

Township of
Langley



Est. 1873

LOW CARBON MOBILITY PLAN: ELECTRIC VEHICLES

Prepared for:

Township of Langley

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 **INTEGRAL**

with **MCEWAN CLIMATE & ENERGY**



TABLE OF CONTENTS

1.	INTRODUCTION TO THE LOW CARBON MOBILITY PLAN	3
2.	ELECTRIC VEHICLES.....	5
2.1	WHAT ARE EVs?	6
2.2	WHY PLAN FOR EVs?	8
2.3	FEDERAL ACTION ON EVs.....	9
2.4	PROVINCIAL ACTION ON EVs.....	11
2.5	WHY EVs?	12
3.	ELECTRIC VEHICLES IN PERSPECTIVE.....	13
3.1	MARKET TRENDS.....	13
3.2	EVs IN LANGLEY TOWNSHIP	14
3.3	FACTORS AFFECTING EV ADOPTION.....	17
4.	KEY ACTIONS.....	21
4.1	LEADERSHIP IN TOWNSHIP FLEET, EQUIPMENT AND PROCUREMENT	22
4.2	EV CHARGING ON PRIVATE PROPERTY.....	23
4.3	PUBLICLY ACCESSIBLE EV CHARGING	24
4.4	STRATEGIES FOR TRUCKS, BUSES AND OFF-ROAD TRANSPORTATION.....	26
4.5	PUBLIC EDUCATION AND AWARENESS.....	27
4.6	ELECTRIFYING SHARED MOBILITY.....	28
4.7	ADVOCACY FOR EV LEADERSHIP FROM OTHER LEVELS OF GOVERNMENT AND UTILITIES.....	30
5.	MOVING FORWARD	31
	REFERENCES	32

1. INTRODUCTION TO THE LOW CARBON MOBILITY PLAN

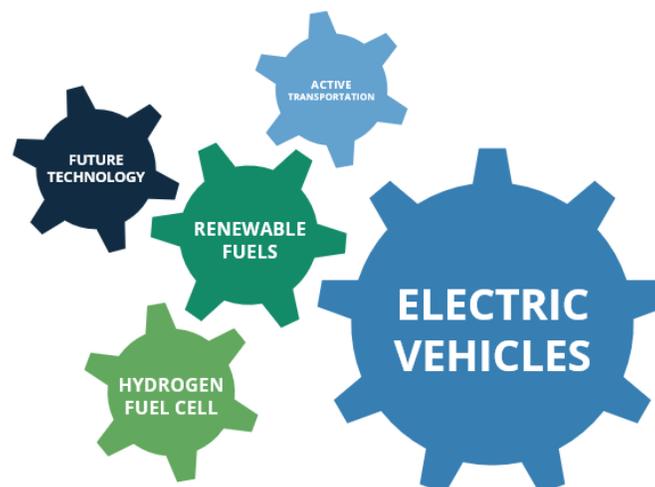
In light of efforts to reduce greenhouse gas emissions, including a Council declaration of a climate emergency in July 2019, the Township of Langley recognizes the need to plan for new modes of low carbon mobility and work toward more sustainable transportation systems.

For the purposes of this Plan, “low carbon mobility” refers to shifting to transportation systems that emit zero or low amounts of greenhouse gas (GHG) emissions. For vehicles, these systems include electric vehicles (EVs), hydrogen fuel-cell technology, and renewable fuels.

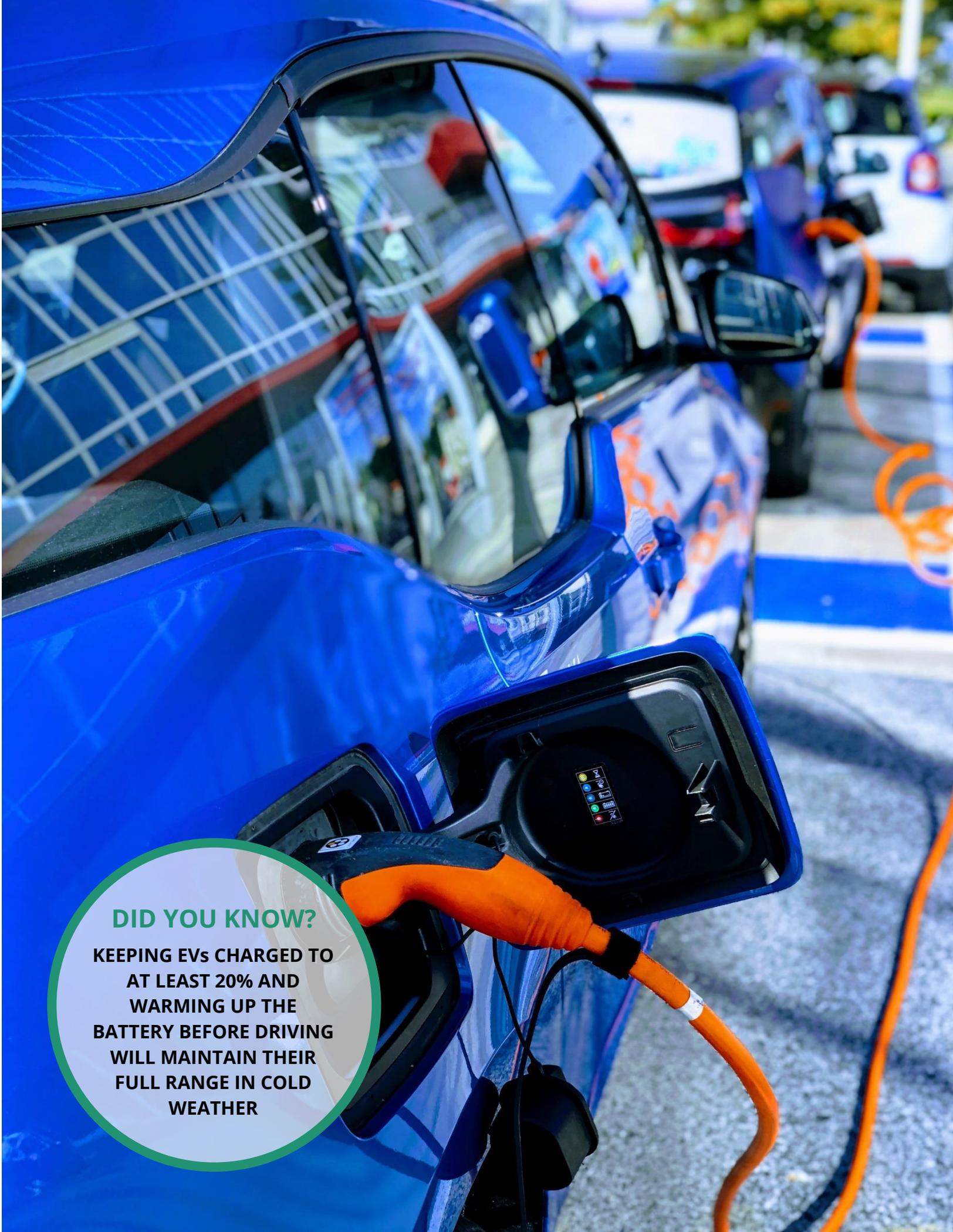
Low-carbon vehicle systems are becoming increasingly competitive in a range of transportation modes, including passenger vehicles, medium- and heavy-duty vehicles, transit (e.g. bus, Skytrain, and passenger trains), “little vehicles” (e.g. motor scooters and electric bikes), cargo trains, watercraft, and aircraft. Low carbon mobility also includes active modes of transportation such as walking, cycling, and rolling (e.g. inline skates, kick scooters, and skateboards).

With a wide range of low carbon mobility systems emerging, there is still some uncertainty regarding technology development and what modes of transportation will ultimately become most optimal. For this reason, the Low Carbon Mobility Plan (LCMP) is a living framework that will be regularly revisited.

The order of the individual components added to the LCMP does not speak to the priority or promise of technology, but rather its imminence in the community and strategic planning timeline. Each chapter or entry will be implemented and re-evaluated independently, but within perspective of the Plan as a whole. This ensures the Township is planning for contemporary mobility needs efficiently and in real-time, while fostering GHG reductions to address climate change challenges.



The pieces of the Township's Low Carbon Mobility Plan



DID YOU KNOW?

**KEEPING EVs CHARGED TO
AT LEAST 20% AND
WARMING UP THE
BATTERY BEFORE DRIVING
WILL MAINTAIN THEIR
FULL RANGE IN COLD
WEATHER**

2. ELECTRIC VEHICLES

“The number of EV models available on the market has never been higher, making EVs an increasingly viable choice for British Columbian drivers.”

