SUSTAINABLE CITY ADVISORY COMMITTEE

HIS WORSHIP, THE MAYOR
AND COUNCILLORS

SUBJECT: CITY PUBLIC ELECTRIC VEHICLE CHARGING PILOT PROJECT

RECOMMENDATION:

1. THAT Council approve the proposed pilot project for City public EV charging, as outlined in Section 3 of this report.

REPORT

The Sustainable City Advisory Committee, at its meeting held on 2018 November 14, received and adopted the *attached* report seeking Council approval for a City public EV charging pilot project.

Respectfully submitted,

Councillor S. Dhaliwal
Chair

Copy: City Manager
Director Engineering
Director Planning and Building
Director Finance
Director Parks, Recreation and Cultural Services
Chief Building Inspector
Chief Librarian

City of Burnaby

Meeting 2018 Nov 14

COMMITTEE REPORT

TO:	CHAIR AND MEMBERS SUSTAINABLE CITY ADVISORY COMMITTEE	**DATE:**	2018 November 7
FROM:	DIRECTOR PLANNING AND BUILDING DIRECTOR ENGINEERING	**FILE:** *Reference:*	76500 20 *EV Policy*

SUBJECT: CITY PUBLIC ELECTRIC VEHICLE CHARGING PILOT PROJECT

PURPOSE: To seek Council's approval for a City public EV charging pilot project.

RECOMMENDATION:

1. **THAT** Council approve the proposed pilot project for City public EV charging, as outlined in Section 3 of this report.

REPORT

1.0 INTRODUCTION

On 2018 May 7, Council received a report recommending amendments to the Zoning Bylaw to require parking spaces in new residential development to have outlets for electric vehicle (EV) charging. Council approved the report, and the subsequent Zoning Bylaw changes, which took effect on 2018 September 1. The report also advised of three additional policy areas under development: public EV charging; EV charging in new commercial/office/institutional development; and EVs in City fleets. This report advances recommendations for the next policy area, public EV charging.

1.1 Policy Framework

Policy supporting the uptake and use of electric vehicles is aligned with the City's three sustainability plans (environmental, social and economic):

- The **Environmental Sustainability Strategy** (ESS) and **Community Energy and Emissions Plan** (CEEP) support EVs in the *Move* section, including with specific strategies and actions to encourage the uptake of EVs. The CEEP also includes adopted targets for reducing community greenhouse gas (GHG) emissions, of which transportation accounts for 50%. The ESS and CEEP *Manage* goal also supports the City demonstrating leadership in reducing GHGs in management of its operations and facilities. A report to Council, dated 2017 August 9, advanced an implementation framework for these plans, which included EV Policy as a Phase 1 initiative.

- The **Social Sustainability Strategy** supports EVs due to opportunities to improve affordability with reduced vehicle operation and maintenance costs, and to improve health through reduced air pollution.

- The **Economic Development Strategy** supports EVs due to opportunities to support Burnaby's green economy and the sustainability of businesses in Burnaby.

Specifically as it relates to public EV charging, Burnaby's CEEP includes the following "Big Move" (priority) strategy, which is also shared with the ESS, and supporting actions:

C2.5 (NEW Big Move) - Transition to more efficient (including zero-emission) vehicles…

a) Consider developing policy to strategically support deployment of EVs, including...(in) ***publicly accessible areas*** *and consideration for* ***public fast-charge station(s)****.*

b) Consider opportunities for demonstrating leadership and accelerating EV adoption by... ***providing public charging in municipal buildings and parking lots****.*

The proposed pilot project also aligns with the following goals and sub-goals of the **Corporate Strategic Plan**:

- **A Connected Community**
  - Partnership – Work collaboratively with businesses, educational institutions, association, other communities and governments
  - Geographic connection – Ensure that people can move easily through all areas of Burnaby, using any form of transportation.

- **A Healthy Community**
  - Healthy Environment – enhance our environmental health, resilience and sustainability.

- **A Dynamic Community**
  - Economic Opportunity – Foster an environment that attracts new and supports existing jobs, businesses and industries

- **A Thriving Organization**
  - Financial viability – Maintain a financially sustainable City for the provision, renewal and enhancement of City services, facilities and assets

1.2 Market Context

The EV market in Canada continues to grow rapidly. Canada-wide, EV sales in the second quarter of 2018 grew by 214% (and by 202% in BC) compared to the same period in 2017. The national EV market share of all light duty vehicles over the past three months was 2.3%, compared to 0.7% at the same time last year. Some of the posited reasons for this pace of change include increased car buyer comfort (supported by improved charging access) and interest in the

technology; availability of more EV models that fit many market niches; and, the release of the Tesla Model 3 into the Canadian market[1].

