



REPORT

Engineering Services & Development Services Department

To: Mayor Coté and Members of Council **Date:** 6/11/2018

From: Jim Lowrie **File:** 09.1740.02
Director of Engineering Services (Doc# 1208437v6)

Jackie Teed
Acting Director of Development Services

Item #: 257/2018

Subject: **Electric Vehicle Readiness Policy for New Residential, Commercial and Institutional Buildings**

RECOMMENDATION

THAT Council endorse the process for the development of an electric vehicle charging infrastructure policy for new buildings as outlined in the Next Steps Section of this report including consultation with the development community on the following proposals:

- a) Residential: For new buildings, all residential parking spaces, excluding visitor parking spaces, shall include access to a Level 2 energized outlet;
- b) Commercial/Institutional: For new buildings and major renovations requiring a rezoning, that policy be formulated to guide development applications.

EXECUTIVE SUMMARY

Access to charging at home or at work is a key factor in a decision to purchase an electric vehicle. The proposed policy in this report recognizes that the majority of charging for electric vehicles will occur at home, rather than 'at work' or 'on the go'. As such, equipping our new residential buildings with the capacity for electric vehicle charging is key to transitioning toward zero emission vehicles in New Westminster.

It is also much more cost-effective to provide charging facilities at the time of construction in comparison to retrofitting a building to the same infrastructure standard after completion. Accordingly, the earlier new building requirements are implemented, the more electric vehicle (EV) charging opportunities become available throughout New Westminster, with less pressure on the limited number of public charging sites.

Existing Council policy supports the use of efficient and low-carbon mobility options. The increased use of electric vehicles can make a significant reduction in air pollution and greenhouse gas (GHG) emissions, and is a key strategy in achieving our community emission reduction targets. Research shows that there is likely going to be a rapid uptake in the purchase of electric vehicles as vehicle costs decrease and charging facilities become widely available.

A number of local governments within Metro Vancouver and elsewhere in BC have developed, or are in the process of developing, electric vehicle 'readiness' requirements that apply to new residential, mixed-use and commercial development. These requirements typically specify the minimum percentage of non-visitor parking stalls that must provide Level 2 (208 to 240 volt) charging capability at the electrical outlet. To date, three local governments have updated their zoning bylaws with a 100% electric vehicle readiness requirement for residential buildings, which is further described in this report.

This report does not include policy recommendations for municipal fleet vehicles, nor does it include strategies regarding expansion / pricing of public EV charging stations in New Westminster. A comprehensive approach for these matters will be brought to Council at a later date following a planned City staff workshop in 2018.

PURPOSE

This report proposes an electric vehicle infrastructure policy and requirement approach applicable to new development within the City of New Westminster. It includes a summary of key issues and technical considerations relevant to development of an EV infrastructure policy for new buildings. This report outlines next steps to be taken by City staff, resulting in a proposed Zoning Bylaw amendment for new residential buildings to be brought forward for consideration in 2018, in tandem with a policy to guide rezoning requirements for EV charging readiness in new commercial and institutional buildings.

BACKGROUND

A key consideration for the City of New Westminster and other local governments pursuing sustainable transportation and greenhouse gas reduction outcomes is the role of local policy and/or programs that support low-carbon mobility, while at the same time discouraging an increase in the number of vehicles and vehicle-kilometers travelled. The policy direction in this report recognizes the Master Transportation Plan (MTP) hierarchy of walking, cycling

and public transit as preferred modes of travel, but also supports market transition to zero emission vehicles as reflected in our Official Community Plan and Community Energy & Emissions Plan.

