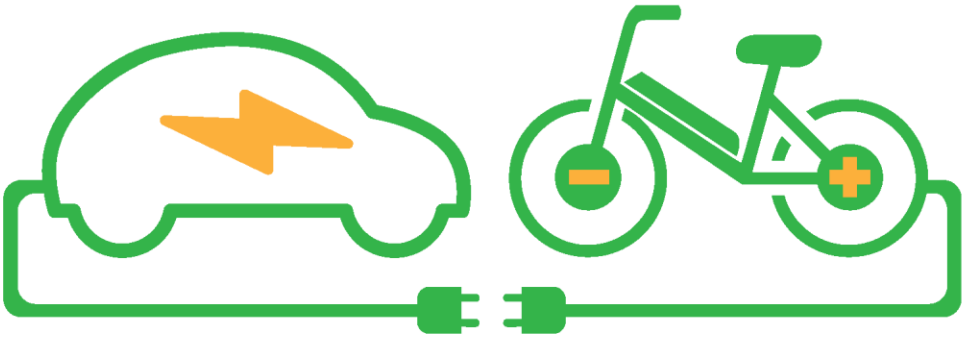
City of Kamloops



ELECTRIC VEHICLE & ELECTRIC BIKE STRATEGY

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1 INTRODUCTION

1.1 About this Strategy

The transition to electric vehicles (EVs) and electric bicycles (E-bikes) is an opportunity to reduce greenhouse gas (GHG) emissions and local air pollution and may include other benefits, such as improved community health and well-being. The Electric Vehicle and Electric Bike Strategy (EV and E-Bike Strategy) will support the City of Kamloops in the transition to EVs and E-bikes by:

- informing the public about EVs and E-bikes (e.g. charging and benefits)
- summarizing key market trends, factors impacting adoption and current policy context
- establishing guiding policies, and associated targets and actions that support EV and E-bike adoption

1.1.1 Strategic Alignment

The EV and E-Bike Strategy complements and aligns with the City's Official Community Plan (KAMPLAN) and the Transportation Master Plan. Both documents include goals and policies that set a course for a sustainable, environmentally-friendly community that is active and healthy. The transition to electric transportation through the actions described in the EV and E-Bike Strategy is central to pursuing this vision.

The EV and E-Bike Strategy also complements the forthcoming Community Climate Action Plan (CCAP), which will establish GHG reduction targets and actions within the land use, transportation, buildings, and waste management sectors. Considering that transportation accounts for 66% of Kamloops' GHG emissions, a transition to low-carbon, electric transportation is crucial to Kamloops achieving its emissions reductions goals.

1.1.2 Development of the EV and E-Bike Strategy

The EV and E-Bike Strategy was developed over four phases between December 2019 and May 2020:

1. **Background research and best practices review** - The EV strategies and plans of other North American municipalities and reports on how local governments can influence EV and E-bike adoption were reviewed. Potential actions from the review were summarized for consideration in Kamloops.
2. **EV charging infrastructure analysis** - An analysis using a geographic information systems (GIS) model was used to map where in Kamloops future demand for EV charging infrastructure is expected to emerge.
3. **Public and stakeholder engagement** - The City conducted engagement to obtain public and stakeholder input in the development of the EV and E-Bike Strategy, which is described in Appendix 4.6.

4. **EV and E-Bike Strategy Development** - The EV and E-Bike Strategy was developed based on the opportunities identified in the background research and best practices review.

1.2 About Electric Vehicles and E-Bikes

1.2.1 Electric Vehicles

There are two categories of EVs:

- **Battery electric vehicles (BEVs)** - BEVs use electricity to power a 100% electric motor and battery. They need to be plugged into a wall outlet or charging station to recharge the battery. The range BEVs can travel is increasing steadily, with many models now able to travel 400–700 km between charges.
- **Plug-in hybrid electric vehicles (PHEVs)** - PHEVs have an electric motor and a rechargeable battery and can also use gasoline, diesel, or some other fuel as an additional source of energy. PHEVs typically have a shorter electric range than BEVs.

Note: For the purposes of this strategy, EVs do not include plugless hybrid vehicles or hydrogen fuel cell vehicles.

Table 1 provides some examples of EVs currently available in BC, including their electric range (i.e. the distance they can travel by electric power). More models have been announced by various manufacturers and are expected to be available in the coming years.

Table 1: Example of EVs available in BC. Source BC Hydro[1].

Battery Electric Vehicles (BEVs)	
Vehicle Name	Range (km)
	Base Electric Range
Audi A3 e-tron	329
BMW i3	183–246
Chevrolet Bolt	383
Hyundai IONIQ	200
Hyundai Kona Electric	415
Jaguar I-PACE	377
Kia Niro EV	385
Kia Soul EV	248–383
Meccanica Solo	160
Nissan Leaf	242–363
Tesla Model 3	386–499
Tesla Model S	555–595
Tesla Model X	491–523
Volkswagen e-Golf	201

Plug-in Hybrid Electric Vehicles (PHEVs)		
Vehicle Name	Range (km)	
	Electric Range	Gasoline Range
BMW 745Le xDrive	26	441
BMW i3 Range Extender	203	116
BMW i8 Coupè	29	488
Chevrolet Volt	85	591
Chrysler Pacifica Hybrid	51	784
Ford Fusion Plug-in Hybrid	35	947
Honda Clarity	77	475
Hyundai IONIQ Electric Plus	47	961
Karma Revero	60	328
Kia Niro PHEV	42	853
Kia Optima PHEV	47	937
Mercedes Benz GLC 350e 4MATIC	21	541
Mini Cooper S E Countryman All4 PHEV	19	420
Mitsubishi Outlander PHEV	35	463
Porsche Panamera 4 E-Hybrid	23	768
Toyota Prius Prime	40	995
Volvo S90 Inscription	34	753
Volvo XC60 R-design	27	779

1.2.2 Electric Bicycles

Three categories of E-bikes include:

- **Pedal-assist** bikes enhance the efforts of the rider when they are pedaling.
- **Power-on-demand** bikes only provide power when the motor is engaged, usually with a throttle located on the handlebar grip.
- **Hybrid E-bikes** combine aspects of both the pedal-assist and power-on-demand bikes. There is a pedal-assist sensor and an option to use the motor by triggering the throttle on the handlebar grip.

The typical battery range of E-bikes currently varies from about 50 km to 160 km, and cost ranges from $1,000 to over $6,000. Table 2 provides some examples of E-bike models currently available in BC.

In BC, E-bikes are defined as two- or three-wheeled bikes with a small electric motor (500 watts or less) and a maximum speed of 32 km/hr. on flat ground without pedaling [50]. E-bikes can be operated by pedalling or propelled by the electric motor.

Like any bicycle, E-bikes can be operated on roads or bicycle networks, and riders are not required to have a driver's licence, vehicle registration, or insurance. However, in BC, riders are required to wear a helmet and be at least 16 years of age [50].

Table 2: Select E-bikes available in BC

Pedal-Assist E-Bikes		
Bike Name	Battery Range (km)	MSRP (CAD$)
Canondale Tesoro Neo X3 Remixte Bike	100	4,250
Cube Compact Hybrid	150	3,999
Ghost Square Cross B1.9 E-Bike	25–150	2,950
OPUS Connect	125	3,379
Tern GSD S10 400wh E-Cargo Bike	50–110	5,950
Trek Powerfly 5	160	4,899
Power-On-Demand E-Bikes		
Bike Name	Battery Range (km)	MSRP (CAD$)
Pedego Comfort Cruiser	-	4,250
Hybrid (Power-On-Demand/Pedal-Assist) E-Bikes		
Bike Name	Battery Range (km)	MSRP (CAD$)
Bulls Lacuba Evo Lite Step-Thru	161	5,899
Gazelle Ultimate T10 HMB	94	4,899
GoCycle GX	65	4,299
Juiced Bikes Ocean Current	64	2,258
Pedego City Commuter	-	3,895
Pedego Interceptor	-	3,895
Spark	80	1,300

1.3 About EV and E-Bike Charging

1.3.1 EV Charging

There are different levels of EV charging, which are summarized in Table 3 below.

Table 3: Overview of EV Charging Levels [2]

Level	Speed of Charge	Supply Voltage	Current Output	Power Output	Typical Applications
Level 1	Slow	120 V, 1PH	12–16 A	1.44–1.92 kW	Home, workplace
Level 2	Medium	208–240 V, 1PH	12–80 A	2.5-19.2 kW	Home, workplace, public
DC fast charging	Fast to very fast	208–600 V, 3PH	Up to 400 A	Up to 400 kW	Public, especially highway

The different levels of EV charging are used in different contexts:

- **Home charging** - In BC, 72% of passenger EV charging occurs at home, where drivers will typically recharge their vehicles overnight [3]. To date, many households have used Level 1 charging. However, with longer-range BEVs becoming more prevalent, more households are moving to Level 2 charging, and this trend is expected to continue.
- **Workplace charging** - A significant portion of passenger EV charging occurs at work [3]. Employers offer charging services to their employees, who recharge their vehicles over the course of the day. Workplace charging is typically at a Level 1 or Level 2.
- **Public charging** - Publicly accessible DC fast charging can enable longer trips in EVs. Additionally, publicly accessible DC fast charging or Level 2 charging can provide "opportunity charging" at locations such as retail centres, civic amenities, parks, and other locations. Some drivers who lack access to home or workplace charging rely predominantly on public charging. Access to public charging may also be important for commercial fleets to convert to EVs.
- **Fleet charging** - Fleet vehicles include passenger vehicles, taxis, trucks, buses, and other vehicles. If a fleet has a location where vehicles are regularly parked, such as a depot, charging infrastructure will typically be implemented at that location. Fleets may also make use of fast charging infrastructure distributed along their routes.