There has been an increase in the prevalence of electric vehicles (EVs) over the last several years, both in Canada and internationally. The rise of EVs is largely a product of their increasing affordability, greater efficiency and lower cost to operate than gasoline or diesel vehicles, and supportive government policy. Consumers are also turning toward EVs as a way of reducing their environmental impact, as they release few, if any, greenhouse gas emissions and air pollutants into the atmosphere. EVs offer several other benefits to consumers and local governments alike, such as reduced maintenance costs, improved community health, and quieter streetscapes.

The number of EV models available on the market has never been higher, making EVs an increasingly viable choice for British Columbian drivers. However, there are still many barriers to EV adoption, which is why the Township of Langley has created a Low Carbon Mobility Plan (LCMP). The EV plan will provide a framework that will guide efforts to support further electrification of the transportation sector in the Township, including public and municipal vehicles. Specifically, it has been designed to:

- Encourage and support further adoption of EVs to help reduce community and fleet GHG emissions;
- Establish the role of the Township and the private sector in providing EV infrastructure and services;
- Aid the Township in responding to growing demand for EV infrastructure, both by Township employees and the community; and
- Increase public and industry awareness about the EV industry.

The EV plan combines industry-leading knowledge with feedback from local stakeholders and Township residents to provide a strong foundation for the Township’s pursuit of electric mobility, and provides a foundation from which the Township can achieve its broader sustainable transportation goals.

2.1 WHAT ARE EVs?

This EV plan focuses on supporting adoption of plug-in EVs. Plug-in EVs include battery electric vehicles and plug-in hybrid electric vehicles.

BATTERY ELECTRIC VEHICLES (BEV)



are propelled by electricity from onboard batteries charged via an external power source, typically the electric grid. Many BEVs available today are capable of travelling over 300km on a single charge.

PLUG-IN HYBRID ELECTRIC VEHICLES (PHEV)



come equipped with all-electric and fossil-fuel capabilities. PHEVs feature batteries that power an electric motor and can be charged via an external power source. They also can use another fuel, such as gasoline, to power an engine or generator. PHEVs usually run on batteries for shorter trips, and then can automatically switch to another fuel.

Other vehicle technologies, such as hydrogen fuel cell vehicles, may be important to achieve zero-emissions transportation in certain applications, such as long-haul trucking. However, because of the very different infrastructure needs they present, they will be addressed in later additions to the LCMP.

Plug-in EVs are currently the most efficient and sustainable option to replace traditional fossil fuel powered vehicles. Plug-in EVs will represent the most competitive option for the vast majority of passenger vehicles, as well as most commercial trucking and off-road applications.

DEFINITION: Electric vehicles (EVs) or zero-emissions vehicles (ZEVs)?

Zero-emissions vehicles (ZEVs) are vehicles that have no tailpipe emissions of GHGs or air pollutants.

ZEVs include plug-in EVs, both BEVs and PHEVs when propelled by their batteries. ZEVs also include hydrogen fuel cell vehicles (HFCVs), which are fueled with hydrogen, then produce electricity to power an electric motor via a hydrogen fuel cell. Hybrid hydrogen fuel cell and battery EVs may likely emerge in the future.

How fast can you charge an EV?

Different kinds of EV infrastructure have different charging rates, depending on the size of the battery.

LEVEL 1

Use a **120-volt** system to fully charge an EV in **8-20 hours**

LEVEL 2

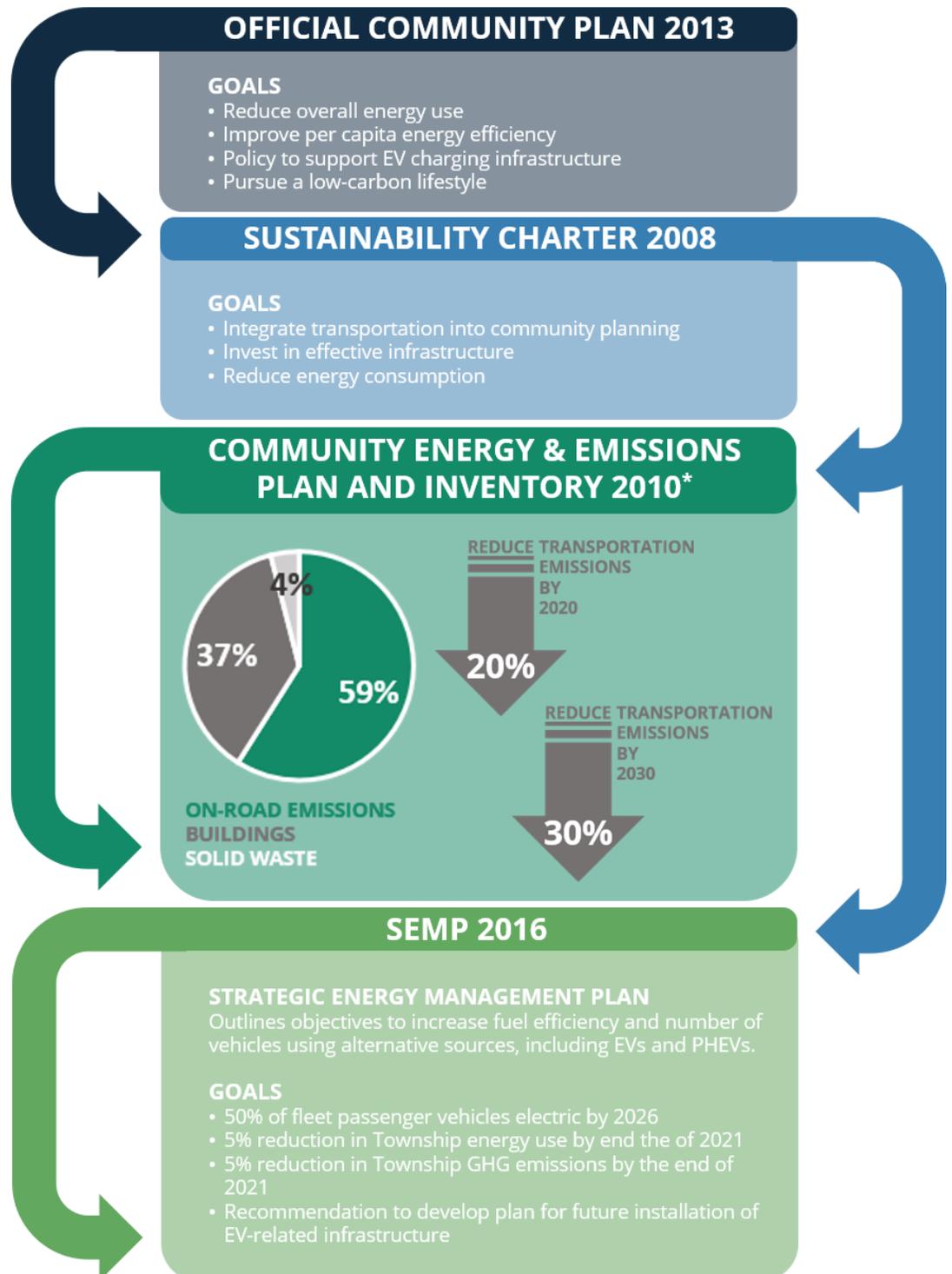
Use a **240-volt** system to fully charge an EV in **4-6 hours**

LEVEL 3

Use a **480-volt** system to fully charge EV in **under an hour**

2.2 WHY PLAN FOR EVs?

The idea of EVs in the Township was first introduced with the *Sustainability Charter* in 2008. Since then, several other related strategies (see below) have been released, all with the general goal of reducing overall emissions and managing energy within the Township. The EV entry of the LCMP is important to bring these goals together in a cohesive way to ensure the Township is prepared for the future of EVs.



*The Township is currently in the process of developing an updated CEEP that is expected to be implemented in 2020. This updated CEEP will place transportation emissions within the broader context of communitywide emissions.

