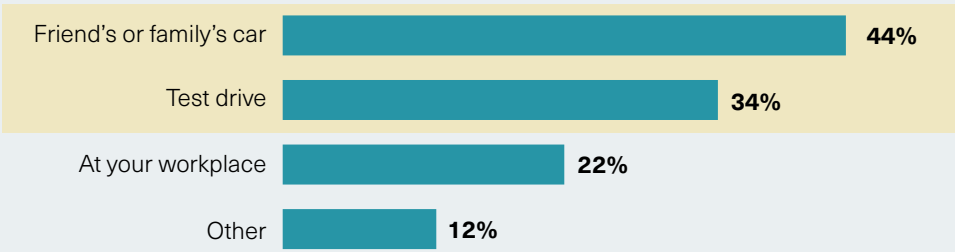
EV experience level of non-EV owners

73% of survey repsondents who do not currently own an electric vehicle reported that they have **never driven an EV.**

Of the 27% of non-EV driver respondents that have driven an EV, a significant number indicated that they have driven a friend or family member's EV (44%) or taken an EV for a test drive (34%).

Other respondents indicated that they have driven an EV at work or in contexts such as car shares, vehicle rentals and auto repair shop loaner vehicles.

EV Driving Experience (Non-EV Owners)



Question: *Please tell us where and how? Select all that apply.* (392 responses)

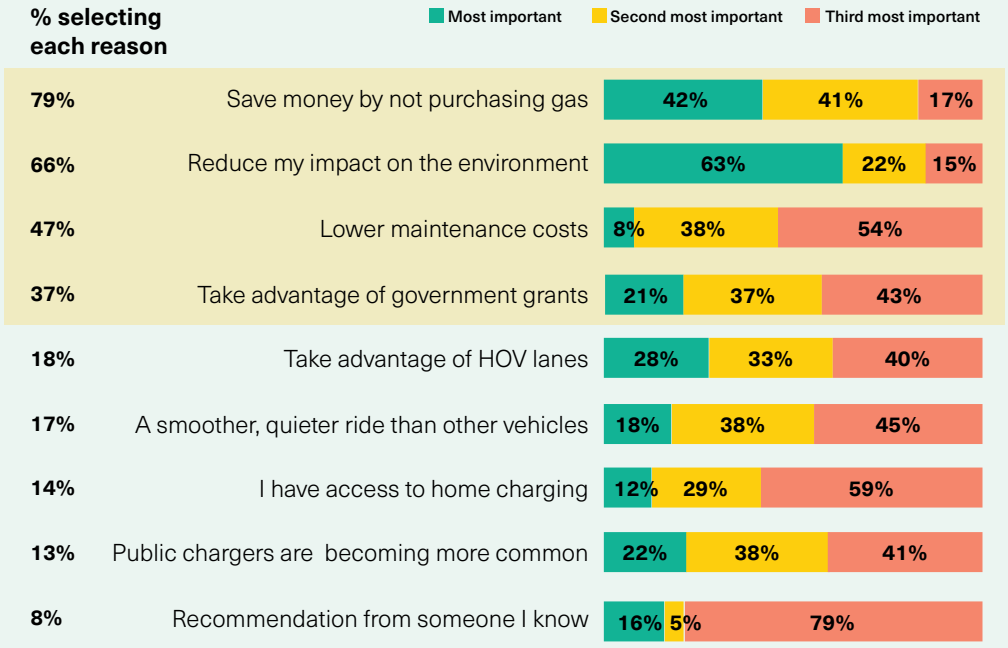
BENEFITS OF PURCHASING AN EV

Both EV owners and non-EV owners identified **saving money by not purchasing gas** and **reducing impact on the environment** as the top two reasons to purchase an electric vehicle. Additionally, EV owners surveyed indicated that fuel cost savings and reduced environmental impact are the primary ongoing benefits of owning an electric vehicle.

Other key reasons for purchasing EVs include **lower maintenance costs** and the **availability of government grants** to offset the initial purchase cost of an EV. Three out of four the four top benefits identified by survey respondents are financial, whereas one is environmental.