1.3.2 E-Bike Charging

The most common method of charging an E-bike is to plug the battery charger into a 120 V electrical wall outlet. Most battery packs can be removed from the bike and charged at home, in the workplace, or another convenient location. E-bike battery packs can also be charged on the bike with an electrical outlet adjacent to bike parking. Fully charging an E-bike takes about two to six hours, depending on the capacity of the battery.

Because many E-bikes have removable batteries that can be recharged indoors, public charging infrastructure is less important for E-bike adoption than for EVs. However, public E-bike charging at strategic locations can support longer E-bike trips.

2 FACTORS IMPACTING ADOPTION

2.1 Electric vehicles

While EV sales globally and in BC are steadily rising, there are several factors impacting their wide-scale adoption, including:

- **Price** - Research and consumer surveys frequently report that the cost of EVs is currently the main barrier to EV adoption [4] [5]. As EV costs decline towards parity with regular cars, price is expected to become less of a barrier to EV adoption.
- **Electric range** - The distance a vehicle can travel before recharging is also an important factor of EV adoption. Until recently, many EV models had fairly limited range, sometimes as low as 100–200 km. However, many newer BEV models have a range exceeding 400 km, with some now exceeding 600 km on a single charge.
- **Model availability** - To date, most passenger EVs have been smaller cars, with few larger SUV or pickup options. These types of larger vehicles have been gaining market share and now comprise over 75% of all vehicle sales in BC [6]. Many manufacturers have launched or announced larger EV models to meet consumer demand for these larger vehicles.
- **Access to charging** - With EVs' improving price, range, and model availability, the factor that is most important to future EV adoption is likely to be access to charging. Access to charging at home is important for most households to adopt an EV. Access to workplace and publicly accessible charging is also important to support EV adoption.

When asked about the challenges of EV adoption, respondents of the Let's Talk Kamloops survey most commonly indicated the high cost of purchasing an EV and the limited distance that an EV can be driven on a single charge, as shown in Figure 1.

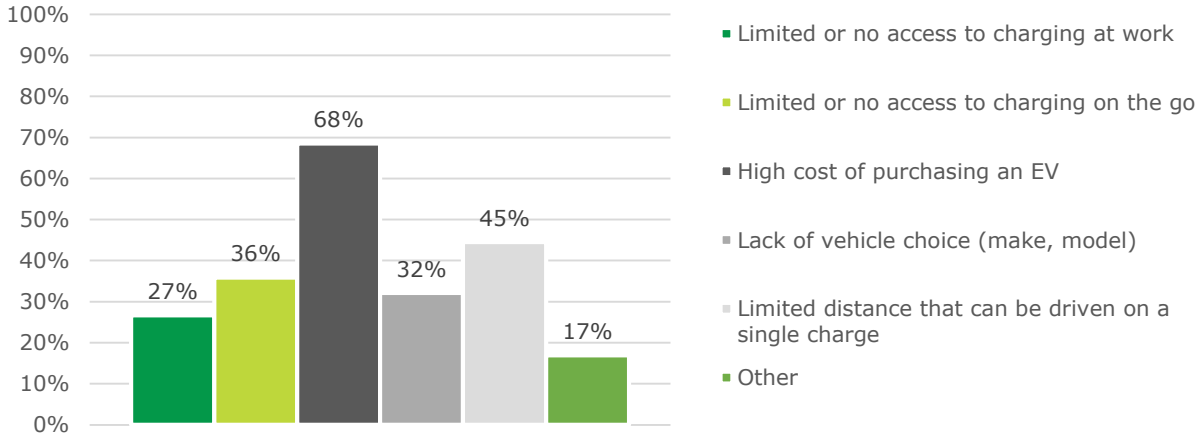

Figure 1: Let's Talk Kamloops survey results - What are the present challenges to your household driving an EV (select all that apply)?

2.2 Electric Bicycles

While E-bikes are increasingly popular, there are several key barriers limiting their adoption:

- **Price** - The higher cost of E-bikes relative to traditional bicycles is a barrier to adoption. However, it is worth noting that if an E-bike is replacing trips by automobile and/or the purchase of a vehicle (or second or third vehicle), the E-bike is comparatively affordable.
- **Road safety concerns and the need for a quality bicycle network** - Safe, connected bicycle networks are important factors in helping people feel comfortable riding any bicycle, including E-bikes. If there are safe, convenient bike routes, people are more likely to adopt E-bikes. Therefore, improving Kamloops' bicycle network is likely the greatest opportunity to support E-bike adoption.
- **Secure and accessible bike parking** - With E-bikes' greater value, many users have concerns about theft. Secure bike parking at riders' residences, workplaces, and destinations helps to support E-bike adoption. Additionally, the larger size and weight of an E-bike can also make it challenging to lift over obstacles, and large cargo bikes need more space for parking and ability to maneuver. As such, a portion of bicycle parking areas can be designed to accommodate larger and heavier E-bikes.

When asked about the importance of various factors on the adoption of E-bikes, almost 90% of the Let's Talk Kamloops survey respondents indicated that safe bike routes are "very important", followed by safe and secure E-bike parking at 81%, as shown in Figure 2.

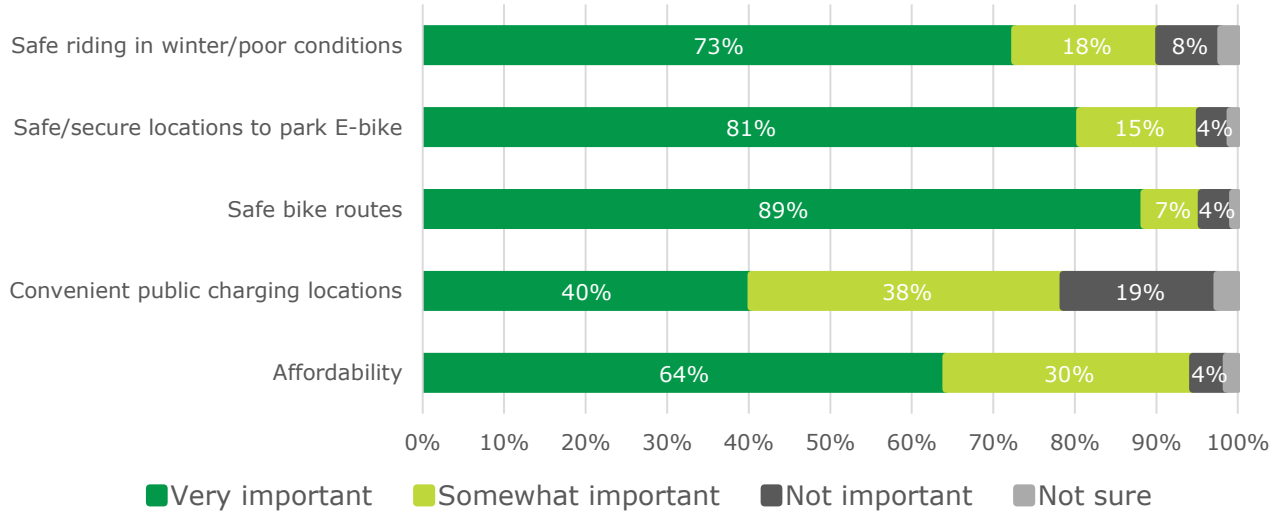

Figure 2: Let's Talk Kamloops survey results - How important are the following factors in enabling E-bike adoption in Kamloops?

3 POLICIES, TARGETS, AND ACTIONS

While technological trends, declining EV costs, and supportive provincial and federal policy all favour continued growth of EVs and E-bikes, there is still an important role for the City to play to support its rapid adoption in the community. Given that the transportation sector is the largest contributor of GHG emissions, without strong local action to drive EV and E-bike adoption, Kamloops is unlikely to meet its climate goals or fully realize the clean air, cost savings, and health and well-being benefits associated with EVs and E-bikes.

The EV and E-Bike Strategy establishes five key policies for the City to consider for implementation, each with associated targets and actions. These policies, targets and actions were developed based on the review of literature and best practices from other jurisdictions as well as input received during public and stakeholder engagement. An addendum to the strategy includes additional context and information regarding some of the recommended actions in the EV and E-Bike Strategy.

3.1 Support Home and Workplace EV and E-Bike Charging

Targets

- By 2023, all newly constructed off-street residential parking will be EV-ready.
- By 2030, all residential parking in existing apartments will be EV-ready.
- By 2030, most households without access to on-site parking for "at-home" charging will have access to EV charging, through a mix of workplace, on-street, and other forms of public charging (to be measured via surveys and/or other analysis).

Background

Access to EV charging at home is crucial to households choosing to adopt an EV. Home charging is the most convenient form of EV charging—like a phone, you plug in your EV at night and typically have a full charge by morning.

For households with private garages or on-site parking pads (e.g. many single-family homes, duplexes, and some townhomes), implementing home charging can be low cost and simple. Today, about 80% of Kamloops households live in single-family homes, duplexes, or townhomes, which means that for a large proportion of the community, it may be relatively easy to install an EV charger, assuming they are not relying on shared or on-street parking and their strata bylaws (if applicable) permit such use.

However, accessing home charging is more challenging for households that live in apartments with shared parking areas, those who must park on the street, or those that live in strata properties. Implementing EV charging in existing apartments or condos typically requires complicated retrofits and/or building owner/strata council approval. For those who must park on the street, ready access to curbside and/or publicly accessible charging is crucial.

Going forward, KAMPLAN projects that medium- to high-density multi-family housing (e.g. apartments and condos) will comprise nearly half (46%) of all future housing stock that is added during the OCP's projection period to 2039. New housing developments can be made EV-ready by providing an electrical outlet at each parking space, which allows a charging station to be installed in the future as drivers adopt EVs. EV-ready parking in new developments reduces the complexity and costs of retrofitting a charging station later. Currently, 15 municipalities in BC have adopted 100% EV-ready requirements for residential parking in new buildings. Public engagement revealed strong support for the City to adopt similar requirements—82% of public survey respondents and 97% of engagement session participants supported this action. Additionally, 48% of respondents to the City's survey for developers, homebuilders, and realtors supported adopting such a requirement, and 38% noted they might support such a requirement but would require more information.