The EV market is expected to continue to grow rapidly over the coming years, but the rate of uptake will still depend in large part on the availability of charging. Charging at home while vehicles are parked overnight is the most convenient option and for that reason the City's EV policy focused first on requiring infrastructure to support home charging in all new developments, now a Zoning Bylaw requirement. The challenge remains for residents of existing homes that were built prior to these new requirements. Residents without access to EV charging may need to rely on charging available at the workplace and/or in publicly accessible locations throughout the community. In the absence of such charging opportunities, purchasing an EV may not be a viable option for many citizens.

1.3 Overview of Charging Infrastructure and Levels

There are three components of EV charging:

- **The electrical infrastructure and outlet** that delivers and provides a means to connect to the electrical grid, either as alternating (AC) or direct (DC) current.

- **The EV Supply Equipment (EVSE)**, an apparatus that typically includes a cord to connect the vehicle to the electrical supply[2]. EVSE measures and controls the delivery of electricity, and may include a fee-collection function. EVSE may be portable (carried within the vehicle) or affixed next to a parking space.

- **The vehicle's built-in charging system** that accepts and converts the electricity supplied via the electrical infrastructure and EVSE into stored energy in the vehicle's battery.

The most common types, or "levels", of charging, as outlined in previous Council reports and summarized in ***Appendix A***, include:

- **Level 1 (AC)**, which takes the form of a 120V wall outlet. This level of charging is becoming less common since it takes a long time to charge, particularly as vehicle range and battery size are increasing.

- **Level 2 (AC)**, which takes the form of a 208V or 240V outlet, to which EVSE in a pedestal or wall-mounted unit may be attached. This is the most widely deployed type of EV charging today, and is suitable for home, workplace and public locations. It can deliver a useful charge in one to two hours, and can fully charge an empty battery in most EVs on the market in 6 hours. Level 2 charging can also form part of an *EV energy*

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[1] Source of data reported in this paragraph: Fleetcarma Electric Vehicle Sales Update Q2 2018, Canada https://www.fleetcarma.com/electric-vehicles-sales-update-q2-2018-canada/

[2] Cordless ("induction") charging exists but has not yet been widely deployed in the marketplace.

management system (EVEMS) which can share a single electrical circuit with multiple EV outlets or other electrical devices. EVEMS is described in the report approved by Council on 2018 May 7.

- **DC Fast Charge (DCFC)**[3], which provides direct current at 50kW or 25kW, and usually takes the form of a larger pedestal with utility box supplied with connectors and cords. It can fully charge most vehicles on the market today in about 30 to 45 minutes, and a useful charge for top-up can be delivered in 15 minutes. Due to the large power draw this type of charging is more expensive to install and so not as common or widely deployed as Level 2 charging.

1.4 Fees for EV Charging

Best practices suggest that charging a fee for the service of EV charging is appropriate as it helps to ensure the parking space is not taken up by vehicles that are not utilizing the charging, whether internal combustion vehicles or EVs that are over-staying the space beyond the time required to charge. Fees also provide a source of revenue that can help to offset the operating and capital cost of the service, and support a user-pay model of service.

Under existing BC Utilities Commission (BCUC) rules, local governments and utilities can charge fees for EV charging, and landlords can charge fees to their tenants. However, private entities may not charge fees to their customers, as it is considered "re-selling electricity". This restriction is based on an energy system model (e.g. power plants) that did not contemplate the case of EV charging specifically, and it is currently being reviewed by BCUC[4]. A change in these rules to allow collecting fees by private entities could result in the installation of more charging by businesses on a voluntary basis, and provide a stronger basis for increased requirements for EV charging in new commercial and institutional developments.

2.0 PUBLIC EV CHARGING IN BURNABY

As mentioned above, publicly accessible EV charging can help to fill in the EV charging network, serving residents without access to home charging, and providing a top-up for drivers on-the-go. Public charging can also support businesses and economic activity, as EV drivers are more likely to shop or do other business in areas where they can also charge their vehicle[5]. Public EV charging may be provided by businesses, institutions, and the City specifically.

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[3] Tesla also makes a proprietary "super charger" which is a form of DCFC that delivers even faster charging but can only be used by Tesla vehicles (Tesla vehicles can, however, also use Level 2 and regular DCFC).