EV OWNERS

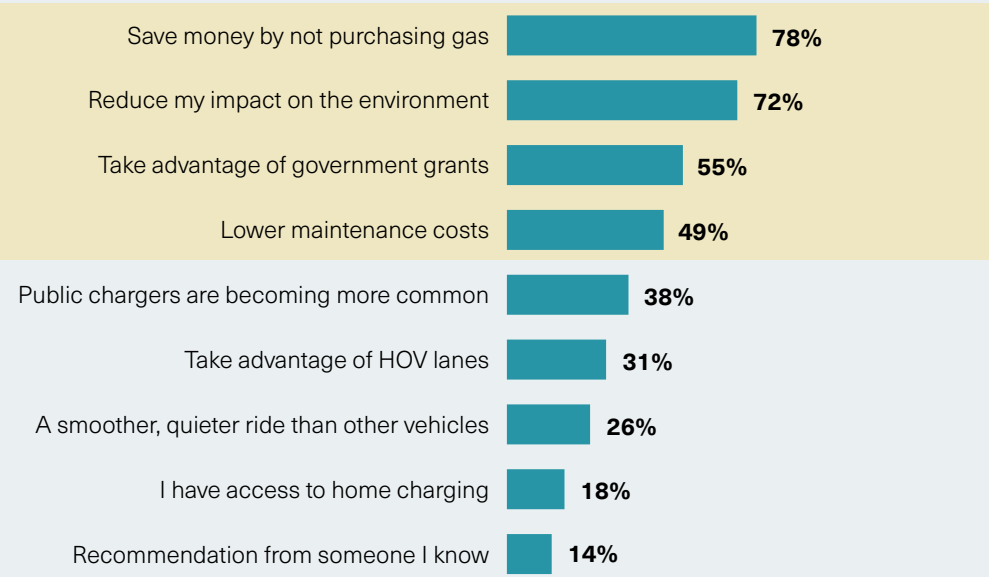
Reasons for purchasing an EV (EV owners)



Question: *What initially motivated you to purchase an EV? Rank the three most important motivators.* (238 responses)

NON-EV OWNERS

Reasons to purchase an EV in the future (Non-EV owners)



Question: *What would be your main reasons to buy an EV? Select all that apply.* (1493 responses)

BARRIERS TO PURCHASING AN EV

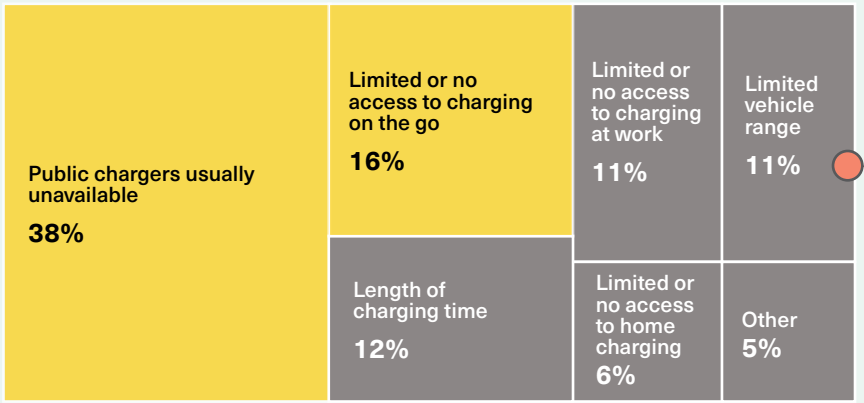
EV OWNERS

Ongoing challenges to EV ownership

Electric vehicle owners were asked to identify their primary ongoing challenge with owning an EV.

Over half of EV owners surveyed (54%) identified **issues with access to and availability of public charging** as their primary ongoing challenge to owning an EV.

Ongoing challenges to EV ownership



Question: *What is the primary ongoing challenge as an EV Owner? Select one answer.* (237 responses)

Note: A relatively small percentage of EV owners (11%) selected limited vehicle range as their primary ongoing challenge, contrasting with the significant number of non-EV owners indicating limited range as a key barrier to EV ownership (see chart to the right).