Beyond EV-ready new buildings, a few existing apartment buildings in BC are undergoing retrofits to make all of their parking EV ready. However, building owners and managers typically have an incomplete understanding of the optimal way to implement such projects and face financial barriers. Incentives for making existing apartments 100% EV ready would help reduce these financial barriers. Participants in the City's engagement sessions overwhelmingly supported the City supporting existing apartment buildings and workplaces with education and additional incentives to implement EV charging infrastructure.

Workplace and public charging also play a role in supporting EV adoption. They can supplement home charging and, in some cases, make up for a lack of access to home charging. Access to workplace charging increases drivers' confidence in acquiring EVs—the US Department of Energy estimates that people whose workplaces provide EV charging are six times more likely to drive an EV [7]. Accordingly, the City can require EV-ready workplace parking in new developments and encourage existing workplaces to implement EV charging infrastructure.

#	Actions	Time Frame	Budget	Responsible
3.1.1	**100% EV-ready residential parking requirements for new developments** - Amend the Zoning Bylaw to require that all residential parking in new developments be EV-ready (i.e. feature an energized electrical outlet capable of providing "Level 2" EV charging adjacent to each stall). Explore opportunities to support the building industry with the implementation of the EV-ready parking requirement.	2020-21	Not applicable	Planning and Development; Building and Engineering Development; Sustainability

#	Actions	Time Frame	Budget	Responsible
3.1.2	**Pilot financial incentives for EV-ready retrofits in existing multi-family buildings and workplaces** - Coordinate with key stakeholders to pilot 100% EV-ready retrofits, with the City financially supporting (i.e. Climate Action Fund) approximately five of the retrofits. Share lessons learned with other jurisdictions and consider opportunities for expansion.	2020–23	$200,000	Sustainability
3.1.3	**Educate owners and managers of existing apartments and workplaces** - Work with the provincial "Go Electric" EV Charger program, utility, or government programs; EV charging service providers; and/or other entities to educate owners and managers of existing apartments and workplaces on the benefits of retrofitting existing buildings to have EV-ready parking available for tenants and employees.	2020–23	Not applicable	Sustainability
3.1.4	**EV-ready commercial and institutional parking requirements for new developments** - Amend the Zoning Bylaw to require that a specified portion of commercial and institutional parking be EV-ready in new developments.	2020–21	Not applicable	Planning and Development; Building and Engineering Development; Sustainability
3.1.5	**E-bike parking** - Amend bicycle parking requirements in the Zoning Bylaw to include a 120 V outlet for every four bicycle parking spots in new apartment developments, distributed equally throughout the bike parking area.	2020–21	Not applicable	Planning and Development; Building and Engineering Development; Sustainability

3.2 Develop Public Charging Infrastructure

Targets

- By 2025 and subsequent years thereafter, publicly accessible charging will meet the needs of EV drivers in Kamloops, including residents and visitors (to be measured via surveys and/or other analysis).

Background

Publicly accessible EV charging is critical to enabling EV adoption. The City's public engagement results revealed strong support for City investments in public charging, with 77% of residents surveyed and 97% of engagement session participants supporting this action.

Public charging is best located close to common destinations, such as services (e.g. shopping and medical) or recreation, to provide drivers with useful amenities while they charge their vehicle. Public charging can be located on private business premises, on curbsides, at dedicated public parking lots, and on City properties. EV drivers can locate—and sometimes schedule—public charging stations using an app such as PlugShare [8].

In neighbourhoods where households typically park on the street, curbside charging can make up for a lack of access to home charging. The City can explore partnerships with BC Hydro and/or other entities to provide public curbside EV charging in locations with limited access to off-street parking.

To facilitate travel between regions, and to serve local households without access to home charging, networks of DC fast charging stations that can charge EVs in less than 30 minutes are essential. The utility and private sector is beginning to build out this network—notable examples include the BC Hydro EV network [9], Tesla Supercharger network [10], and Electrify Canada [11]. Despite these growing investments, the economics of implementing DC fast chargers are expected to remain challenging for the medium term until a critical mass of EV driver customers emerge, making it difficult for the private sector to implement DC fast charging at optimal levels. Accordingly, there is a need for ongoing public investment in DC fast charging and support for the private sector to develop such infrastructure.

#	Actions	Time Frame	Budget	Responsible
3.2.1	**Invest in City-owned public charging** - Expand the network of City-owned publicly accessible EV charging at City facilities and/or on-street by deploying: • 4–8 DC fast charging stations • at least 20 Level 2 charging stations Allocate Climate Action Fund Reserve and pursue grant funding to offset capital costs wherever possible.	2020–23	$400,000–$600,000	Engineering; Capital Projects; Purchasing; Sustainability; Fleet and Trades
3.2.2	**Formalize responsibility for the City's EV charging network** - Manage the costs of the public EV charging network, and assess options for its operations and maintenance. Implement user fees to at least recover the operating costs of providing the EV charging network.	2020–21	TBD	Capital Projects; Fleet and Trades; Bylaw Services; Purchasing; Sustainability
3.2.3	**Establish "EV-friendly" parking and business licensing regulations** - Clarify that new or existing properties may designate up to 10% of their minimum required number of parking spaces as "EV only" where only EVs may park. Evaluate whether any amendments to the Zoning Bylaw are required. Clarify that when EV charging is located on an existing business premise, the business does not require a separate business licence for providing this service.	2020–21	Not applicable	Planning and Development; Sustainability

#	Actions	Time Frame	Budget	Responsible
3.2.4	**Explore exempting EV charging infrastructure from development cost charges, revitalization tax exemptions, and/or providing other financial tools to support investments in public charging** - Explore incentives and financial tools to support private sector investment in publicly accessible EV charging infrastructure (note: Section 3.5 also includes an action to explore financial tools to support electrification of commercial vehicles).	2020–23	TBD	Finance; Sustainability; Planning and Development
3.2.5	**Explore "feebates" and/or regulations that encourage deployment of public charging infrastructure on private property** - A "feebate" system introduces a new fee for some sectors (e.g. through business licensing and parking), but provides exemptions or rebates to entities that take some desired action. Work with other jurisdictions to explore viable "feebate" approaches, and/or other regulatory tools, to encourage investment in public EV charging infrastructure (note: Section 3.5 also includes an action to explore green business licence "feebates" to support electrification of commercial vehicles).	2020–2025	Not applicable	Planning and Development; Sustainability

3.3 Support E-Bike Adoption

Targets

- By 2025, over 75% of Kamloops residents will report feeling safe riding to their most common destinations (to be measured via survey).
- By 2040, 40% of the population will use sustainable modes of transportation (e.g. walk, cycle, public transit, or carpool) for commuting to work (an increase from the current Transportation Master Plan target of 30%).

Background

E-bikes have the potential to increase the share of trips that are made by bicycle in Kamloops. The electric assistance of E-bikes effectively doubles the distance that people are willing to travel by conventional bicycle and largely eliminates the barriers that Kamloops' hills present to cycling.

With increased E-bike adoption, the main barriers to increasing the number of trips taken by bicycle are safety, security, and convenience. Indeed, 100% of participants in the City's engagement session and the vast majority of survey respondents felt it was very important to prioritize the completion of Kamloops' bicycle network to help make cycling safer for all ages and abilities. As such, the City will look to expedite the development of a safe and connected bicycle network. To ensure the safety of all users, it is also important to consider the greater speeds of E-bikes in the design of bicycle infrastructure. In addition, given the typically higher value of E-bikes, the City may explore opportunities to increase the availability of secure bike parking options at common end-of-trip facilities.

Greater use of active transportation (e.g. walking and bicycling), including E-bikes, can have many co-benefits, including improved health and decreased congestion, emissions, and air pollution. For these reasons, it is appropriate for the City to provide financial support for their adoption. Thompson Rivers University (TRU) has emerged as a leader in supporting E-bike adoption by launching an E-bike share program with TapBike and coordinating discounts for staff and students on the purchase or rental of E-bikes [12]. The City can explore implementing similar initiatives.

#	Actions	Time Frame	Budget	Responsible
3.3.1	**Expedite the build-out of cycling infrastructure** - Prioritize cycling infrastructure development, as indicated in the 2018 Transportation Master Plan, and increase the annual level of investment to expedite the development of a safe and connected bicycle network. This investment will help reduce barriers to cycling and accommodate the greater potential use of bicycle infrastructure that E-bikes enable.	2021–25	TBD	Transportation

#	Actions	Time Frame	Budget	Responsible
3.3.2	**Consider speed and security of E-bikes in the design of bicycling infrastructure** - To ensure safety and prevent theft, consider the speed of E-bikes and the cost of ownership when designing infrastructure and secure bicycle parking on City property.	Ongoing	Not applicable	Transportation, Facilities
3.3.3	**E-bike share program** - Explore options to implement an E-bike share program to serve appropriate neighbourhoods.	2022–25	TBD	Transportation
3.3.4	**Explore E-bike incentives** - Partner with TRU, local vendors, and local businesses to explore incentives for E-bike purchases and/or rentals.	2020–22	TBD	Sustainability; Transportation; Purchasing

3.4 Lead by Example in City Fleet and Facilities

Targets

- By 2030, reduce fleet GHG emissions by 40% below peak levels.
- By 2050, reduce fleet GHG emissions by 100%.
- By 2025, make workplace EV charging available for any City employee who requests this service (provided they work at a City facility where employee parking is provided).