[4] The review was initiated in early 2018; the consultation period is now closed, and a decision is anticipated soon. More information is available at: https://www.bcuc.com/Documents/Proceedings/2018/DOC_50755_02-08-2018_BCUC-EV-Charging-FAQ.pdf

[5] For example, the Heights Merchants' Association presented a delegation to the 2018-02-06 Sustainable City Advisory Committee expressing an interest in policy and programs that would increase the provision of EV charging in this neighbourhood.

2.1 Existing Public EV Charging in Burnaby

Some businesses in Burnaby already provide EV charging for their customers. Due to the existing BCUC restriction noted above, this charging is provided to the public for free (although fees for parking may still apply, at rates consistent with adjacent non-EV spaces). Some examples include:

- Malls such as Brentwood (one Level 2 charge point[6]), Lougheed (three Level 2 charge points), and Metropolis (six Level 2 charge points);
- Lake City Centre (one Level 2 charge point);
- Cornerstone Building at SFU (four Level 1 and five Level 2 charge points);
- Tim Hortons on Kingsway (one Level 2 charge point);
- Canada Way Business Park (two Level 2 charge points).

Public institutions and not-for-profit organizations that provide EV charging in Burnaby include:

- BCIT (one Level 1, 12 Level 2, and two DCFC charge points);
- Burnaby Central Secondary School (two Level 2 charge points);
- Burnaby Association for Community Inclusion (two Level 2 charge points);
- Metro Vancouver, Metrotown headquarters (one DCFC charge points).

In addition, the City of Burnaby currently provides EV charging at the following locations (no fees for charging are currently applied):

- Deer Lake Centre[7] (four Level 2 charge points);
- Shadbolt Centre for the Arts (one Level 1 charge point);
- Edmonds Community Centre[8] (two Level 1 charge points).

The new South Burnaby Ice Arena is also being designed to include Level 2 charge points in six stalls, and 22 additional stalls pre-wired for future EVSE installation (20% of stalls in total). See ***Section 3.2.3*** explaining the relationship of this site to the proposed pilot project.

The locations and details for all currently available public EV charging sites across BC are available on www.plugshare.com; see also ***Appendix B***.

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[6] The term "charge point" means a connection point for a vehicle to receive a charge, and is used instead of "station" or EVSE here, since a single station/EVSE may supply multiple charge points.

[7] This site is available to the public, but is primarily used by tenants of the building. A report to the Environment Committee dated 2014-05-08 provides background about its installation.

[8] The Level 1 chargers at City facilities do not provide adequate charging for most users, and upgrading to Level 2 is being explored, including as a part of this pilot project.

2.2 Charging Levels (Level 2 vs. DCFC) in Public EV Charging

At present, Level 2 charging is the most commonly installed type of charging for locations that people visit for shopping, recreation and work. Level 2 charging can be supplied from a building's electrical supply, either as dedicated circuits or shared circuits using energy management systems, or directly from the public grid for curb-side charging. The cost of equipment and installation of a Level 2 EVSE (a single wall mounted or pedestal unit providing two charge-points) ranges from about $12,000 to $20,000. In the City of New Westminster, public Level 2 charging was also recently installed in streetlight standards that were previously converted to LED, utilizing spare electrical capacity. Level 2 charging is therefore a good choice for the bulk of the EV network at this time, as it is relatively cost effective, suitable for a wide range of locations, and appropriate for locations where typical parking durations are at least one hour.

DC Fast Charge (DCFC) delivers more charge in a short time, allowing for a higher turnover, and may be utilized by residents of the immediate neighbourhood, drivers passing by, and others who may seek it out. DCFC EVSE is usually connected directly to the electrical grid, or requires additional electrical supply provided to a building to support it. As previously noted, DCFC draws a much larger amount of power and installation cost is typically $50,000 to $100,000. It is usually deployed more strategically and can form key nodes in the public EV charging network. Many DCFC installations to date in BC have received funding from BC Hydro and Natural Resources Canada.

At this time Level 2 charging would likely form the majority of Burnaby's public charging network, while DCFC would also be considered for key locations as funding opportunities arise.

3.0 PROPOSED PILOT PROJECT FOR PUBLIC LEVEL 2 EV CHARGING

Many municipalities in BC provide EV charging to various extents. Surrey and Vancouver entered the field relatively early and today Surrey has around 40 sites providing public EV charging, while Vancouver has over 200. Other communities are still getting started and have only a small number of sites provided to date. Over the past ten years, the industry, technology and policies have matured, lessons learned have been shared between jurisdictions, and Burnaby Council has approved policy direction that includes support for public EV charging. Staff and Council members are also receiving a growing number of inquiries from residents and businesses requesting public EV charging. It is therefore proposed to respond to this demand for EV charging by installing EVSE at existing City owned facilities and parking areas, beginning with a pilot project as outlined below.