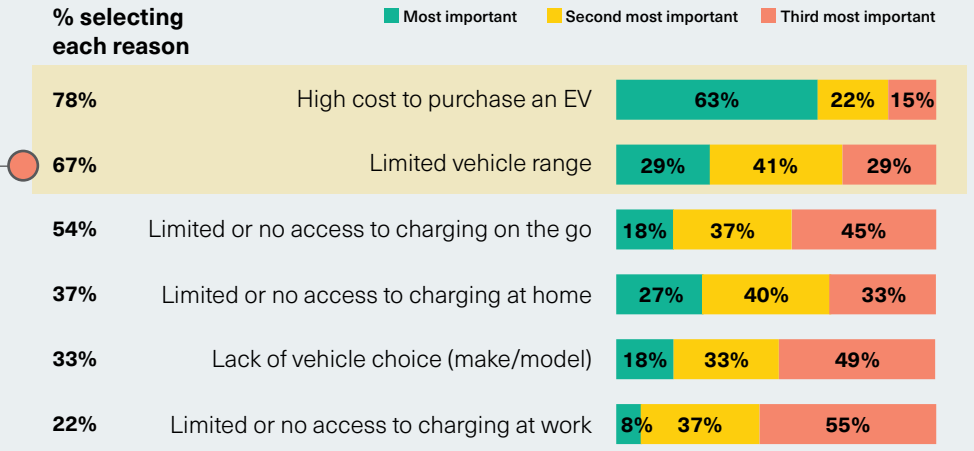
NON-EV OWNERS

Barriers to purchasing an EV in the future

Non-EV owners were asked to rank the top three reasons that would prevent them from owning an EV in the future.

Non-EV owners identified **high cost of purchase**, **concerns about limited vehicle range** and **limited access to charging** as key barriers to EV ownership.

Barriers to owning an EV (Non-EV Owners)

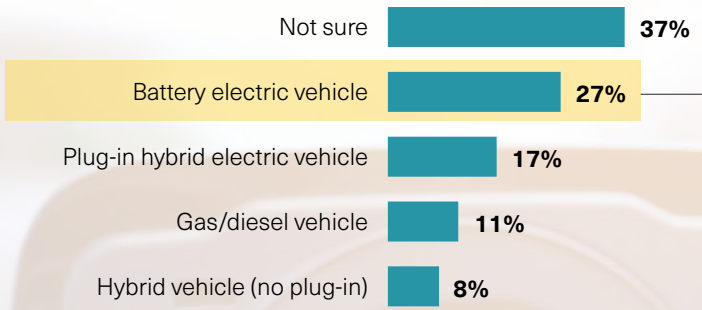


Question: *What are the top three barriers that would prevent you from owning an EV? Rank the three most important barriers.* (1494 responses)

PLANNING FUTURE VEHICLE PURCHASES

NON-EV OWNERS

Type of vehicle non-EV owners plan to purchase next

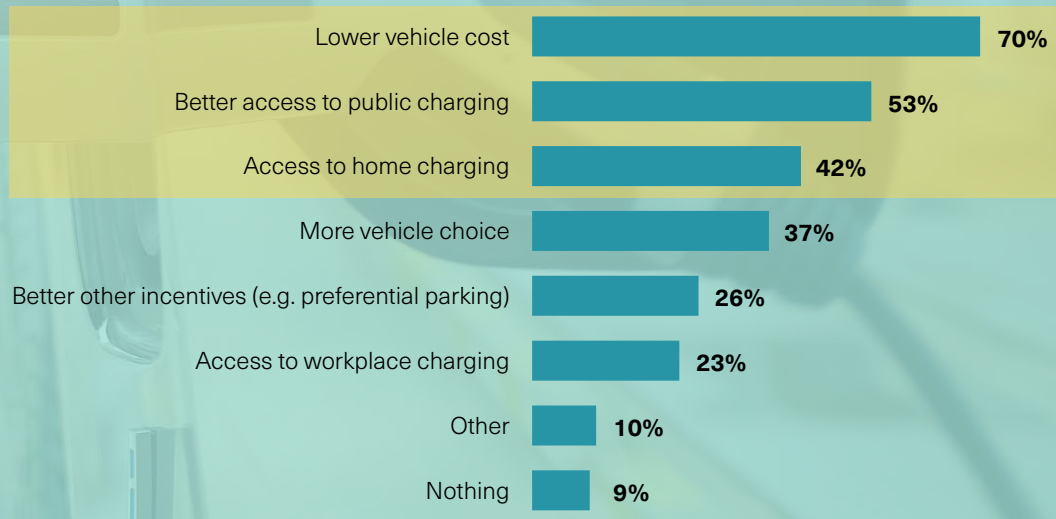


Question: *What type of vehicle will your next vehicle be?* (1123 responses)

27% of non-EV owners surveyed plan to purchase a fully electric vehicle in the future, compared to 25% who plan to purchase a hybrid vehicle, 11% who plan to purchase a gas/diesel vehicle and 37% undecided.