Background

Cities play an important role in demonstrating leadership in the adoption of sustainable technologies. A total of 82% of surveyed residents supported the City committing to electrifying its municipal fleet as suitable vehicles come up for replacement. Many local governments around the world now preferentially choose low-carbon models whenever it is cost-effective and practical to do so. Some leading local governments apply an internal carbon price into their business case calculations to account for the impacts of GHG emissions–Metro Vancouver's Carbon Price Policy applies a cost of $150 per tonne of CO_2 equivalent [13].

The City can support employees who use EVs and E-bikes to commute to work, or motivate others to do the same, by providing workplace charging. To ensure the financial sustainability of this service, it is best practice to charge employees a fair user fee to use workplace chargers. Additionally, the City can educate and engage its personnel about the advantages of EVs. Finally, the City can provide appropriate bike storage and end-of-trip facilities to accommodate increased staff and visitor travel by active transportation, including E-bikes.

#	Actions	Time Frame	Budget	Responsible
3.4.1	**Electric First procurement policy** - Adopt an "Electric First" procurement policy stating that the City will preferentially procure electric vehicles and equipment, unless the life cycle cost analysis demonstrates that the electric option is not cost-effective, or there is no option available that can reasonably perform the required task. Life cycle costing will apply an internal carbon price of $150 per tonne of CO_2e to account for the social costs of greenhouse gas emissions and air pollution.	2020	Not applicable	Trades and Fleet; Purchasing; Sustainability
3.4.2	**Green Fleet Plan** - Develop and implement a Green Fleet Plan, which will include a fleet assessment to evaluate opportunities for right sizing and electrification, in order to reduce emissions and optimize fleet life cycle costs.	2020–21	TBD	Fleet (Civic Operations); Purchasing; Sustainability
3.4.3	**Workplace charging pilot** - Pilot workplace charging for employees at three City facilities and, based on this experience, consider expanding to other facilities within three years. As part of this action, survey City employees on their interest in acquiring an EV and their demand for workplace charging. Adopt a workplace charging policy, including user fees to cover the cost of electricity consumption. Share lessons learned from the workplace charging pilot with other Kamloops employers.	2020–21	$150,000	Trades and Fleet; Capital Projects; Sustainability

#	Actions	Time Frame	Budget	Responsible
3.4.4	**Facility assessments** - Assess City facilities to determine the optimal electrical system design needed to accommodate fleet, employee, and visitor EV charging (and other future electrification opportunities such as heat pumps, etc.). Perform initial assessments on four civic facilities, expanding to other facilities based on lessons learned.	2020–21	$40,000	Capital Projects; Trades; Sustainability
3.4.5	**E-bikes in City fleet** - Explore deploying E-bikes at appropriate facilities and train staff on their use. Monitor uptake and apply lessons learned for future expansion. Share lessons learned with employers in Kamloops and other municipalities.	2020–24	$50,000	Fleet (Civic Operations); Sustainability

3.5 Drive Electrification of Commercial Fleets and Transit

Background

Commercial fleets include commercial goods trucking, other forms such as refuse trucks, and "shared mobility" services such as taxis and future car-share and ride-hailing services. Shared mobility and regional trucking present good opportunities for electrification in the near term given the strong life cycle cost advantages of electric vehicles in these applications.

Likewise, transit authorities around the world are rapidly transitioning to electric buses and other forms of electric transportation. In November 2018, BC Transit approved its Low Carbon Fleet program, a 10-year fleet replacement strategy aligned with the Province's CleanBC plan.

Finally, logging trucks, farm equipment, construction equipment, boats, and recreation vehicles will increasingly present electrification opportunities. To date, dozens of vehicles in these different market segments have been introduced to the North American market, and analysts such as the International Council on Clean Transportation have documented how electrification of such vehicles is increasingly viable.

#	Actions	Time Frame	Budget	Responsible
3.5.1	**Advocate for provincial, federal, and utility policies that support electrification of commercial fleets and transit** - A variety of regulations are critical to support the electrification of commercial fleets and transit. Continue engaging with other BC local governments and partners to advocate for strong policies to support the electrification of these vehicles.	Ongoing	Not applicable	Sustainability
3.5.2	**Support engagement and education opportunities with commercial fleets** - Working in partnership with BC Hydro, the Province, and others, engage with commercial fleets as required to identify opportunities for the City to support their electrification and to facilitate education about electrification opportunities.	Ongoing	Not applicable	Sustainability
3.5.3	**Explore financial tools to support EV commercial fleets** - Financial tools could be used to support the following: • Electric truck (E-truck) or electric taxi (E-taxi) fleet adoption and associated charging infrastructure • Other electric transportation and/or zero carbon initiatives. Develop options to help drive the adoption of electric commercial fleets.	2020–23	TBD	Sustainability; Planning and Development
3.5.4	**Explore "feebates" and/or regulations that encourage EV commercial fleets** - As noted in Action 5 in Section 3.2, some BC local governments are beginning to explore "feebate" mechanisms and other tools to encourage electrification of commercial fleets. Work with other jurisdictions to explore such tools.	2022–25	TBD	Planning and Development; Sustainability

#	Actions	Time Frame	Budget	Responsible
3.5.5	**Support BC Transit E-Bus Integration** - Support the implementation of BC Transit's Low Carbon Fleet program.	Ongoing	TBD	Transportation; Engineering

4 APPENDICES

4.1 Benefits of EVs

Cost Saving

EVs have lower operating costs compared to regular cars (i.e. internal combustion engine vehicles). The cost of charging a passenger EV at current BC residential electricity rates is equivalent to about $0.20 per litre of gasoline and can cost even less at commercial electricity rates. EV drivetrains also have far fewer moving parts than regular cars and therefore require less maintenance. The 2 Degrees Institute estimates that passenger EV fuel and maintenance costs are 74% lower than regular cars. Over a 10-year vehicle life, this equates to savings of approximately $23,000 to $36,000 [14].

EVs are currently typically more expensive to purchase than comparable regular cars. However, EV costs are declining, and the International Council on Clean Transportation projects that an EV with 400 km of range will cost the same (even without subsidies) as a comparable gasoline car by 2026 and less thereafter [15].

EVs will also realize life cycle[1] cost savings in the trucking sector and other heavy-duty vehicle applications. For urban and regional goods delivery using small- and medium-sized trucks, E-trucks are often cost-effective today [16]. Many experts anticipate that BEV trucks will be the lowest cost truck option (considering both capital and operating costs) for most heavy duty trucking applications before 2030 [17] [18] [19].

EV cost savings will not only help individual households and businesses, they will also benefit the local economy. Money spent on fossil fuels predominantly leaves the community, whereas money saved on fuel is more likely to be spent locally, contributing to local economic activity.

Reduced Greenhouse Gas Emissions

EVs result in far fewer GHG emissions than regular cars. Even accounting for the emissions associated with manufacturing vehicles and batteries, the life cycle emissions of PHEVs and BEVs are ~60% to 90% lower, respectively, than regular cars when charging using BC's relatively clean electricity supply mix [20] [21].

The benefits of EVs on climate change will only improve over time. All around the world, the GHG intensity of electricity is declining, driven by the decline of coal, increased adoption of renewable energy sources like wind and solar, and other factors [22]. There is the potential to use EVs to optimize the use of renewable energy sources, such as automatically ramping up EV charging when clean, inexpensive wind and solar power is abundant, and reducing charging when power from the electricity grid is more expensive.

[1] Life cycle cost analysis considers the total costs - financial and/or environmental - over the life of a vehicle.

Clean Air and Improved Health

BEVs and PHEVs operating in fully-electric mode have no tailpipe emissions and therefore eliminate a major source of air pollution as they replace regular cars. In Canada, about 14,600 premature deaths and $114 billion in healthcare costs are attributed to air pollution [23]. Transportation is a considerable contributor to air pollution. In Canada, passenger vehicles account for approximately 21% of nitrogen oxide (NOx) and 51% of volatile organic compound (VOC) emissions, which form ozone that causes respiratory irritation and smog [24]. Therefore, the transition to EVs can play an important role in reducing these impacts.

EVs can also reduce noise pollution in urban environments. EV motors and braking systems are much quieter than those of regular cars, particularly for larger vehicles like trucks or buses. The World Health Organization has found that reduced community noise levels improve sleep, long-term hearing, mental health, and general performance [25].

4.2 Benefits of E-Bikes

It is widely accepted that cycling, including E-bikes, has many health, financial, environmental, and societal benefits. The active lifestyle associated with cycling improves health and well-being. Travel by both traditional bicycles and E-bikes has much lower costs than by automobile, with significantly lower purchase, fuel, parking, and maintenance costs. Travel by E-bike results in extremely low GHG emissions and air pollution compared to passenger vehicles and has only slightly more GHG emissions than traditional cycling, taking into account manufacturing and disposal [26]. When cycling replaces driving, it helps to reduce congestion and improve community livability.

E-bikes can enhance the benefits of traditional cycling by enabling longer trips, improving accessibility, increasing cargo loads, and reducing travel times, as detailed below.

Accessibility

E-bikes make cycling more accessible for a wider diversity of people. E-bikes have been shown to more than double the average length of a trip people are willing to make by bicycle [27]. Likewise, E-bikes require less effort to ride up hill and other challenging terrain, which is a significant benefit for a hilly community like Kamloops. Finally, E-bikes can provide people who are less able to cycle (e.g. those recovering from injury, seniors, and people with disabilities or health problems) the opportunity to cycle with more ease. For these reasons, E-bikes can enable more people to take up cycling and allow people to continue to cycle later in life.

Greater Cargo Loads

E-bikes can allow for heavier loads to be carried by bike. A wide variety of cargo E-bikes are available with increased space to carry large and heavy loads—some can carry more than 500 lbs. These bikes can carry children, groceries, and other loads, which allows people to

more easily meet their daily travel needs by bike. The increased cargo-carrying capacity also makes them more viable for courier and delivery applications.