2.3 FEDERAL ACTION ON EVs

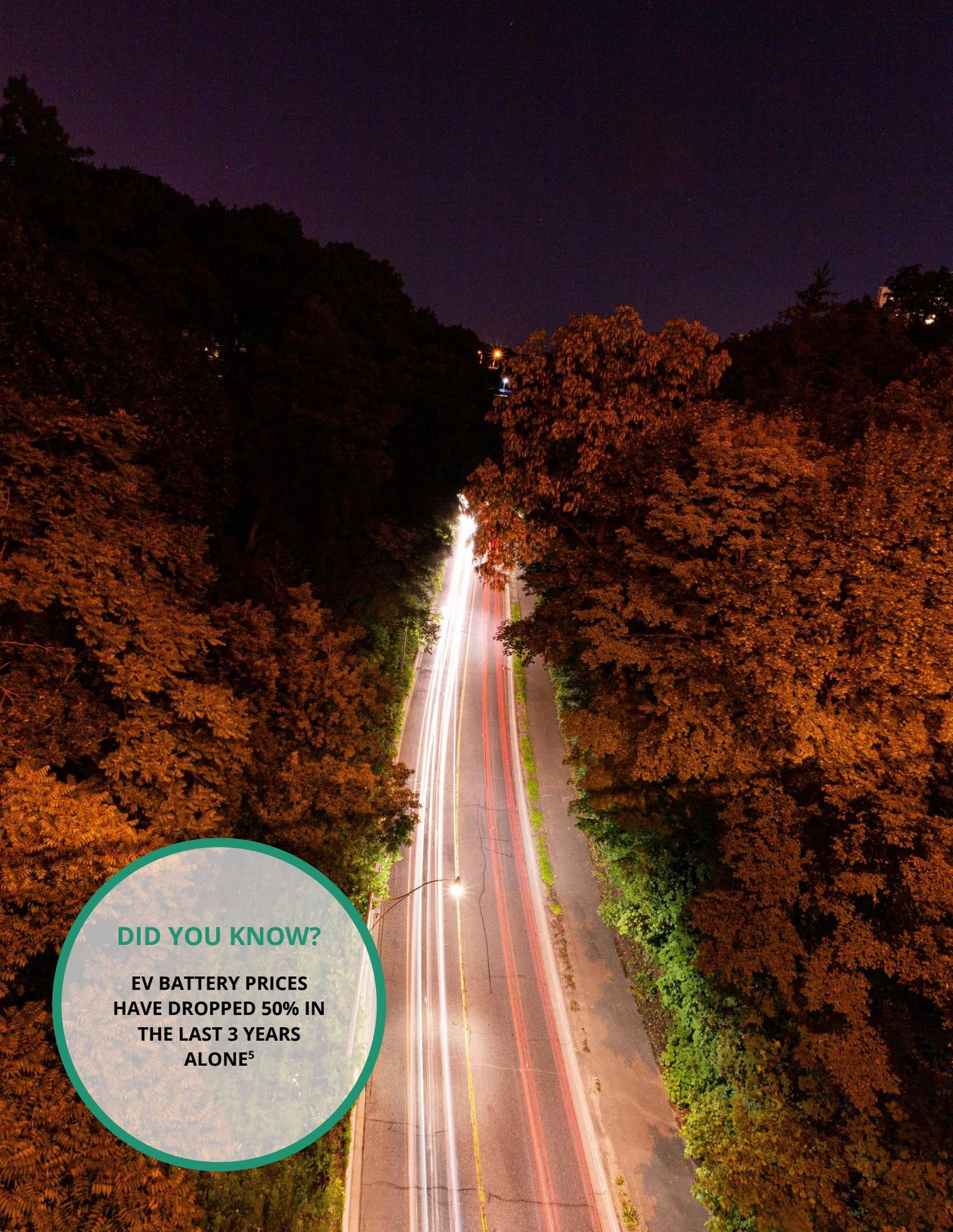
In 2016, the Government of Canada pledged to reduce national GHG emissions by 30% relative to 2005-year emissions by 2030¹. It further established a framework² to reduce emissions, grow the clean economy, and develop resilience to the changing climate. In respect to clean growth and transportation, the framework highlighted the need to increase the number of zero-emission vehicles (ZEVs) on the road and shift from higher- to lower-emitting modes of transportation.

In an effort to green government operations, the federal government has additionally committed to purchasing ZEVs or hybrids for 100% of their new executive vehicles and 75% of new light-duty unmodified administrative vehicles³. For the broader population, a set of Canada-wide targets will see an increase in sales of new ZEVs to 10% by 2025, 30% by 2030, and 100% by 2040. Steady progress towards these goals are projected to put 14.1 million new ZEVs on the road by 2040.

Effective May 2019, the federal government began providing purchase and lease incentives through the *Incentives for Zero-Emission Vehicles Program* (iZEV).⁴

The iZEV program is designed to help Canadians afford clean transportation technology through point-of-sale incentives for individuals and tax write-offs for businesses. Program features include:

- **\$5,000** in incentives for battery-electric, hydrogen fuel cell, and longer-range PHEVs;
- **\$2,500** in incentives for shorter range PHEVs; and
- A **100%** tax write-off for ZEVs to support adoption by businesses.



DID YOU KNOW?

**EV BATTERY PRICES
HAVE DROPPED 50% IN
THE LAST 3 YEARS
ALONE⁵**

2.5 PROVINCIAL ACTION ON EVs

The Government of British Columbia's 2018 *CleanBC*⁶ plan sets a goal of reducing provincial GHG emissions and growing the low-carbon economy. It renews the Province's commitment to emissions reductions of 40% by 2030, 60% by 2040, and 80% by 2050 (relative to 2007 levels)⁷. With respect to transportation, *CleanBC* outlines two key actions: bring down the price of clean vehicles and speed up the switch to cleaner fuels.

CleanBC also establishes an active transportation strategy, with measures to promote cycling, walking, and other methods of non-motorized transport.

The Province will further support active transportation through the provision of incentives for local governments and public-sector organizations that reduce the need for commuting.

There are a number of programs available in British Columbia that encourage EV adoption. Relevant programs are listed below in Table 1, along with a description of the key features of each program.

Table 1 Summary of EV Programs and Incentives in British Columbia

Program Name	Program Description
Clean Energy Vehicles for British Columbia (CEVforBC)⁸ Program	<ul style="list-style-type: none"> Introduced in 2011 and has since committed more than \$71 million to vehicle point-of-sale incentives and charging infrastructure.
BC SCRAP-IT Program⁹	<ul style="list-style-type: none"> Provides a potential rebate of up to \$6,000 for early retirement of old vehicles that are replaced with EVs. While 2019 funding has been exhausted, additional funding is expected in 2020.
Specialty Use Vehicle Incentive (SUVI) Program¹⁰	<ul style="list-style-type: none"> Offers between \$2,000 and \$50,000 for other vehicle types such as e-motorbikes, forklifts, trucks and buses.
ZAPBC Program¹¹	<ul style="list-style-type: none"> Provides a free Level 2 ChargePoint Charger for home use. 2019 funding has been exhausted; however, additional funding is expected in 2020.
Charging Incentives and Solutions Program¹²	<ul style="list-style-type: none"> Provides incentives towards the purchase and installation of eligible electric vehicle charging equipment and support services for homes, multiple-unit residential building (MURBs) and workplaces (program fully subscribed, additional funding expected).

2.6 WHY EVs?

The electrification of mobility is an important policy objective at the municipal, provincial, and federal government levels. This collective pursuit of low-carbon transportation is due in large part to the benefits of EVs; experts widely agree that EVs are better for humans and the environment than conventional internal combustion engine (ICE) vehicles. EVs can provide a number of financial and non-financial benefits for both EV owners and non-owners (see Table 2).