Lower vehicle cost and **better access to public and home charging** emerged as leading factors that would convince non-EV owner respondents to buy a fully electric vehicle.

Motivators to purchase a fully electric vehicle



Question: *What would convince you to buy a fully electric vehicle? Select all that apply.* (383 responses)

OVERVIEW OF CHARGING BEHAVIOUR

EV OWNERS

Distribution of charging time between home, workplace and public chargers

Survey respondents who own EVs reported that **they do the majority of their vehicle charging at home**, with some charging taking place in public or at work.

Average amount of time spent charging at different locations

73%
of charging time spent **at home**

17%
of charging time spent **at public chargers/on the go**

13%
of charging time spent **at work**

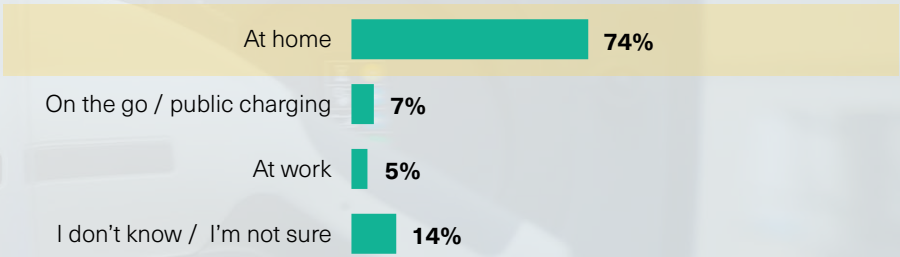
Question: *What percent of the time do you charge your EV at each of the following locations?* (233 responses)

NON-EV OWNERS

Predictions about distribution of charging time between home, workplace and public chargers

The majority of non-EV owner respondents indicated that they **would most likely charge at home** if they were to purchase an EV.

Most likely place to charge an electric vehicle



Question: *If you owned an electric vehicle, where do you think you would charge it most?* (1475 responses)

FREQUENCY OF CHARGING

EV OWNERS

Factors that affect the charging frequency of EV owners

EV owners surveyed were asked about factors that currently affect charging frequency.

Availability of at home/at work charging emerged as the number one factor that impacts frequency of charging for EV owners.

NON-EV OWNERS

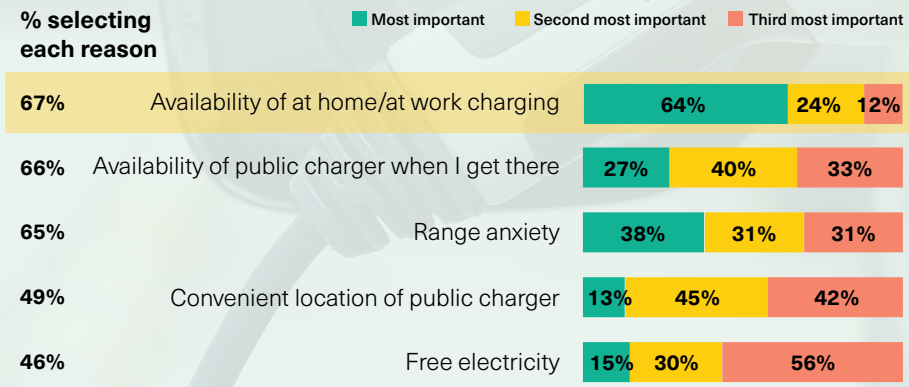
Perceptions about public charging frequency from non-EV owners

Non-EV owners surveyed were asked what factors they believe would affect their charging frequency if they owned an EV.

Range anxiety, defined as fear that the EV battery will run out of power before the vehicle reaches the desired destination, emerged as the number one factor that non-EV owners believed would impact frequency of charging.