Reduced Travel Times

Another benefit of E-bikes is the potential for reduced commute times. With the assistance of the electric motor, cyclists can reach their destination faster and with less effort.

4.3 Public EV Charging Infrastructure in Kamloops

4.3.1 Current Charging Station Locations

While the large majority of EV charging occurs at home and the workplace, expanding the network of publicly accessible EV charging is also important to support EV adoption. Access to public charging enables households that have limited access to home or workplace charging to adopt EVs, lessens "range anxiety", and makes EVs more visible. DC fast charging is particularly important to enable long-distance trips between Kamloops and other regions and to allow local residents to recharge quickly during shorter stops.

To date, various EV charging networks have implemented DC fast charging stations in Kamloops, including Petro-Canada, Canadian Tire and Electrify Canada, BC Hydro, and Tesla Superchargers. Additionally, various businesses, hotels, car dealerships, TRU, and the City offer public Level 2 charging. A map of public charging stations currently in Kamloops is shown in Figure 3.

Investment in publicly accessible EV charging infrastructure is expected to continue. However, the business case for providing public EV charging, particularly DC fast charging, is challenging while there are still relatively few EVs on the road. The International Council on Clean Transportation, C40 Cities, and other leading analysts suggest that to achieve optimal levels of public EV charging infrastructure, investment from cities and other levels of government is required to complement investment by the private sector [28] [29]. While early deployment is key to capitalize on the growing market demand for EV charging, relying only on the private sector to implement EV charging will likely result in this critical infrastructure being underbuilt.

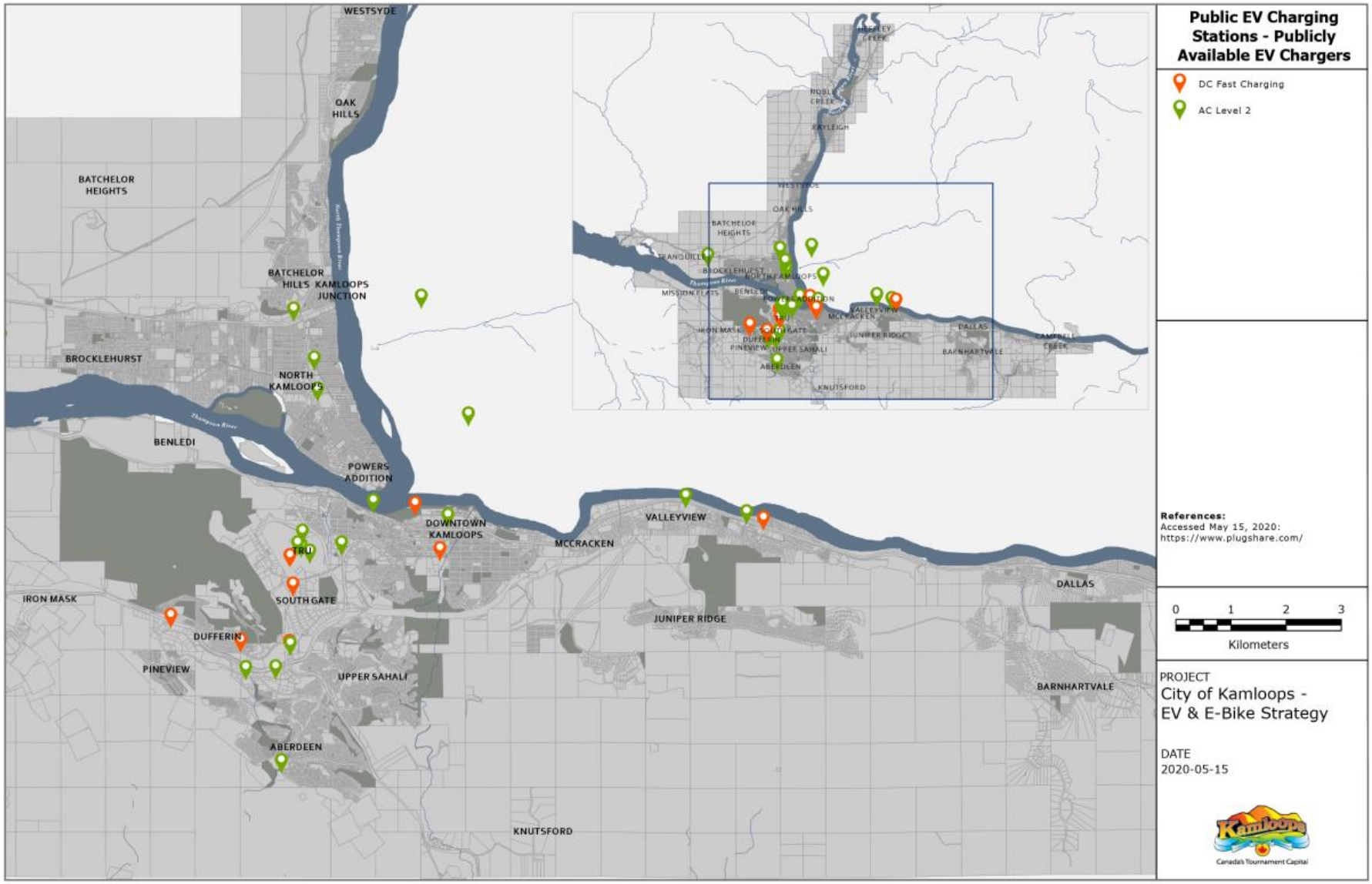

Figure 3: Publicly accessible EV charging stations in Kamloops. Source: Plugshare.com, May 2020.

4.3.2 Possible Future Charging Station Locations

Figure 4 shows where citizens engaged on Let's Talk Kamloops, the City's online engagement website, would most like to see public EV and E-bike charging infrastructure. These locations correspond well to Figure 5, which summarizes a geospatial analysis of priority locations for public charging performed as part of developing the EV and E-Bike Strategy. Priority locations were developed based on potential sites' proximity to amenities (e.g. shopping, recreation) as well as population centres.

Responses received during public engagement and the geospatial analysis suggest that there are a variety of neighbourhoods across Kamloops where public EV charging can be located. City facilities in these locations and on-street parking are good opportunities for the City to implement its own publicly accessible EV charging network. Likewise, the City can facilitate private investment of properties in these areas.

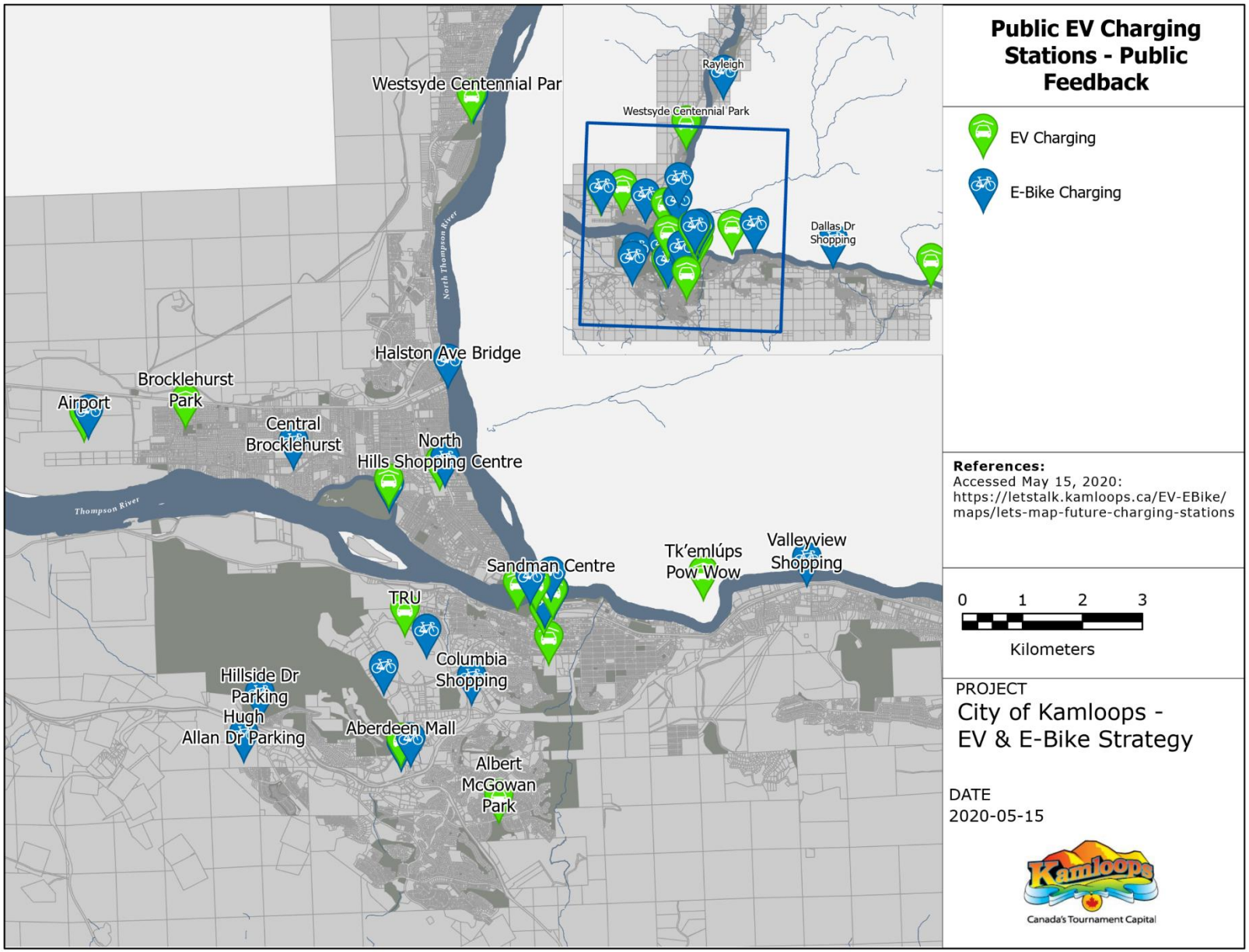

Figure 4: Locations identified for public EV and E-bike charging locations during public engagement.