Table 2 Benefits of EVs

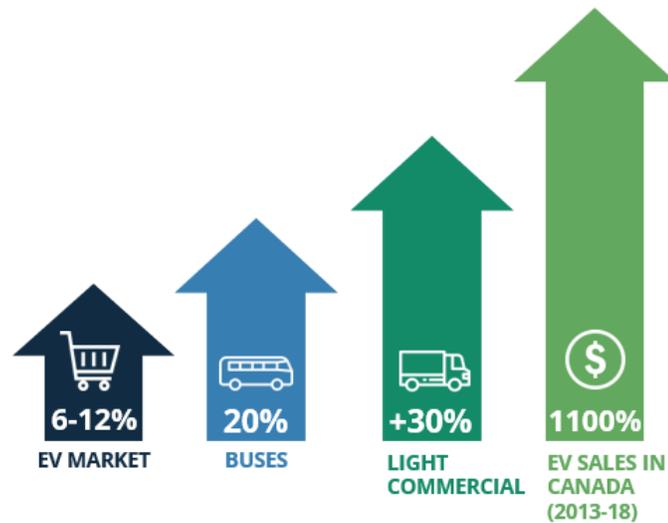
Economic Benefits	
Lower Operational Costs 	<ul style="list-style-type: none"> In BC, electricity is currently less expensive than both gasoline and diesel With an annual driving distance of 20,000 km, EVs can save more than \$2,000 in fuel costs per year¹³
Lower Maintenance Costs 	<ul style="list-style-type: none"> EV motors, batteries, and drivetrain electronics require no regular maintenance In BC, EV owners spend approximately \$375 less annually on maintenance than ICE vehicle owners¹⁴ For municipal and company fleets, it is estimated that ZEVs' maintenance costs are approximately two-thirds less than ICE vehicles, resulting in lower lifecycle costs for the fleet
Local Economy 	<ul style="list-style-type: none"> Electricity in BC is primarily produced in-province, resulting in EV owners' expenditures on this power source benefitting local and regional economies¹⁵ EV adoption has also been shown to generate employment in research and development, manufacturing, charging infrastructure installation, and charging infrastructure maintenance¹⁶
Environmental Benefits	
GHG Emissions Reductions 	<ul style="list-style-type: none"> EVs substantially reduce GHGs by partially or completely eliminating tailpipe emissions¹⁷ In BC, EVs can reduce vehicular travel emissions by 80-98%, compared to an ICE vehicle¹⁸
Battery Life & Recycling 	<ul style="list-style-type: none"> Most EVs come standard with lithium-ion batteries, which are 90% recyclable Lithium-ion batteries can also be repurposed for energy storage because they retain about 70% of their capacity, supporting lower cost and lower carbon electricity systems¹⁹
Grid Integration & Resilience 	<ul style="list-style-type: none"> EV charging can occur during times of low electricity demand, resulting in lower costs for EV drivers, as well as lower electricity rates for all utility customers Flexibility in EV charging can also help integrate sources of renewable energy (e.g. solar and wind). In the future, EVs and associated charging infrastructure may be designed to allow excess battery-stored energy to be sold back to the local utility, used to meet residential energy needs, and/or provide a source of emergency power and battery storage
Health Benefits	
Reduced Air Pollution 	<ul style="list-style-type: none"> Because electric motors do not combust fossil fuels, EVs do not emit carbon monoxide (CO), volatile organic compounds (VOCs), nitrogen oxides (NOx), or fine particulate matter, which are major contributors to air pollution and associated health problems²⁰
Reduced Noise Pollution 	<ul style="list-style-type: none"> Constant or repeated exposure to high levels of environmental noise can negatively affect health Because EVs produce little to no road noise (especially at low speeds), they have significant potential to reduce noise pollution in the urban environment
Lower Urban Heat Island Effects 	<ul style="list-style-type: none"> The urban heat island (UHI) effect is a process in which densely populated urban areas trap heat²¹ The UHI effect primarily occurs because buildings and paved roads absorb and hold warmth more effectively than rural areas and naturally vegetated ecosystems, but is exacerbated by the use of vehicles and other equipment EVs can help mitigate the UHI, as they generate ~20% of the total heat of ICE vehicles²²

3. ELECTRIC VEHICLES IN PERSPECTIVE

3.1 MARKET TRENDS

Electric mobility is growing rapidly in many parts of the world, due in large part to the falling cost of EVs, supportive government policies and incentives, as well as increased consumer familiarity with the technology. In 2018, the global EV fleet reached a total of 5.1 million vehicles, an increase of two million vehicles over the previous year²³.

GROWTH IN THE EV MARKET



3.2 EVs IN LANGLEY TOWNSHIP

The availability of charging infrastructure in the Township has increased substantially since the first charging stations were installed in 2013. As of April 2019, the Township offers free public access to seven Level 2 EV charging stations, although fees may be incurred in the future. Charging stations are located at:

- Aldergrove Credit Union Community Centre;
- Township Civic Facility;
- Langley Events Centre;
- Walnut Grove Community Centre; and
- W.C. Blair Recreation Centre

The Township is also host to a BC Hydro-owned DC Fast Charger, located at the Langley Events Centre. There are also plans to add an additional Level 2 charger at the George Preston Recreation Centre, as well as two more chargers at local shopping centres. This growing number of charging stations will support the growing interest in EVs among Langley Township residents.

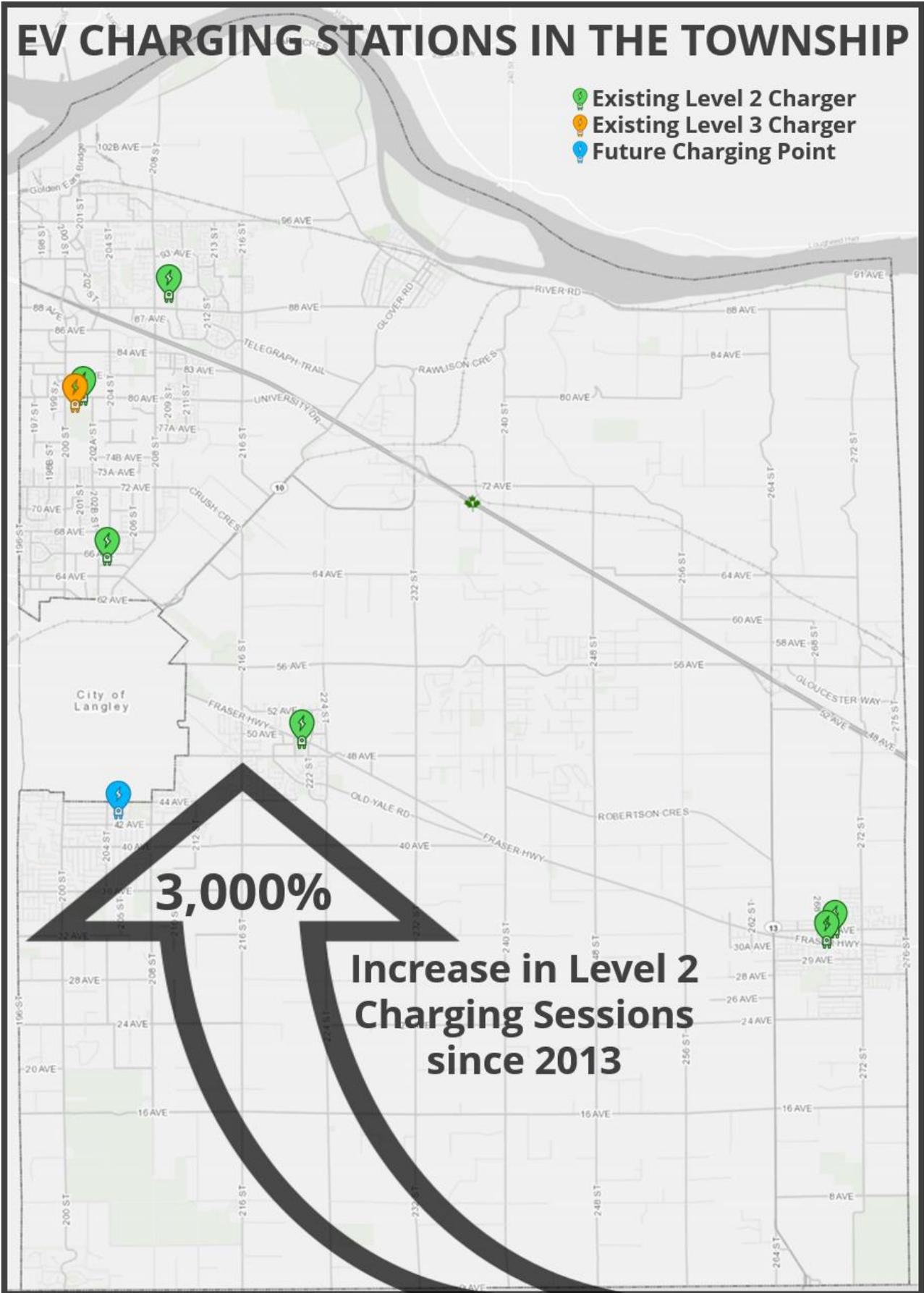


WHAT WE HEARD

Results from the Township's 2019 Resident EV Survey suggest that **69% of survey respondents were *somewhat to very likely* to purchase an EV.**

A majority of residents see the potential for EVs to mitigate the environmental impact of vehicular travel. Out of 394 responses, **79% of respondents felt that electric vehicles are better for the environment** than conventional vehicles, while only 10% felt that EVs are worse for the environment.

Feedback from the Township's 2019 Resident EV Survey also suggest that planned locations for future charging infrastructure should be in line with the desires of the community. Suggested locations for charging capacity include shopping locations, public parks, community centres, and gas stations, among other locations.





DID YOU KNOW?