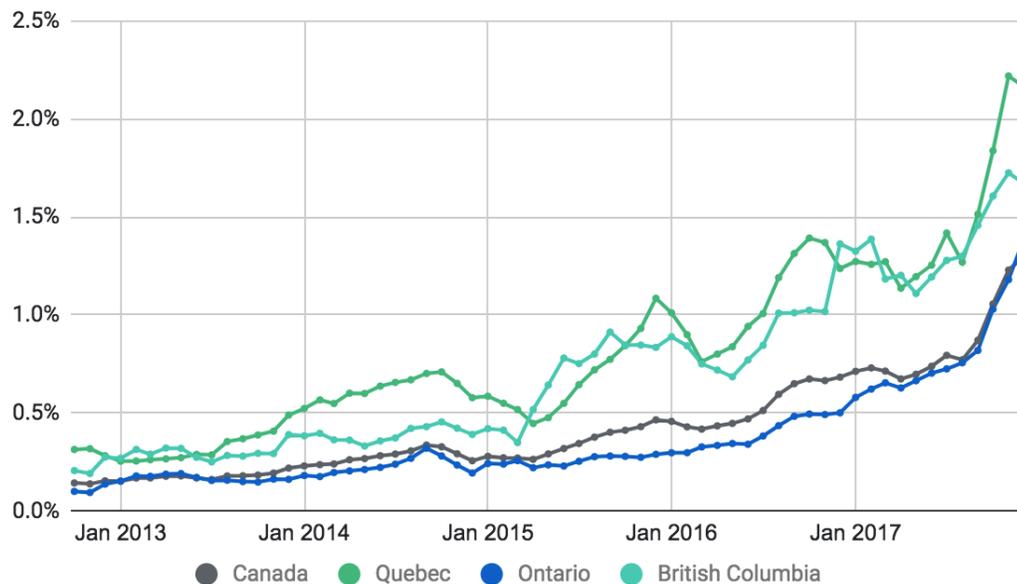
It is broadly recognized that it is cost effective and pragmatic to install necessary electrical infrastructure for EV charging at the time of construction, than it is post-construction. This bears itself out in terms of the challenges experienced by local residents within existing strata condominium buildings that have an electric vehicle but cannot convince their strata council to allow for EV charging wiring and equipment at their parking stall, even when the owner has agreed to cover the full cost of equipment and electrical connection. For these residents, the only option for charging their vehicle is a limited number of public charging sites in the city. The policy proposed in this report will begin to address this issue immediately and more so over the longer term, by requiring adequate electrical panel capacity and pre-wiring of electrical conduit to an energized outlet at each non-visitor parking stall in new residential buildings.

ANALYSIS

Electric Vehicle Uptake

Annual sales of new plug-in electric vehicles in Canada have increased over the past three years, particularly in British Columbia and Quebec, representing 1.5% to 2% of new car sales respectively in those provinces as of November 2017 (see Figure 1). In British Columbia, demand for some electric car models has exceeded supply at local dealerships.

PEV sales as a % of total vehicle sales, Canada (3mo. avg) **Figure 1**



Source: FleetCarma, Electric Vehicle Sales in Canada 2017

Current research shows accelerated uptake of electric vehicles generally in North America, due to falling costs of technology, increased range between charging, wider choice of vehicle makes and models, significantly lower fuel and maintenance costs compared to internal combustion engine (ICE) vehicles, and superior performance. In jurisdictions such as California, Quebec, Ontario and British Columbia, provincial and state incentive programs on EV purchases further influence EV ownership rates.

While a precise prediction of future market share for electric vehicles is challenging to determine, as forecasts are affected by supply and demand variables. However, some automakers have already committed to fully plug-in fleets by 2030, and the following projections for the North American market are often cited:

- 5% to 20% of all vehicle sales by 2024
- 25% by 2030
- 50% by 2040

Advances in Electrical Supply Systems

Charging equipment for EVs, referred to as ‘electric vehicle service equipment’ or EVSE, as well as necessary electrical infrastructure within a building consists of five main elements:

1. **Adequate capacity** at the building’s **electrical panel** for EV charging;
2. **Electrical raceway and conduit** from electrical panel to each parking stall;
3. **Energized outlet** at each parking stall, labeled for intended use by electric vehicle charging;
4. **Energy (load) management and load sharing systems** are EVSE control technologies that reduce peak power demand and improve utilization of charging systems, thereby reducing electrical infrastructure costs; and,
5. **Charging unit with cable** to reach the vehicle (typically supplied by a growing number of vendors in the EVSE market).

Items 1 to 3 can be cost-effectively installed at the time of construction, and is the focus of New Westminster’s proposed EV-readiness policy and Zoning Bylaw requirement for residential buildings. Item 4 can also be implemented during building construction, and City staff is proposing to develop a technical guidance document for integration of load sharing systems. Item 5 would be left up to the owner or builder / developer to select and install after building completion.

For multi-residential buildings, it is now technically feasible to utilize shared or load-managed systems (‘smart charging’) for the provision of Level 2 charging, rather than dedicated electrical circuit connections for each stall. The Canadian Electric Code has been

recently updated to allow for load management systems where the available power for EV charging is dynamic, and can also take advantage of excess electrical capacity overnight. The intent of load management systems is to share electrical capacity across a number of parking stalls per electrical circuit, thus reducing their likelihood that the building would require costly upgrade to overall electrical supply capacity at the time of construction.