3.1 Considerations for Public EV Charging

In order to ensure that public resources are efficiently allocated, the proposed pilot project would allow Burnaby to explore a number of considerations associated with providing public EV charging, as a basis for a future program for this area of service.

Key considerations and findings that would arise from a pilot implementation include:

- **Public Benefits** – as noted above, greater uptake of EVs in Burnaby can play an important role in meeting the community GHG reduction targets as stated in the CEEP, and help to improve air quality. The specific GHG benefits can be quantified with usage data of installed public Level 2 EV charging. Users can also benefit from lower fuel and maintenance costs.

- **Costs and resources** – the cost of the EVSE itself is relatively predictable, however installation costs can vary widely depending on site specific variables. The staff resources required to manage public EV charging, together with the appropriate level of service that can be provided by vendors, also require closer examination. Deployment of EV charging at a modest number of sites initially, together with monitoring, would allow for better estimating these costs to the City.

- **Siting and locations** – although much can be learned from the experience of other municipalities in terms of factors and criteria to consider for siting of EV charging, a pilot project will allow Burnaby to gain further information and direct experience specific to the City.

- **Fees and revenue** – as noted above, it is recommended that a fee be applied for charging so that drivers pay for the service, to help ensure turnover and to recoup some costs. Evaluation and feedback on specific fee structures, and the revenue generated, would be part of the pilot project evaluation.

- **Public use and feedback** – monitoring the usage of the various sites, and comments and feedback from the public about the charging, would also be used to inform future installations and EV policy and programs.

- **Technology and vendor service** – the quality of equipment and services offered by vendors for maintenance would be evaluated as a part of procurement and monitoring, with the objective to minimize the burden on City staff resources in a cost-efficient manner.

3.2 Proposed Level 2 Pilot Project Components

3.2.1 Objective and Scope

The proposed pilot project would have the objective of gaining experience with the provision of City-owned and operated Level 2 EV charging in a range of publicly accessible locations in Burnaby, in order to set future direction for a City program for this service area.

Two general types of installations of Level 2 charging are proposed:

1. Parking areas adjacent to existing City facilities, primarily (but not necessarily exclusively) intended to serve visitors to those facilities.
2. Street-side parking areas, either on City streets (curb-side) or in City owned surface parking lots, intended to serve visitors to nearby commercial/shopping areas and City amenities.

Geographically, the installations would be deployed on the basis of Burnaby's quadrants, to ensure EV charging is not overly concentrated in one area of the city, and to evaluate outcomes in a range of locations.

3.2.2 Phases and Timing

The first phase of the project would target existing City facilities. The project would aim to select one or more sites in each of the quadrants of the city, and to install two to four Level 2 EV charge points at each location. Candidate sites would include community centres, recreation centres, libraries, and other facilities that have a high rate of public visitation. Charging infrastructure may be installed in surface parking or in underground parkades, depending on the site. Capital budget has been provided for this initial phase in the 2019 Provisional budget (Engineering Facilities), subject to Council's approval.

The second phase of the project would target street-side parking in commercial areas. Potential sites would likely be located within areas of high commercial activity and mixed-use, at curbside locations on streets that are not stripped of parking during rush hour, or in nearby surface lots. Locations may also be chosen to utilize street-light standards, with a similar approach as demonstrated in the City of New Westminster. The fact that Burnaby has retrofit most of the streetlights across the City with LED presents a possible opportunity to add another layer of sustainability to this initiative by utilizing spare electrical capacity for EV charging. The capital budget for this work would be determined and allocated at a later date.

The first phase is proposed to be undertaken in 2019, and the second phase in a subsequent year. In each case, the EV charging would be provided for a two-year "pilot" period, after which staff would report back to Council with outcomes and recommendations to continue or discontinue the program, and further specific recommendations for changes to or expansion of the program as appropriate.

3.2.3 Relationship of Pilot Project with EV Charging in New Capital Projects

Installation costs of EV charging in new projects can be built into the budget and are typically lower than retrofitting. For this reason the proposed pilot project is focusing primarily on retrofitting EVSE in existing locations. Nevertheless, monitoring of EVSE installed in new capital projects, such as at the South Burnaby Ice Arena, will be included where possible in the data collected during the pilot project. Lessons learned from EVSE installed in both retrofit and new capital projects will inform the potential development of a broader City program for EV charging.