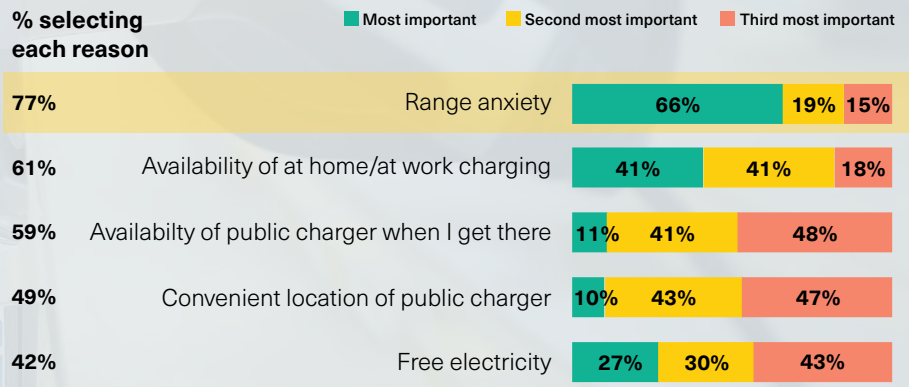
NOTE: The percentage of EV owners indicating that **range anxiety** is most important factor affecting frequency of charging was significantly lower than non-EV owners surveyed.

Factors affecting frequency of charging (EV Owners)



Question: *What factors affect how often you charge? Rank the three most important factors.* (233 responses)

Factors affecting frequency of charging (Non-EV Owners)

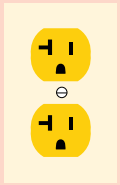


Question: *If you owned an EV, what factors do you believe would affect how often you charge? Rank the three most important factors.* (1471 responses)

CHARGING AT HOME

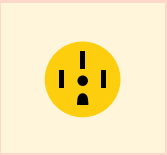
TYPES OF HOME CHARGERS

There are two types of home charging available for EVs: Level 1 and Level 2.



Level 1 charging uses a standard 110 volt household outlet where EV owners plug in the cable adapter that comes standard with their EV.

With Level 1 charging, it takes **8 to 16 hours** to fully charge an EV from an empty battery and six to eight hours to fully charge a plug-in Hybrid.



Level 2 charging uses a specially-installed 220 volt outlet and results in a faster EV charging time.

A Level 2 charger will fully charge an EV in **6 to 8 hours** and a plug-in hybrid vehicle in three to four hours.

SUMMARY OF CHARGING LEVELS AVAILABLE AT HOME

Home charging levels available to EV owners

While the majority of EV owner respondents reported that they have access to Level 2 charging at home, **over one third of EV owners surveyed indicated that they rely on slower Level 1 charging** to charge their vehicles at home.

Home charging levels available to non-EV owners

Significantly fewer non-EV owners surveyed have access to Level 2 charging (15% compared to 64% of EV owners surveyed).

Despite 74% of non-EV owner respondents reporting that they would most likely charge an EV at home, **45% of non-EV owners reported that they have no access to home charging**.

Summary of survey feedback

Availability of charging at home	EV Owners	Non-EV Owners
Access to 110 volt outlet (Level 1)	**36%**	**40%**
Access to 220 volt outlet (Level 2)	**64%**	**15%**
No access to charging	**0%**	**45%**

Question (EV owners): *What type of home charging do you use, Level 1 or Level 2?* (233 responses)
Question (Non-EV owners): *Do you have access to charging at home?* (1475 responses)

CHARGING IN PUBLIC

EV OWNERS

Public charging frequency

The majority of EV owners surveyed (61%) indicated that they access public EV chargers less than once a week. 31% reported that they access public chargers every few days.

Only 7% of EV owners surveyed indicated that they access public EV chargers most days or daily.

Time of day that public charging is accessed

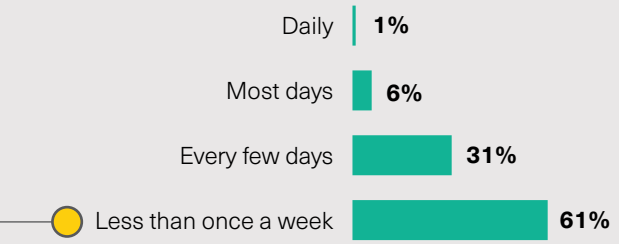
Sixty-one percent of EV owners surveyed indicated that they access public chargers between the hours of 10 am and 6 pm, positioning this timeframe as the busiest for public charging.

While some EV owners access public chargers before and after these hours, only 3% of respondents indicated that they access public chargers overnight.