**MANY EV
MANUFACTURERS ARE
INVESTING IN RECYCLING
THE LITHIUM IN EV
BATTERIES AS A WAY OF
REDUCING BOTH COSTS
AND ENVIRONMENTAL
IMPACTS**

3.3 FACTORS AFFECTING EV ADOPTION

There are a number of factors that strongly influence rates of EV adoption, including incentives and initial cost, availability of charging infrastructure, vehicle availability and selection, public education and awareness, and shared mobility. Each of these factors is discussed below.

Incentives and Initial Cost \$

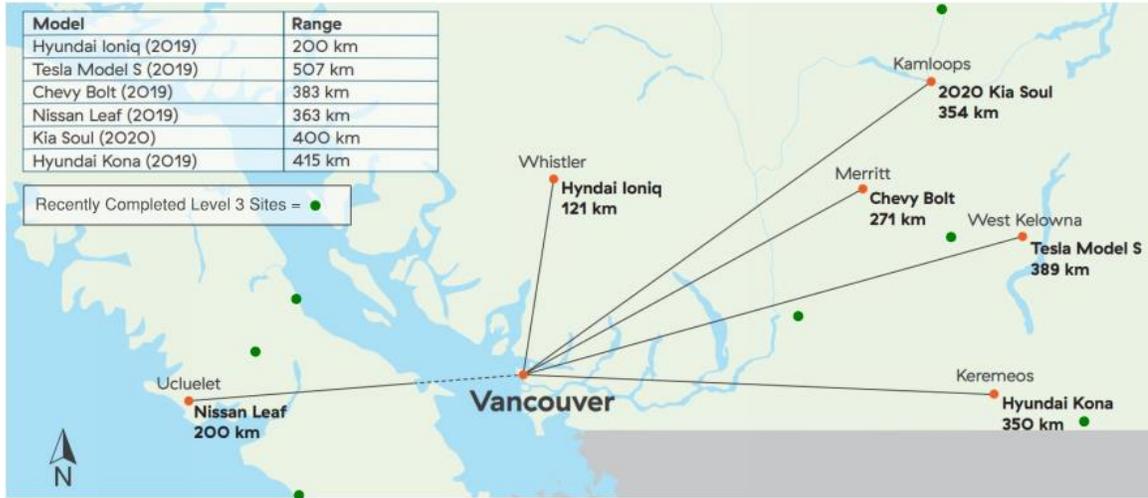
The availability of financial incentives has a dramatic influence on EV purchase rates in Canada, with more than 97% of EV purchases taking place in provinces that offer substantial financial incentives²⁴. The provision of these incentives helps offset the initial cost of EVs which, despite recent increases in affordability, is still greater than comparable fossil fuel-powered vehicles. Even without rebates or incentives, many electric models can now be purchased for between \$35,000 and \$45,000, with the least expensive options available for as low as \$27,000²⁵.

Availability of Charging Infrastructure

The availability of adequate charging infrastructure can strongly influence consumers' EV purchase decisions. In past years, undersupply of charging infrastructure in British Columbia acted as a barrier to EV purchasing. However, the availability of publicly accessible charging stations has increased dramatically, particularly in the Lower Mainland and eastern portion of Vancouver Island. As of summer 2019, there are more than 1,700 charging stations throughout British Columbia, including nine Level 3 fast charger sites recently built by the province, and another six planned for construction in 2019 and 2020²⁶. Moreover, FortisBC has announced a "40 by 2020" plan that will see 40 Level 3 charging stations in the Kelowna-Creston-Princeton area by the end of 2020²⁷. The growth of this province-wide Level 3 network is likely to help to alleviate range-anxiety for Township families, opening up the majority of the province to EV travel.

Despite recent investments in charging infrastructure, concerns over EV battery range and performance in cold weather continue to influence purchase decisions. A 2019 BC Hydro study revealed that nearly 70% of survey respondents indicated that they are hesitant to purchase an EV due to concerns over the reliability of EVs for travel on out-of-town road trips²⁸. However, the survey also reported that the majority of out-of-town road trips are less than 300 kilometers each way, which is well within the range of most EVs (see *Figure 1*).

Figure 1 Road Trips and EV Range Hesitations (BC Hydro, 2019)



The results of BC Hydro's 2019 survey highlight the importance of educating the public about EV capabilities. In addition, it will be important for utilities, private organizations, and government to ensure that the provision of charging infrastructure keeps pace or exceeds that of EV purchasing.



WHAT WE HEARD

Results from the Township's 2019 EV Survey revealed that EV range is the most common factor influencing respondents' decisions regarding whether to purchase and EV. Interestingly, **82% of respondents live within 45 kilometers of work or school** (90 kilometers round-trip), suggesting that EV ranges should not be an issue for the majority of Township residents' day-to-day travel.



WHAT WE HEARD

Results from the Township's 2019 EV survey suggest local awareness of EVs is moderate, with **67% of respondents indicating awareness of available incentives**. It should be noted that the maximum EV incentive has reduced to \$14,000 since the survey was completed in spring 2019.

Vehicle Availability and Selection

Despite an increase in the number of available EV models in recent years, a 2018 study by Clean Energy Canada²⁹ found that only 40% of dealerships in British Columbia had EVs on their lots available for purchase. EV availability varied within the province, from 54% of dealerships in the Lower Mainland to only 7% in northern BC. The study also reported that:

- Wait times for EVs are generally multiple months to a year;
- EVs are often sold almost immediately after arriving at dealerships; and
- British Columbia has a particularly hard time keeping up with EV demand.

British Columbia's targets of increasing new EV sales to 10%, 30%, and 100% for 2025, 2030, and 2040, respectively will likely shift this trend by requiring dealerships to sell a minimum share of EVs every year. While there are now several BEV options for passenger cars and SUVs, the industry is less developed for other vehicle types such as pickup trucks and medium- and heavy-duty vehicles; therefore, it may take longer for EV technology to gain a meaningful market share for these vehicle types.

Availability of Charging Infrastructure

As recently as 2014, 59% of Canadian seniors were unfamiliar with EVs, and only 18% of the population believed EVs were a viable alternative to conventional vehicles³⁰. To help address this gap, *Emotive: The Electric Vehicle Experience*³¹ was launched in 2013 to provide a public outreach campaign designed to increase awareness about EVs in British Columbia. Emotive includes a Community Outreach Incentive Program that offers funding and support for communities and local governments in the Province to deliver EV outreach. While *Emotive's* work has helped to increase awareness overall, public education and awareness of the benefits of EVs is still necessary to ensure increased EV uptake in the future.



Active Transportation

British Columbia has made increasing active transportation a priority. The *Move. Commute. Connect*⁶² Strategy is the Province's approach to encourage more active transportation, reduce GHG emissions, and improve quality of life for residents. The Strategy's main goal is to double the percentage of trips taken by active transportation by 2030, through education and awareness, incentives, and policy development. As part of the Strategy, the Province developed the *Transportation Options Program* under the existing *Scrap-It Program*, which provides \$850 towards the purchase of an electric bike (e-bike) for individuals scrapping high-emission vehicles. The increasing availability of electric-assist bikes, scooters, and other "little vehicles" may increase the viability of active transportation, and the demand for active transportation networks.

4. KEY ACTIONS

While there are several supportive trends to indicate that EVs are on the rise across the country, there is still an important role for the Township in directly supporting the reliability, availability, and accessibility of electric mobility in the community. The remaining sections of this report outline the key actions the Township will take to increase awareness and adoption of EVs, including a description and the timeframe for completion.

These actions were developed through extensive research of North American EV fleets and technology, external stakeholder engagement through workshops and a public survey, and internal stakeholder workshops with various Township divisions.

Action Table Legend

Timeframe	Description
Short	1-2 years
Medium	2-4 years
Long	5+ years



4.1 LEADERSHIP IN TOWNSHIP FLEET, EQUIPMENT AND PROCUREMENT

Electrifying Township vehicles and equipment is a key opportunity to lead in the transition to electric mobility, reduce corporate GHG emissions, and improve local air and noise pollution. An increasing variety of EVs suitable to municipal fleets are commercially available, with more models announced for the future – including pick-up trucks, vans, dump trucks, service trucks, tractors, mowers, and others. As battery and other component costs decline, electric vehicles and equipment will increasingly represent a fiscally-prudent way to reduce life cycle costs and maximize value for the Township.

Adopting EVs into the Township’s vehicle fleet will require adequate fleet charging infrastructure at Township facilities. As more and larger vehicles electrify, electrical upgrades to facilities may be required, which can present a challenge to cost-effectively transitioning to EVs. To minimize costs, it is important for the Township to carefully plan for future charging needs, optimize charging strategies and minimize electrical demand, and “future-proof” initial charging infrastructure projects to ease the expansion of EV charging infrastructure as needs grow.