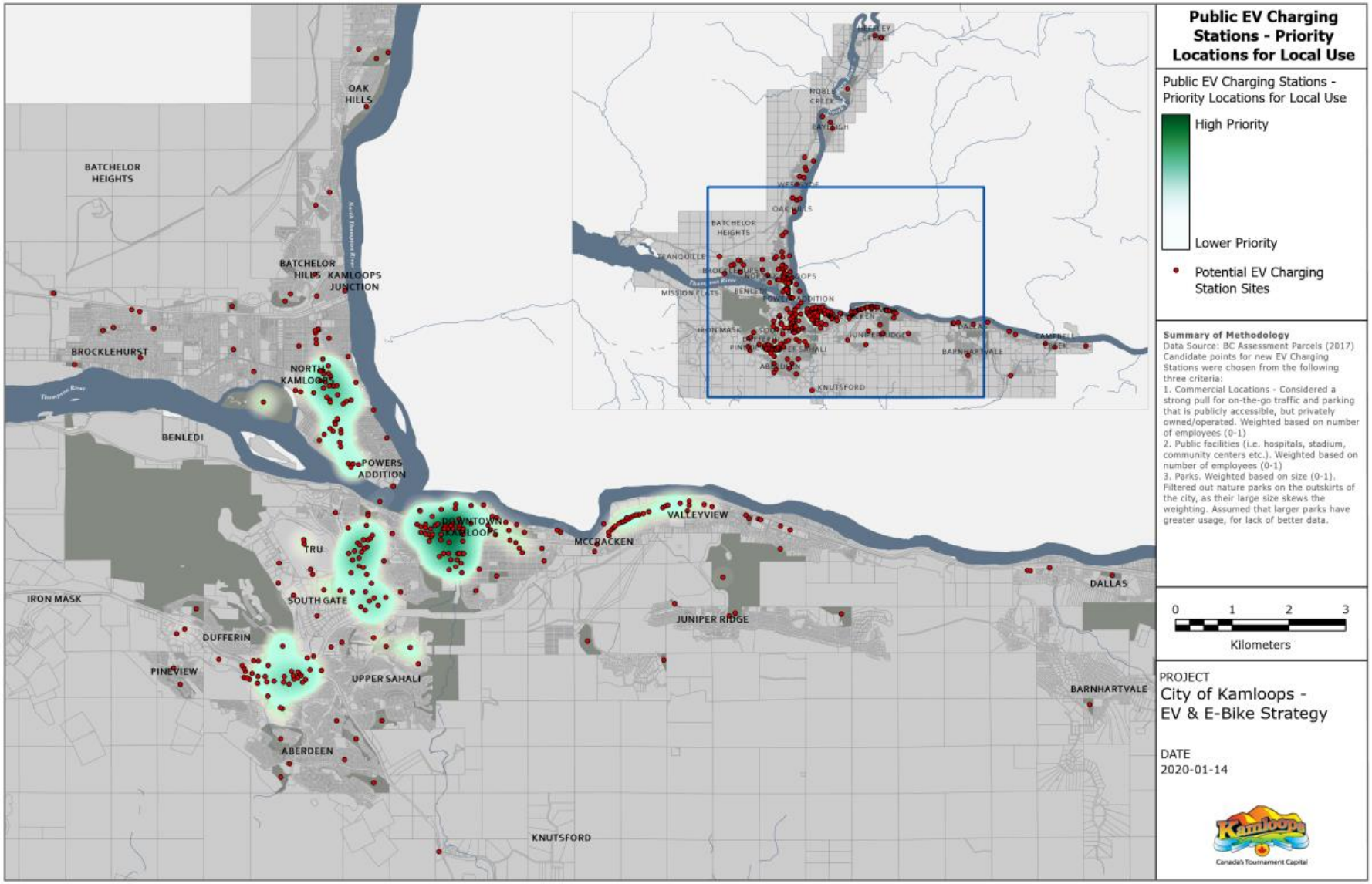

Figure 5: Analysis of priority locations for public EV charging to serve local demand.

4.4 Provincial and Federal Support for Electric Transportation

The following section provides an overview of federal and provincial support for EVs and E-bikes. Table 4 provides a summary of incentives and rebates for EVs and charging stations currently available in BC.

The transportation sector accounted for 25% of Canada's total GHG emissions in 2018, 50% of which is attributed to light-duty vehicles and 35% to medium- and heavy-duty vehicles [30]. Accordingly, supporting zero-emission vehicles, including EVs, is crucial to the federal governments' target to reduce Canada's GHG emissions 30% below 2005 levels by 2030.

The federal government has set the following sales targets for new light-duty vehicles in Canada [31]:

- 10% zero-emission vehicles by 2025
- 30% zero-emission vehicles by 2030
- 100% zero-emission vehicles by 2040

In support of Canada's emissions and vehicle sales targets, the federal government is undertaking a wide variety of initiatives to encourage EV adoption. The Pan-Canadian Framework on Clean Growth and Climate Change is the federal government's plan to meet emissions targets. It includes a variety of actions to accelerate the shift towards low-carbon transportation systems, including [32]:

- **Setting emissions standards and improving efficiency** - The federal government is implementing increasingly stringent standards for light-duty vehicle emissions and updating heavy-duty vehicle emission standards.
- **Shifting from higher to lower emitting modes and investing in infrastructure** - The federal government is investing in public-transit upgrades and expansion as well as EV charging networks for light- and heavy-duty vehicles.
- **Using cleaner fuels** - The federal government is developing a Clean Fuel Standard to reduce the GHG emissions intensity of fuels used in transportation as well as other solid and gaseous fuels. The Clean Fuel Standard will establish a mechanism for EV charging networks to receive credits for providing relatively clean sources of transportation fuel, which suppliers of more GHG-intensive fuel (i.e. gasoline or diesel) may then purchase to be in compliance with the standard. This mechanism presents an important revenue opportunity for EV charging networks.

The CleanBC Plan is the Province of British Columbia's plan to reduce GHG emissions and includes these key components:

- **The adoption of the *Zero Emissions Vehicles (ZEV) Act*** - The *ZEV Act* requires 10% of new light-duty vehicle sales and leases to be zero emissions by 2025, 30% by 2030, and 100% by 2040.

- **Strengthening BC's renewable and low-carbon fuel requirements** - These requirements will achieve 20% emissions reductions from transportation fuels by 2030. Like the federal Clean Fuel Standard, these requirements can allow EV charging providers to be compensated for the low emissions intensity of their fuel.
- **Incentives for EVs and other zero emissions vehicles** - Including incentives for passenger vehicles, buses, heavy-duty vehicles, and various off-road vehicles and equipment.
- **Expanding EV charging** - By providing incentives for home, workplace, and public charging infrastructure.

In addition, in November 2018, BC Transit established a Low Carbon Fleet Program that aligns with the CleanBC Plan. BC Transit will only procure electric heavy-duty buses starting in 2023. The program includes a 10-year fleet replacement strategy that would replace 1,200 existing buses with electric versions and expand their fleet with 350 electric buses. BC Transit plans to have a fully electric fleet by 2040.

Provincial and federal incentives for EVs and EV charging infrastructure are summarized in Table 4.

Table 4: Overview of incentive and rebate programs for EVs and charging stations in Canada and BC.

Region	Program Name	Description	Equip Type	Amount	Conditions	Target
Vehicle Incentives						
Canada	iZEV [31]	Point of sale incentive for consumers who buy or lease an eligible ZEV	BEV	$5,000	For <6-seat vehicle, base model MSRP is less than $45,000; maximum MSRP is $55,000	Individual
			PHEV	$2,500		
Canada	iZEV [31]	Tax write-off	BEV, PHEV	varies	Maximum write-off of $55,000, no limit to total vehicle cost	Individual
BC	CEV for BC [33]	Vehicle point-of-sale incentives	BEV	$3,000	MSRP must be less than $55,000	Individual
			PHEV	$1,500		
BC	Scrap-It [34]	Incentive to retire an older, heavily polluting vehicle and purchase an EV to replace it	New BEV, PHEV	$6,000		Individual
			Used BEV, PHEV	$3,000		Individual

Region	Program Name	Description	Equip Type	Amount	Conditions	Target
BC	Specialty-Use Vehicle Incentive (SUVI) [35]	Rebate on specialty-use electric vehicles, including motorcycles, utility trucks, buses, and medium- and heavy-duty trucks	BEV	$2,000–$50,000, depending on vehicle type	Maximum 35% of MSRP; Maximum 5 per business	Individual, businesses
Charging Infrastructure Incentives						
Canada	NRCan Electric Vehicle and Alternative Fuel Infrastructure Deployment Initiative [36]	Funding for DCFC with minimum 50 kW power	Charging station	varies		Companies Institutions
BC	CleanBC Go Electric EV Charger Rebate Program [37]	Rebate on purchase and installation costs of level 2 charging stations	Level 2 charging station	50% of costs	Up to $350	Homeowners
			Level 2 charging station	50% of costs	Up to $14,000 ($2,000/station or $1,000/energized outlet)	Apartments, condos
			Level 2 charging station	50% of costs	Up to $5,000 ($350/station)	Apartments, condos
			Level 2 charging station	50% of costs	Up to $14,000 ($2,000/ station)	Workplace
BC	ZapBC [38]	Free level 2 ChargePoint charging station	Level 2 charging station	Value of $1,000		Individuals
BC	Fleet Champions Program [39]	Reimbursement for charging stations purchase and installation for fleets.	Level 2 charging station	33% of costs	Up to $2,000	Fleets

4.5 Global Trends and Forecasts

4.5.1 Electric Vehicles

Global sales of passenger EVs have grown by an average of 60% every year since 2012, reaching approximately 3% of global passenger vehicle sales in 2019 [40] [41]. In BC, EVs accounted for 10% of passenger vehicle sales in 2019 (i.e. 4,696 EVs purchased) and about 30% of sales of passenger vehicle types for which EV models are currently available (e.g. small- to medium-sized cars) [42].