How charging is integrated into the lifestyles of drivers

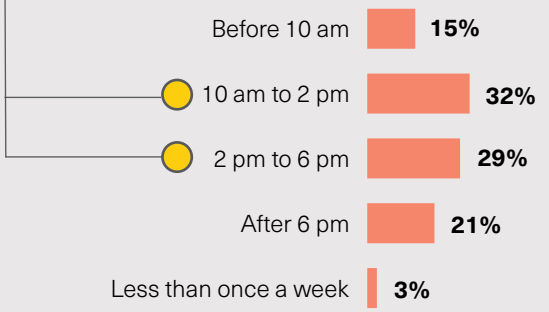
Respondents indicated that approximately **half of public charging sessions are purposeful**, with EV owners driving out of their way to access charging stations, and **half are integrated into daily/ weekly activities**.

Frequency of charging at publicly accessible charging stations



Question: *How often do you charge at publicly accessibly chargers?*
(233 responses)

Timing of charging at publicly accessible charging stations



Question: *What time of day do you typically charge at public chargers?*
(233 responses)

CHARGING IN PUBLIC

ABOUT DC FAST CHARGERS

Charging speed

Currently the fastest method of charging an EV is through a **DC Fast Charger (DCFC)**, also sometimes known as a Level 3 charger.

A DCFC can typically charge an EV battery from 0% to 80% in approximately 30 minutes, which is about 6 to 8 times faster than a Level 2 charger.

Installation costs

DCFC stations are **expensive to install** due to the large amount of electrical infrastructure required to support them.

A typical DCFC installation costs approximately $100,000, which is roughly 5 times the cost of a Level 2 installation.

With the knowledge that the City of Surrey intends to implement an hourly rate for DCFC charging to offset the high cost of installation, survey respondents were asked to answer questions about preferred types, distribution and locations of public chargers.

PREFERRED TYPES AND LOCATIONS OF PUBLIC CHARGERS

Types of installations preferred

41%
of survey respondents want **more Level 2 chargers** and fewer DC Fast Chargers

38%
of survey respondents want **more DC Fast Chargers** and fewer Level 2 chargers

20%
of survey respondents don't know.

Preferred distance to drive to public chargers

Five to ten minutes was identified as the ideal drive time to either a public Level 2 charger or a DCFC. Survey feedback demonstrates that willingness to travel to public chargers drops off after ten minutes.

Preferred locations for public chargers

Preferred locations for public chargers identified by survey respondents include:

- **Recreation centres and libraries**
- **Adjacent to major highways and roads**
- **Retail locations on private property**

GATHERING INPUT ON EV STRATEGY ACTIONS

Survey respondents were asked to provide input on their level of support for actions that the City is proposing to take to encourage EV adoption.

Proposed actions include:

- Investing in increasing the number of publicly available EV chargers in the City
- Increasing awareness of and educating the public about EVs
- Providing small grants to stratas to help offset some of the cost of installing EV charging infrastructure
- Using funds from developers to provide shared EVs and dedicated charging infrastructure for public use
- Developing a workplace charging program for City staff with chargers available to the public outside of business hours
- Converting the City's fleet of medium-duty and heavy-duty vehicles to EVs
- Introducing a fee for charging at City-owned facilities
- Advocating for provincial legislation that supports EV adoption

SUMMARY OF KEY FINDINGS

73%

of survey respondents feel that it is important or very important that the City invest in **increasing the number of publicly available EV chargers.**

14% opposed, 13% neutral/don't know

73%

of survey respondents feel that it is important or very important that the City play a role in **increasing awareness and educating the public about EVs.**

14% opposed, 15% neutral/don't know

65%

of survey respondents are supportive or very supportive of the City **introducing a fee for charging** at City-owned facilities.

20% opposed, 16% neutral/don't know

76%

of survey respondents are supportive or very supportive of the Province of British Columbia implementing **"Right to Charge" legislation** that would reduce barriers to installing charging stations in existing apartment and condominium buildings.

4% opposed, 20% neutral/don't know

NEXT STEPS

The City of Surrey will draft the EV Strategy based on the input and ideas gathered from Surrey EV Strategy Survey #1, focus groups and other research and analysis.

The City will present draft actions to stakeholders for another round of engagement in mid 2020 to further shape and refine the EV Strategy before it is finalized and presented to Surrey City Council in Fall 2020.