In addition to its fleet, the Township can also show leadership by providing “at-work” charging for its employees. “At-work” charging is important to encourage drivers to make the switch to EVs – particularly for those with longer commutes or who may not have access to “at-home” charging. Providing for Township employees will support overall EV adoption across the community, while showcasing EV friendly strategies to other Township employers and businesses.

Initiative		Timeframe
1.1	<p>Install fleet and workplace-charging infrastructure at Operations Centre and Civic Facility: assess and increase electrical capacity at the facilities and install Level 2 charging stations. Where possible, consider funding opportunities for Level 3 charging stations.</p>	Short
1.2	<p>Evaluate other Township facilities: assess Township facilities for EV charging potential for fleet, workplace charging, and the public. Include evaluation of potential for efficiency improvements and solar power to increase the available electrical power to EVs at Township facilities.</p> <p>For “at work” charging, focus on providing relatively slow charging (e.g. “Level 1” or “Level 2” with substantial load sharing), so that employees can remain parked all day and not need to move their vehicles. Implement user fees, to recover costs (full operating cost recovery, at minimum).</p>	Long

1.3	Enact an “Electric First” policy: establish an “Electric First” policy that prioritizes efficient EVs, and equipment, in Township fleet and for contracted services, unless a life cycle cost analysis demonstrates it is not viable or cost-effective. Develop a vehicle replacement schedule to plan for upcoming EV purchases that includes adding a low carbon levy to vehicle charge outs.	Short
1.4	Implement staff training: 1) Support EV maintenance training for fleet staff and contractors. 2) Educate staff on distinguishable driving experience differences between EVs and PHEVs in the fleet from ICE fleet vehicles. Consider charging, operation, and safety.	Long
1.5	Learn from best practices of Medium- and Heavy-Duty Vehicles (M/HDV): look to City of Vancouver and other municipalities for research and opportunities on electric M/HDV. Explore signing the “Drive to Zero” pledge.	Medium

4.2 EV CHARGING ON PRIVATE PROPERTY

Access to EV charging at home is one of the most important factors determining whether a household will choose EVs. While most Langley single-family homeowners can readily implement EV charging in their garage or driveway, residents that live in multi-family housing or who park on the street can face significant challenges to accessing “at-home” charging. As a result, it is important for the Township to ensure access to EV charging in both newly constructed and existing multi-family buildings, as well as provide solutions for those who park on the street. Likewise, access to EV charging in workplace parking is important to both complement at-home charging, and to further support EV drivers who do not yet have access to EV charging at home. “At-work” charging can also present an opportunity to integrate charging with solar power, which is growing rapidly globally and may become a more important part of BC’s power supply in future decades.

Since it is far more cost effective to install EV charging infrastructure in new construction projects than to retrofit it into an existing building, it is important to “future-proof” new developments with EV charging infrastructure to anticipate future demand. This is particularly true in shared parking areas in multifamily or commercial developments. However, it is also important to renovate existing buildings to provide residents with access to EV charging, as many of these buildings will be standing for decades. Fortunately, there are innovative strategies that can reduce the costs of EV charging in existing buildings, especially when multi-family and commercial building owners plan to provide access to charging to a large percentage of parking stalls as part of a single comprehensive project.

Initiative		Timeframe
2.1	Implement EV Ready requirements for new residential developments: Establish requirements for residential parking spaces to include an adjacent energized electrical outlet capable of providing Level 2 EV charging.	Short
2.2	Implement EV Ready requirements for new non-residential developments: Establish requirements for non-residential parking spaces to include appropriate provisions for EV charging infrastructure.	Short
2.3	Advocate for “Right-to-Charge” legislation: Send a letter of support to the Province to amend the Strata Property Act to prevent stratas from denying electric vehicle supply equipment (EVSE) for residents.	Short
2.4	Educate residents and workplaces: Coordinate with BC Hydro, the Province of BC, Metro Vancouver, the EV charging industry and others to provide information to homeowners, multi-family condominiums, rental owners, and commercial buildings on strategies to implement EV charging.	Long
2.5	Pilot incentives for single family, multi-family buildings and workplaces: Explore opportunities to complement future provincial and/or utility EV charging infrastructure incentive programs. Focus especially on programs providing access to charging for large parking areas in multifamily buildings and workplaces. Expand existing TOL rebate programs, including electrical panel upgrades.	Medium

4.3 PUBLICLY ACCESSIBLE EV CHARGING

Publicly accessible EV charging stations support EV adoption by:

- Increasing drivers’ confidence that they can access convenient charging when they are “out and about”
- Providing for drivers on longer trips
- Providing for drivers without access to charging at home or at work
- Providing for vehicles used in shared mobility fleets
- Increasing the visibility of EVs

In addition to supporting EV infrastructure on private property, the Township can support continued EV adoption by leading the expansion of publicly available charging infrastructure through the existing Township-owned network, as well as supporting private sector charging infrastructure deployment. With EV adoption increasing, community members will benefit by having access to the Township’s publicly-accessible EV charging network. Implementing fees for the use of the network can provide a recoverable offset source to help make this service financially sustainable. As charging stations become more accessible, fees can also help increase station turnover and availability, encouraging EV drivers to only charge their vehicles when necessary.

As EV adoption increases, it is likely the private sector and utilities will increasingly invest in public charging infrastructure. This may lessen the need for ongoing municipal investment. For the time being, however, the Township’s

investment in charging infrastructure is essential to supporting the transition to electric mobility.

The kind of infrastructure needed to support EV drivers depends on how long they are likely to be parked in a particular location. In general, publicly accessible Level 2 charging infrastructure is appropriate where vehicles are typically parked for an hour or more. DC Fast Chargers provide rapid charging at greater expense, and are best suited when vehicles will be parked for 10 minutes to an hour. DC Fast Charging is especially important to support drivers without access to other forms of charging, as well those taking long-distance trips.

Initiative		Timeframe
3.1	Implement user fees for Township EV charging: Implement fees for EV charging to support cost recovery of EV charging infrastructure and increase turnover. Consider fee levels set by other municipalities in the region.	Short
3.2	Develop an incentive program for commercial EVSE installation: Develop a grant program for Langley businesses or institutions to apply for funding for a public EVSE project.	Medium
3.3	Expand the Township’s publicly-accessible EV charging network: Explore feasibility based on facility power availability and station needs, grant opportunities, and a gap analysis.	Long
3.4	Explore on-street charging: Explore options to provide on-street charging infrastructure where on street parking is provided. Consider integration with retrofitted street-lights, among other options.	Long
3.5	Explore advertising on TOL public stations: Explore the permissibility and feasibility of selling advertising space on digital screens of TOL public EVSE to recoup some costs of station installation. Alternatively, use for in-house advertising.	Medium
3.6	Increase awareness of permitted EV charging station use: Educate users that stations are for charging only, not parking, and to obey posted time limits. Monitor voluntary compliance and evaluate the need for enforcement.	Medium



WHAT WE HEARD

Respondents to the Township’s Resident EV Survey suggested that **drivers desire access to charging on both public property** (e.g. street right-of-way, community centres, parks), **as well as private locations** such as shopping malls and gas stations.



WHAT WE HEARD

Participants in the Township's Medium- and Heavy-Duty Vehicles Workshop were supportive of a Township pilot of M/HD EVs to reduce the risk for private industry, and noted that **electrical infrastructure upgrades represented a key barrier to adoption.**

4.4 STRATEGIES FOR TRUCKS, BUSES AND OFF-ROAD TRANSPORTATION

The number of commercially available plug-in electric trucks and buses is rapidly increasing, with electric models now available for all truck size classes. Many light-duty and medium-duty electric trucks already have a viable business case for many applications, and heavy-duty electric trucks' viability are rapidly improving. Commercial trucks and buses represent over 30% of "on-road" transportation energy use and GHG emissions in the Township. Of these emissions, over 80% come from vehicles making local or regional trips (vs. long-haul transportation).³³ These relatively shorter urban and regional trips are the most feasible for the use of electric trucks. As such, the most promising markets to electrify in the near term include delivery vehicles, refuse trucks, drayage, and buses.

Another category of heavier-duty vehicles that can be electrified are off-road vehicles. These vehicles are responsible for nearly the same volume of GHG emissions as on-road commercial trucking in the Township, and include:

- Tractors and other agricultural equipment (approximately 60% of the Township's off-road GHG emissions);
- Construction equipment (14%)
- Specialty vehicles used in commercial, industrial, port and airport settings (20%); and
- Landscaping, boats, and recreation equipment (6%).