3.2.4 Budget and Resources

Based on input from other municipalities, the cost of installing a dual-port Level 2 charging EVSE for facilities (i.e. two charge points) normally ranges from about $12,000 to $20,000, depending on site specific factors. On this basis, $140,000 has been allocated within the City's Provisional capital budget for 2019, in the Engineering (Facilities) Department, for Phase 1 of the pilot project, and pending further evaluation of potential sites these funds would be allocated based on cost-effectiveness as well as site location and usage factors. Fees collected would be used to help offset operating and capital costs.

For the second phase (street-side locations), budget would be allocated in a subsequent year's capital budget.

At this time it is anticipated that both phases of the pilot project can be undertaken with the City's existing staff resources. Based on the pilot project, recommendations for a broader program would be advanced in future.

3.2.5 Next Steps

Pending Council's approval of this report and proposed capital budget allocation, the next steps would entail the following, beginning in early 2019, with the aim to have the systems in operation before the end of the year:

- Undertake more detailed scan of potential facilities sites to confirm feasibility and costs.
- Issue RFP for procurement of infrastructure and services.
- Install equipment and set up necessary accounts and contracts for monitoring and management of the systems.
- Operationalize public EV charging.
- Monitor usage and public feedback.
- Report back to Council after two years of operation.

Based on the findings of the pilot project, the proposed timing and details of the second phase of the pilot project (installation of Level 2 charging on or adjacent to streets in commercial areas) would be confirmed in a future report to Council, pending review of Phase 1 findings.

4.0 CONCLUSION

Public EV charging can play an important role in enabling the increased use of electric vehicles, with potential community benefits including reduced carbon emissions and air pollution, and is supported by the ESS and CEEP. Level 2 EV charging is the type most widely deployed in a wide range of public and private settings. In order to gain more experience about the benefits, costs and other considerations of providing public Level 2 charging, a pilot project is being proposed. The first phase, which would be initiated upon approval of this report, would involve installing Level 2 EV charging at a modest number of existing facilities in the City, and the

second (future) phase would involve installing Level 2 charging on or adjacent to streets in commercial areas. It is also proposed that opportunities for DC Fast Charging be identified and brought to Council's attention as third party funding opportunities arise. Therefore, it is recommended that Council approve the proposed pilot project, as outlined in Section 3 of this report.

Lou Pelletier, Director
PLANNING AND BUILDING

Leon Gous, Director
ENGINEERING

LT:sla
Attachments

cc: City Manager
Director Finance
Director Parks, Recreation and Cultural Services
Chief Building Inspector
Chief Librarian
City Clerk

APPENDIX A

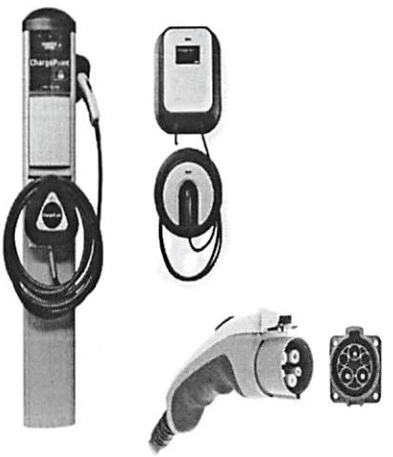
Electric Vehicle Charging Types and Uses

Level 1
(110 v)

Level 1 Charging:

- 3-8 km per h charge
- Useful charge in 8+ hours
- Still used in some home charging and workplace
- Not suitable for longer range vehicles due to long charge time

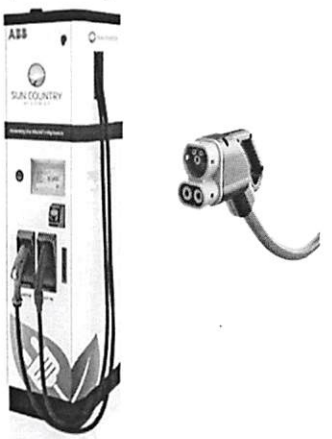
Level 2
(208/240 v)



Level 2 Charging:

- 18-45km per h charge
- Useful charge in 2-6h
- Residential, workplace, retail and public charging (e.g. curbside)
- Amenable to load-sharing (energy management) systems

DC Fast Charge
(500 VDC)



Direct Current (DC) Fast Charge:

- 90-150km per ½ h charge
- Useful charge in 15 min
- Highways, public charging "hubs" with fast turnover

APPENDIX B

Map of Public EV Charging in Burnaby
(from www.plugshare.com as of September 2018)