There is every indication that EVs will account for a growing share of new vehicle sales into the future. Improving battery technology and declining costs are driving this transition. Bloomberg New Energy Finance (BNEF) has documented how average battery prices have fallen from approximately $1,200 per kWh in 2010 to an estimated $135 per kWh in 2020—a result of innovation and increasing economies of scale [43]. BNEF projects these trends will continue, with battery pack prices dipping below $100 per kWh in about 2024, at which point, EVs will typically cost the same amount to produce as conventional regular cars.

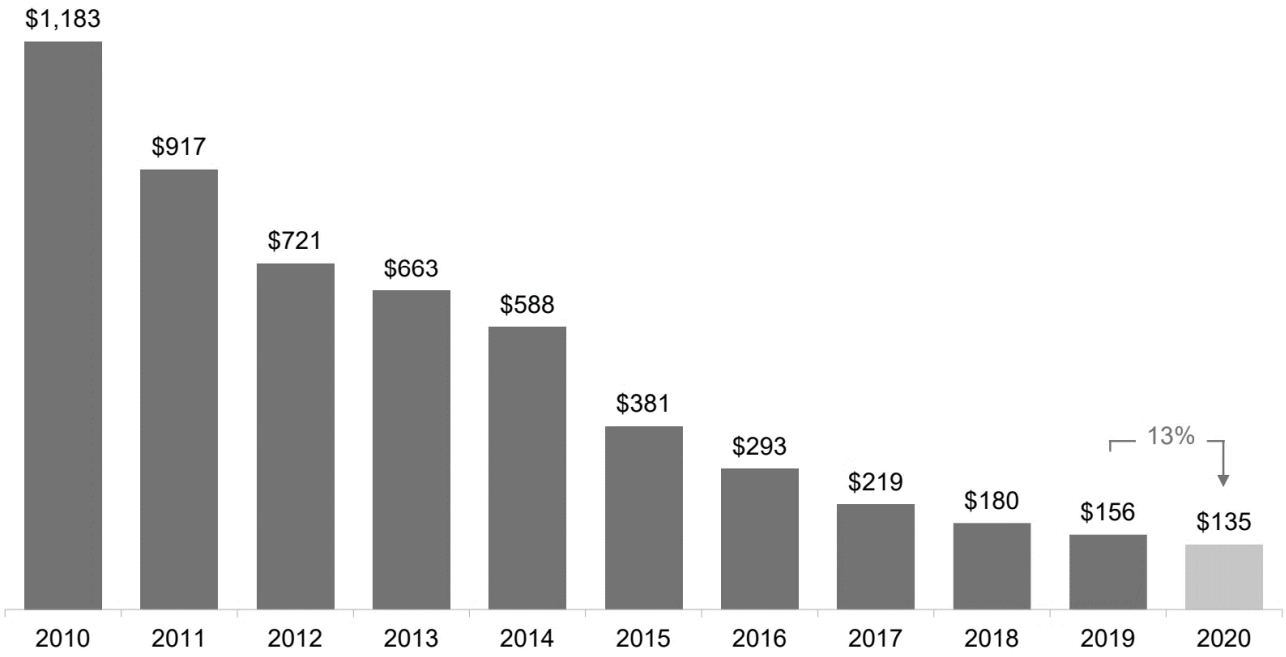

Figure 6: Cost of lithium Ion battery pack per kWh (volume weighted average). Source: BNEF 2020 [43].

With declining battery prices, more vehicle manufacturers are offering a growing range of vehicles. While passenger EVs available to date have predominantly been smaller cars, numerous manufacturers have either launched or announced SUVs and pickup truck options available in coming years. McKinsey & Company estimates that manufacturers will launch approximately 400 new passenger EV models through 2023 (see Figure 7) [44].

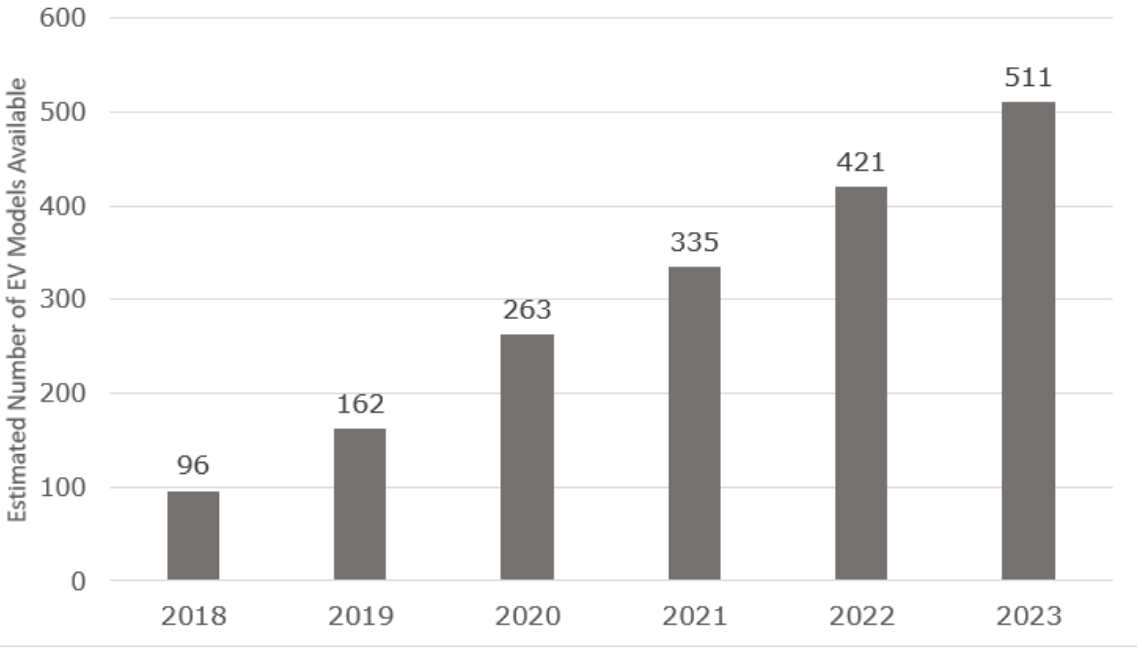

Figure 7: Estimated number of passenger EV models available globally. Derived from McKinsey & Company 2019 [44].

Likewise, the Union of Concerned Scientists has identified 64 electric medium- and heavy-duty truck and bus models either currently on the road or available in the next two years [19]. These electric trucks and buses vary in the maximum range they can travel on a single charge, making them suitable for a wide range of applications (see Figure 8).

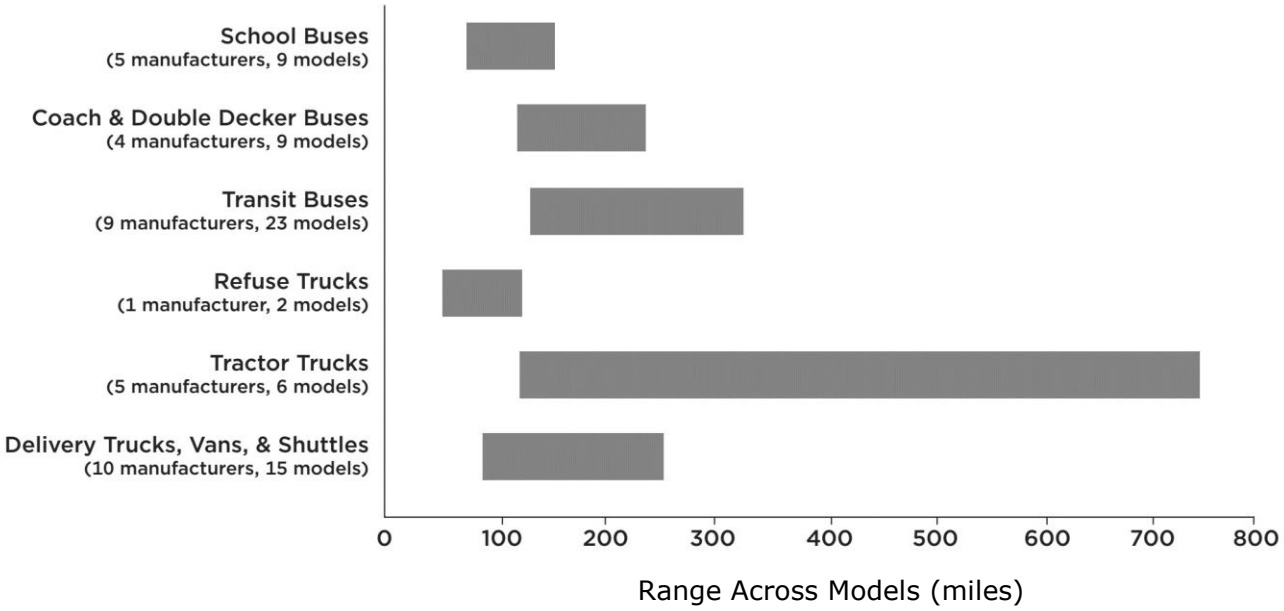

Figure 8: Available electric truck and bus models with maximum range on a single charge. Source: Union of Concerned Scientists 2019 [19].

4.5.2 Electric Bicycles

Like EVs, the adoption of E-bikes appears to be growing rapidly, although available sales data is limited. In 2019, the global E-bike market was valued at approximately USD $15 billion, and various analysts project the market will grow by 5–10% annually into 2025 [45] [46]. It is expected that with the ongoing decline in the cost of batteries and growing economies of scale, E-bike costs will decline.