Fortunately, a growing amount of electric equipment is available to serve these needs. Today, electric models of forklifts, low-speed commercial vehicles, and airport and port specialty vehicles are already widely available. Battery electric and/or grid connected tractors, backhoes, and other agricultural and construction equipment have also been released, though these are currently in very early stages of deployment.

The adoption of electric trucks, buses, and off-road vehicles will have a significant impact on reducing air and noise pollution, as well as GHGs. To help support this transition, municipalities can incentivize their adoption through financial and non-financial means, support improved access to appropriate charging infrastructure, and pilot different electric vehicles to test their capability and reliability under normal operating conditions.

Initiative		Timeframe
4.1	Advocate for zero-emissions requirements for M/HDV vehicles: Advocate that the province and/or Metro Vancouver (as part of its mandate to manage air quality) develop requirements for new vehicle sales and/or fleets to be zero-emissions.	Long
4.2	Champion school bus electrification: Engage with School District No. 35 to encourage policies to convert to an electric school bus fleet.	Long
4.3	Explore EV Ready requirements for commercial truck parking and loading areas: Study appropriate strategies and establish requirements for “EV Ready” truck parking on private and public property.	Long
4.4	Share information/educate about zero-emissions trucks and off-road equipment: Work with BC Hydro, other local governments, the provincial government, Port Metro Vancouver, and industry organizations to regularly engage the trucking, agriculture, construction and industrial sectors about electric vehicle opportunities.	Long
4.5	Explore commercial charging hubs: Engage with landowners, fleet managers, BC Hydro, Port Metro Vancouver and other stakeholders to explore opportunities to implement electric truck charging infrastructure in industrial and commercial lands (e.g. Northwest Langley, Gloucester).	Long
4.6	Consider opportunities to support ZEVs as part of any future mobility pricing: Encourage TransLink and Mayors' Council on Regional Transportation to encourage zero-emissions vehicles as part of any future mobility pricing regime, including the establishment of zero-emissions zones.	Long
4.7	Explore bulk purchase: Engage with manufacturers to explore the business case for coordinating a bulk purchase programs for trucks or off-road equipment for Township fleet, local municipalities, and private business.	Long

4.5 PUBLIC EDUCATION AND AWARENESS

While awareness and understanding of EV options and incentives is growing, the transportation sector is changing quickly. Residents and businesses are rarely fully aware of the opportunities and benefits of adopting EVs, including the array of federal and provincial incentives that exist to support their purchases. Many consumers lack the information they need to make a decision about what kind of vehicle would best suit their needs – even in jurisdictions like California, where EV numbers are high, consumer awareness has been found to remain low.

Provinces, municipalities and industry organizations all have a role to play in providing consumers with information on EV model availability and cost, EV range, charging access points, ongoing fuel and maintenance savings, and available incentive programs. An array of education and experiential programs can help grow consumer confidence in EVs, from website updates to “Ride and Drive” experience events that offer drivers the chance to experience what it’s like to drive an EV.

Initiative		Timeframe
5.1	Support EV education: Partner with other local governments, BC Hydro, and other organizations to educate the general public about EVs.	Long
5.2	Host “Ride and Drive” events: Explore opportunities for the Township to host Ride and Drives, Test Drive Days, and other opportunities for residents to experience EVs and speak with current drivers.	Medium
5.3	Support a Bulk Purchase Program: Explore opportunities for a bulk purchase program for local dealerships to reduce costs for EVs.	Medium
5.4	Showcase Township EVs: Highlight Township EVs through vehicle graphics.	Long
5.5	Encourage the creation of an EV Drivers Group: Explore with EV enthusiasts the possibility of establishing an EV drivers group for South of Fraser residents (similar to Vancouver Electric Vehicle Association) as a resource pool for volunteers and peer-to-peer education.	Long

4.6 ELECTRIFYING SHARED MOBILITY

“Shared mobility” refers to a range of services that may change how we get around in profound ways over the coming years. This strategy considers four main types of shared mobility, as well as conventional taxi services.

Car-sharing

Car-sharing can play an important role in a sustainable transportation system, and can take a few different forms:

- One-way/free-floating fleets that allow pick-up and drop-off at different locations (e.g. car2go; Evo)
- Two-way/station-based fleets that require vehicle pick-up and drop-off at the same location (e.g. ZipCar; Modo)
- Peer-to-peer fleets that allow car sharing between individual owners (e.g. Turo)

While car-sharing increases vehicle travel for some users, studies suggest that it tends to reduce overall vehicle travel by reducing households’ vehicle ownership; this is particularly true for two-way car-sharing. While car-sharing is not widely available in the Township yet, it could be an increasing part of Langley’s transportation system in the future as its urban communities become more dense. Two-way car-sharing has particularly good potential to be electrified if EV charging is provided in a vehicle’s home base parking spot.

Ride-hailing

Ride-hailing services, such as Uber, Lyft and other transportation network companies, are expected to be seen in the region in late 2019 or early 2020.

While ride-hailing has potential to reduce individual car-ownership, studies show that ride-hailing services to date actually tend to increase total vehicle kilometers traveled, increasing congestion and pollution as they displace transit use and active transportation, and experience significant “deadhead” travel (i.e. when there are no passengers). EVs, therefore, present an attractive opportunity to reduce both emissions and operational cost-savings for this sector. Likewise, ride-sharing services (e.g. UberPOOL or Lyft Line) and vehicle right-sizing can be encouraged to reduce congestion and emissions.

“Little Vehicles”

“Little vehicles” refer to bikes, scooters, and other small, speed-limited vehicles that can access traditional bike or pedestrian infrastructure, as well as travel on roadways. Electrification and/or sharing of bikes, scooters and other little vehicles holds the potential to promote sustainable, healthy travel choices in the Township. The same factors support adoption of electric and/or shared little vehicles as support traditional bicycles – access to safe, dedicated, convenient and complete transportation routes.

Initiative		Timeframe
6.1	Advocate for regulatory options to drive sustainable ride-hailing and taxis: Coordinate with other municipalities, the Passenger Transportation Board, and the Ministry of Transportation to develop regulations and programs to minimize per-passenger-emissions and congestion.	Long
6.2	Encourage electric ride-hailing and taxis: Engage ride-hailing companies to explore how EVs can be used in their services. Consider opportunities for ride-hailing vehicles to use Township EV charging infrastructure, and opportunities to support leasing of vehicles.	Long
6.3	Encourage electric car sharing: As car-sharing is introduced into Langley, engage car-sharing companies regarding strategies to support electrification. Support two-way car-sharing in new developments by securing access to Level 2 EV charging with relatively high-power capacity and third-party station management.	Long
6.4	Plan for electric and/or shared little vehicles: Consider the potential for electric and/or little vehicles to increase demand for bicycle infrastructure. Consider opportunities to expedite the build out of the Township’s Ultimate Cycling Network, with a focus on completing safe, convenient routes.	Long

4.7 ADVOCACY FOR EV LEADERSHIP FROM OTHER LEVELS OF GOVERNMENT AND UTILITIES

The transition to electric mobility requires policy changes at the local, provincial, national and electric utility level. The federal and/or provincial government have enabled EV uptake through incentive programs, like BC's zero-emissions vehicle sales mandate, BC's *Low Carbon Fuel Requirement* and the federal *Clean Fuel Standard*, and other policies. Continuing to strengthen these and other policies is crucial to an optimal transition to electric mobility. Likewise, electric utility rate structures, grid service connection and extension policies, and vehicle-grid interconnection strategies, can significantly impact the viability of different types of electric mobility. Utility regulation should evolve towards a focus on beneficial electrification, helping to save consumers money, facilitating better grid management, and resulting in greater uptake of EVs and other efficient electrical technologies that can eliminate emissions.

	Initiative	Timeframe
7.1	Advocate for policy that is focused on the electrification of applicable transportation/mobility sectors: Work with other local governments and industry to regularly articulate key priorities for senior levels of government to support electrification. Consider Union of BC Municipalities resolutions and direct communication to the provincial and federal government.	Long
7.2	Advocate for increased EV supply at dealerships: Work with local municipalities and auto dealerships to explore opportunities to increase supply of EV models from original equipment manufacturers.	Medium
7.3	Encourage learning from Township fleet leadership: Provide feedback to BC Hydro and the province on key barriers and/or opportunities to support electrification based on experience at Township facilities.	Long
7.4	Advocate for training and support for EV maintenance: Advocate for local technical schools and mechanics to receive training and resources to prepare for market shift to EVs.	Medium

5. MOVING FORWARD

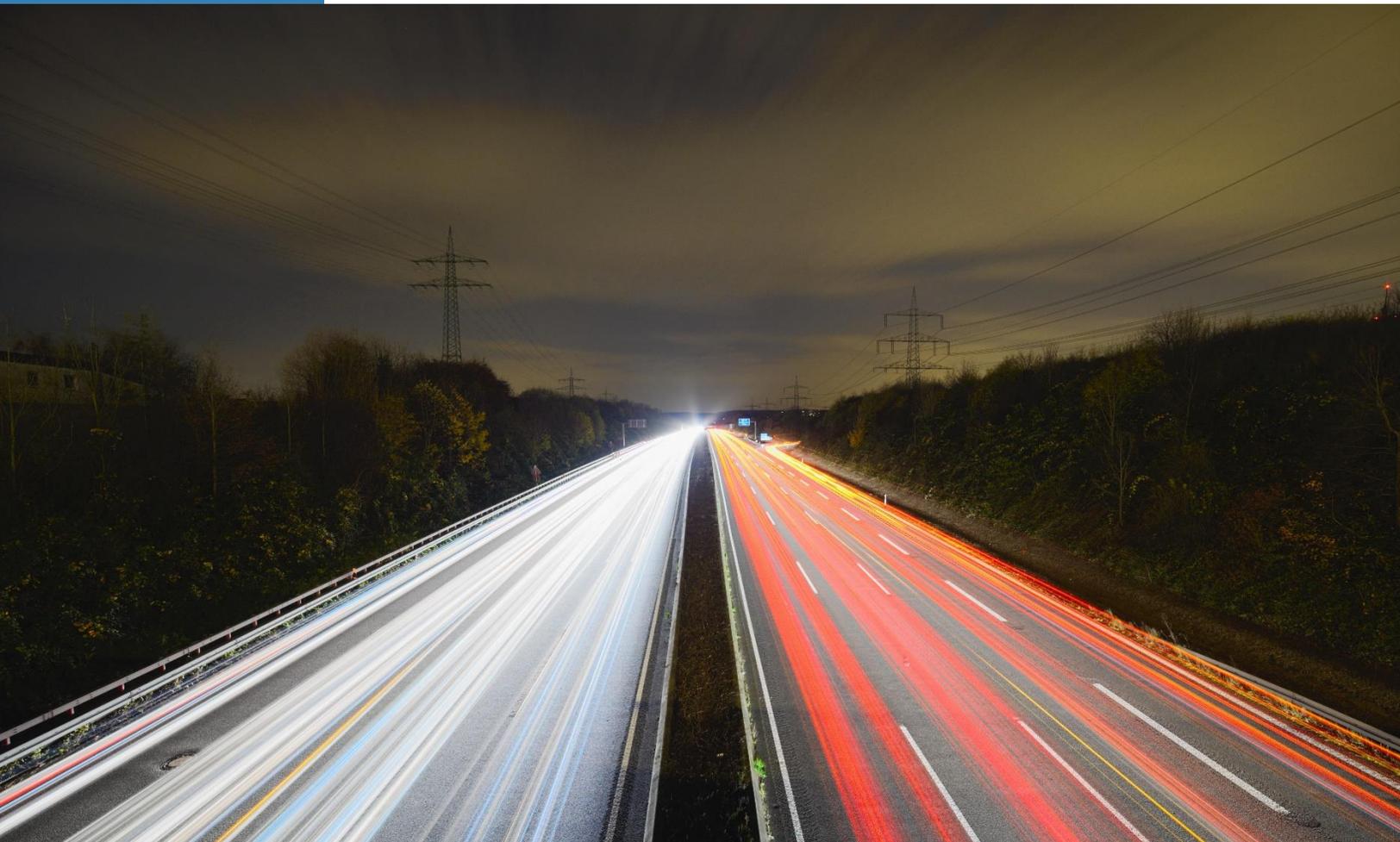
The Township's Low Carbon Mobility Plan: Electric Vehicles provides the background information and key strategies necessary to meet the Township's goals of responding to the growing demand for EVs and supporting EV adoption across the community. It also positions the Township as a leader in EV adoption by setting strategies that will support EV adoption both community-wide and within the Township fleet, helping to achieve significant emissions reductions and meeting its sustainable transportation goals.

Next Steps for EVs

This report is only a starting point for EVs – as new technologies become available and information changes, the EV plan and its implementation will be updated over time to reflect actions achieved and new priorities. Township staff will continue to monitor EV trends and update the report to reflect on the status of each action item, make necessary modifications, and add initiatives as appropriate.

Next Steps for the LCMP

Township Staff will continue to explore other low-carbon mobility options beyond EVs. These will be explored in tandem and, at times, be over-lapping with existing entries to the LCMP. On the horizon for exploration is Active Transportation, Renewable Fuels, and Hydrogen Fuel Cell Technology.



REFERENCES

- ¹ [Government of Canada. \(2019\). Progress Towards Canada's Greenhouse Gas Emissions Reduction Target.](#)
- ² [Environment and Climate Change Canada. \(2016\). Pan-Canadian Framework on Clean Growth and Climate Change.](#)
- ³ [Government of Canada. \(2017\). Greening Government Strategy.](#)
- ⁴ [Government of Canada. \(2019\). Zero-Emission Vehicles.](#)
- ⁵ [EVObsession. "50% Drop in Battery Prices in 3 Years."](#)
- ⁶ [Province of British Columbia. \(2018\). CleanBC.](#)
- ⁷ [Province of British Columbia. \(2019\). Climate Action Legislation.](#)
- ⁸ [Province of British Columbia and New Car Dealers Association of BC. \(2019\). Clean Energy Vehicle Program.](#)
- ⁹ [BC SCRAP-IT Program Society. \(2019\). Incentive Choices.](#)
- ¹⁰ [Province of British Columbia. \(2019\). Specialty Use Vehicle Incentive Program.](#)
- ¹¹ [BC SCRAP-IT Program Society. \(2019\). ZAPBC Program.](#)
- ¹² [Province of British Columbia. \(2019\). Charging Incentives and Solutions Program.](#)
- ¹³ [Fraser Basin Council. \(n.d.\). Plug IN BC - EV101.](#)
- ¹⁴ [Logtenberg, R., Pawley, J., & Saxifrage, B. \(2018\). Comparing Fuel and Maintenance Costs of Electric and Gas Powered Vehicles in Canada.](#)
- ¹⁵ [Malmgren, I. \(2016\). Quantifying the Societal Benefits of Electric Vehicles. World Electric Vehicle Journal.](#)
- ¹⁶ [Malmgren, I. \(2016\). Quantifying the Societal Benefits of Electric Vehicles. World Electric Vehicle Journal.](#)
- ¹⁷ [Plug N' Drive. \(n.d.\). Electric Vehicle Benefits.](#)
- ¹⁸ [Sustainable Transportation Research Team. \(2015\). Electrifying Vehicles: Insights from the Canadian Plug-in Electric Vehicle Study.](#)
- ¹⁹ [FleetCarma. \(n.d.\) How Electric Vehicle Batteries Are Reused or Recycled.](#)
- ²⁰ [Pollution Probe and the Delphi Group. \(2019\). Framework for Municipal Zero Emission Vehicle Deployment.](#)
- ²¹ [Health Canada. \(2010\). The Urban Heat Island Effect: Causes, Health Impacts, and Mitigation Strategies.](#)
- ²² [Li et al. \(2015\). Hidden Benefits of Electric Vehicles for Addressing Climate Change. Scientific Reports.](#)
- ²³ [IEA. \(2019\). Global EV Outlook 2019.](#)
- ²⁴ [FleetCarma. \(2018\). Electric Vehicle Sales Update Q3 2018, Canada.](#)
- ²⁵ [Plug N' Drive. \(n.d.\). Electric Vehicle Benefits.](#)
- ²⁶ [Province of British Columbia. \(2019\). New Electric Vehicle Charging Sites Added to Growing Network.](#)
- ²⁷ [CBC. \(2019\). End to 'Range Anxiety' in Sight.](#)
- ²⁸ [BC Hydro. 2019. Road Trip Range Anxiety is Pumping the Brakes on EV Adoption in BC.](#)
- ²⁹ [Clean Energy Canada. \(2018\). Batteries Not Included.](#)
- ³⁰ [WWF. \(2014\). Transportation rEVolution: Electric Vehicle Status Update 2014.](#)
- ³¹ [Province of British Columbia. \(n.d.\). Emotive: The Electric Vehicle Experience.](#)
- ³² [Province of British Columbia. \(2019\). Move Commute Connect.](#)
- ³³ [Township of Langley. \(2010\). Community Energy and Emissions Plan \(CEEP\).](#)