4.6 Public and Stakeholder Engagement Process

As previously mentioned, part of the process of developing the EV and E-bike Strategy involved conducting a series of engagement activities for community members and stakeholders to provide their perspectives.

Online Engagement

The City hosted opportunities for input on its Let's Talk webpage. Three surveys were available for site visitors and distributed to stakeholders for completion between January 24 and February 28, 2020:

1. **General public survey** - This survey sought the views of respondents (primarily residents) on how the City can support the adoption of EVs and E-bikes. A total of 615 individuals participated in this survey.
2. **Developers, homebuilders, and realtors survey** - This survey explored the development, homebuilder, and realtor communities' perspective on the demand for EV charging and their familiarity with electrical infrastructure for EV charging. A total of 40 individuals participated in this survey.
3. **Businesses and institutions survey** - This survey explored the perspectives of businesses and institutions in Kamloops on providing EV and E-bike charging for employees or members of the public. A total of 21 individuals participated in this survey.

In addition, the Let's Talk webpage featured a map for site visitors to indicate where they think publicly accessible EV and E-bike charging infrastructure should be located. Visitors were also invited to share their ideas on how the City can support EV and E-bike adoption, and to capture opportunities not included in the surveys.

Community Engagement Session

The City hosted an EV and E-Bike Strategy community engagement session on February 26, 2020, at the Sandman Centre. A total of 54 individuals attended the session, which included staff presentations and poster boards that provided information about EVs and E-bikes and how local governments can support their adoption. Participants were encouraged to share their feedback on how the City should support EV and E-bike adoption in Kamloops.

Canadian Home Builders' Association Engagement

The Canadian Home Builders' Association Central Interior hosted City staff and the project consultant team for a workshop on January 16, 2020. The workshop explored the development and home building industries' perspectives on electrical infrastructure for EV charging in new construction and the potential for the City to implement EV-ready requirements for new construction.

City Staff Workshop

The project team also hosted a staff workshop on January 16, 2020, to advise key City staff on the objectives of the EV and E-Bike Strategy and to solicit their input on preliminary targets, policies and actions.

A detailed Community Engagement Summary Report can be viewed at LetsTalk.Kamloops.ca/EV-EBike.

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6 TECHNICAL ADDENDUM

This addendum includes additional context and information regarding some of the actions in the EV and E-Bike Strategy.

3.1 Support Home and Workplace EV Charging

#	Actions	Notes
3.1.1	100% EV-ready residential parking requirements for new developments	AES Engineering has developed a model bylaw and accompanying bulletin to support communities in implementing EV-ready requirements. A key component of EV-ready requirements is a performance requirement, which stipulates the maximum amount of load sharing, using EV energy management systems (EVEMS), that can be designed for in new developments. It is recommended to set performance requirements at such a level that the vast majority of the time (e.g. greater than 90% likelihood), all vehicles will be fully recharged after overnight charging, even when all vehicles are charging simultaneously. BC communities' performance requirements differ, depending on their typical vehicle kilometers traveled, winter low temperatures, and vehicle mix.
3.1.2	Pilot financial incentives for EV-ready retrofits in existing multi-family buildings and workplaces	AES Engineering and Origin Sustainable Design + Planning have submitted a report "EV-ready" MURB, Workplace & Fleet Parking: Incentive Program and Policy Interventions to Support Future Access to EV Charging to BC Hydro. This report recommends that BC Hydro and/or the Province of BC implement a program that provides incentives for comprehensive 100% EV-ready retrofits in existing apartments, workplaces and fleet parking. The report also includes recommendations for local governments. The City could pilot incentives prior to a provincial-scale program, provide "top-up" funding for early adopters, and/or promote and provide

#	Actions	Notes
		education about any future EV-ready program.
3.1.4	EV-ready commercial and institutional parking requirements for new developments	Unlike residential parking, for which 100% EV-ready is widely recognized as best practice, the appropriate level of EV-ready parking for non-residential parking is less clear. To date, communities in BC have required 5–20%. It may be the case that EV-ready requirements are best differentiated from workplace parking (requiring a higher number of parking spaces but allowing significant load management using EVEMS) and visitor parking (requiring EV-ready infrastructure for a smaller percentage of parking spaces, but at higher capacities to accommodate higher rates of charging). Moreover, it may be advisable to use parking and loading requirements for some forms of charging (e.g. workplace charging or Level 2 charging in visitor parking), but to use more flexible, discretionary policies (e.g. policy outlining considerations for rezoning; transportation demand management policies; etc.) to facilitate more expensive DC fast charging, which is likely not appropriate to require for every property. A cohort of BC local governments has been organized by the BC Hydro Sustainable Communities Program to explore appropriate EV-ready requirements for non-residential parking. As of this writing, this work is ongoing. The City can review the findings of this group to inform their requirements.
3.1.5	E-bike parking	HUB Cycling, a charitable not-for-profit organization, advocates for E-bike charging and other end-of-trip amenities. Notably, HUB provides recommendations for the dimensions of bike parking spaces to

#	Actions	Notes
		accommodate some larger E-bike formats, including cargo bikes and trikes.

3.2 Develop Public Charging Infrastructure

#	Action	Notes
3.2.3	Establish "EV-friendly" parking and business licensing regulation	Leading BC local governments have clarified parking and business licensing requirements to ensure clarity and remove barriers to implementing publicly accessible EV charging. "EV-friendly" parking and business licensing regulations ensure that: • properties that implement publicly accessible EV charging and reserve these spaces for EVs do not need to build additional parking to meet minimum parking requirements (with potentially substantial additional cost). To facilitate this outcome, the City can specify that 10% of the minimum number of required parking spaces on a new or existing development may be designated "EV Only" parking before additional parking must be implemented to meet the minimum requirement. • an existing licensed business does not need to take out a separate licence for EV charging stations on their premises—the EV charging is simply viewed as an additional revenue stream for the existing business
3.2.4	Explore exempting EV charging implementations from development cost charges, revitalization tax exemptions and/or providing other financial tools to support investments in public charging	The City levies development cost charges (DCCs) on new or expanded development for transportation, parks, and other infrastructure improvements in order to adequately service the demands of the new development. In the past, the City has applied DCCs applicable to gas bars on public EV charging infrastructure. Under section 563 of the *Local Government Act*,

#	Action	Notes
		the City may explore waiving or reducing DCCs for developments that are designed to result in low environmental impacts. Moreover, developments may be exempted from DCCs if they do not impose a new capital cost burden on the City. Given the environmental benefits of providing EV charging infrastructure, and that the implementation of public charging infrastructure may not impose a new capital cost burden on the City, the City will explore and make any necessary amendments to its Development Cost Charges Bylaw. Additionally, revitalization tax exemptions (RTEs) are tools that BC local governments may use to support environmental, economic or social objectives. They involve granting a (potentially partial) exemption from municipal property taxes for up to 10 years in exchange for a property owner meeting specific development criteria. RTEs could provide a powerful opportunity to provide City incentives for public EV charging infrastructure and other investments on private property that support EV deployment. Other potential tools include Property Assessed Clean Energy (PACE) financing, whereby repayment for investments in properties' sustainability features are repaid via optional local improvement charges; or other incentives or financing mechanisms.
3.2.5	Explore "feebates" and/or regulations that encourage deployment of public charging infrastructure on private property	It may be possible to structure business licence fees to strongly encourage climate actions, including investing in EV charging infrastructure. Under such a regime, the City would signal that licensing fees would be raised by significant levels for certain types of businesses (e.g. shopping centres and hotels) at some point in the future

#	Action	Notes
		(e.g. 2030), with "feebate" exemptions for businesses that make some minimum investment in EV charging. Leading BC local governments are beginning to explore such mechanisms. Other "feebate" structures and/or regulatory approaches could likewise encourage investment in publicly accessing charging infrastructure.

3.4 Lead by Example in City Fleet and Facilities

#	Actions	Notes
3.4.1	Electric First procurement policy	It is recommended that an internal carbon price of $150 per tonne of CO_2e (adjusted for inflation thereafter) be used as part of life cycle costing to account for the social costs of GHG emissions and air pollution. Metro Vancouver adopted the internal carbon price of $150 per tonne following research into the social cost of carbon. Such an internal carbon price represents a best practice among Canadian municipalities.
3.4.4	Facility assessments	Comprehensive assessments of civic facilities to determine the optimal strategies to sequence implementation of EV charging infrastructure and other energy upgrades are key to minimizing life cycle costs and maximizing value. These assessments will consider phased approaches to deploying EV charging infrastructure; the power needs for different charging applications (workplace, public, etc.); other low carbon electrification opportunities (e.g. natural gas equipment to heat pump renovations); and EV energy management strategies to minimize electrical load impacts.

3.5 Drive Electrification of Commercial Fleets and Transit

#	Actions	Notes
3.5.1	Advocate for provincial, federal, and utility policies that support electrification of commercial fleets and transit	Important policies include: • Zero-emissions vehicle sales mandates for medium- and heavy-duty vehicles - Such mandates were introduced for light duty vehicles as part of BC's *ZEV Act*. However, similar mandates have yet to be introduced by the federal or provincial governments for medium- and heavy-duty vehicles, such as freight trucks. The California Air Resources Board (CARB) recently proposed such standards in their Advanced Clean Trucks (ACT) standard. These requirements are important to providing regulatory certainty and ensuring availability of zero-emissions trucks. • Fleet composition mandates - A fleet composition mandate would require that trucking, taxi, and other commercial fleets consist of a growing percentage of zero emissions vehicles in future years. CARB is developing such requirements for California [47]. • Continued strengthening of the BC Renewable and Low Carbon Fuel Requirements Regulation and federal Clean Fuel Standard. • Incentives for vehicles and charging infrastructure. • Charging network planning. • BC Hydro policies for low-cost and timely utility interconnections. • EV-friendly utility rate structures.