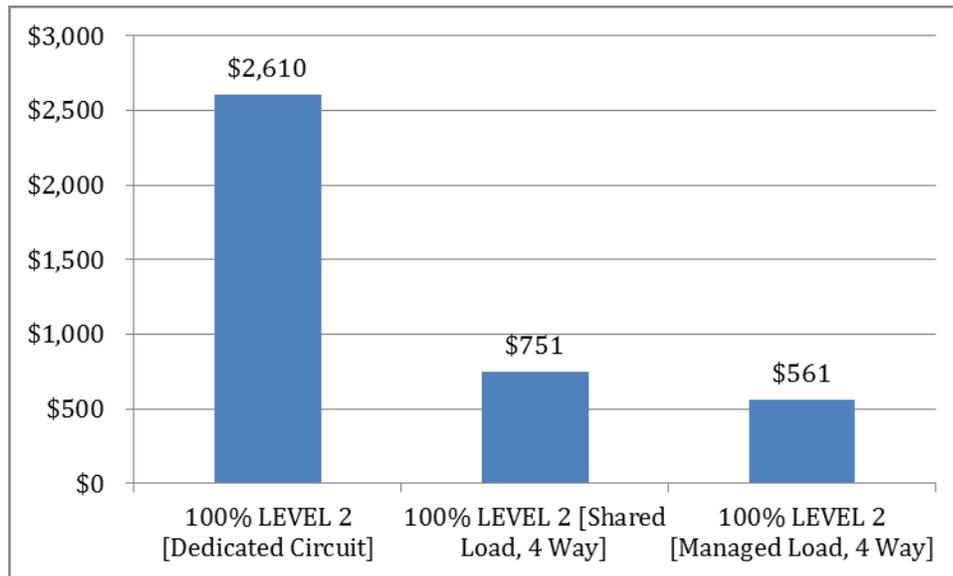
Experiences in both City of Richmond and City of Vancouver, in tandem with evolving technologies have shown that it is now feasible and cost-effective to require all residential spaces in residential buildings to have access to an energized Level 2 outlet. The categories of EV charging are summarized below.

Level 1 charging 120 volt	Equivalent to a conventional household socket. Time to fully charge a battery in an electric vehicle can take from 8 to 48 hours.
Level 2 charging 208 volt to 240 volt	Equivalent to an outlet needed for a dryer. To fully charge an electric vehicle can take up to 8 hours.
DC Fast Charging 25 kW, 50 kW, and up to 135 kW	Also referred to as 'Level 3' charging. An electric vehicle can be fully charged in as little as a few minutes, or as long as 30 minutes.

Level 2 charging is becoming the most prevalent form of EV charging for home-based as well as 'at work' and public charging installations. The convenience of plugging in an electric vehicle at home allows for recharging to occur in the evening hours or overnight.

Construction Cost

For mid-rise and high-rise multi-residential buildings with a parking garage, the estimated cost of providing a Level 2 energized outlet at the time of construction with a load management system ranges between \$560 and \$750 per parking stall for a 4-stall shared system. To serve each of those same parking stalls with a dedicated circuit would be approximately \$2,600 per stall. Figure 2 shows the per-stall cost comparison taken from the 2017 costing study by AES Engineering Ltd., commissioned by the City of Richmond.

Figure 2: Average Cost Per Stall for Level 2 EV Charging Readiness

Source: *Electric Vehicle Charging Infrastructure in New Multi-Family Developments*, report by AES Engineering Ltd., prepared for City of Richmond, April 4, 2017.

Available data indicates that retrofitting a parking space for EV readiness within an existing multi-residential building can be several times more expensive on per-stall basis than it is at the time of construction.

For single-detached and duplex homes, as well as ground-oriented multi-residential buildings such as townhomes, the average per-stall installation costs are as follows:

- Single-detached homes: \$200 to \$500 per stall
- Townhouses / row homes: \$500 to \$700 per stall

Regulations in Other Municipalities

New Residential Buildings

The City of Vancouver first introduced an electric vehicle charging infrastructure policy in 2009, and Richmond in 2012. More recently, the City of Richmond was the first municipality in Canada to enact a 100% electric vehicle charging readiness requirement for new multi-residential buildings in October 2017. The City of Port Coquitlam followed with a Zoning Bylaw amendment for EV readiness, adopted in January 2018. The City of Vancouver also recently updated their bylaw requirements for EV readiness in new multi-residential development to cover 100% of all non-visitor parking stalls. Similarly, both City of Burnaby, City of North Vancouver and District of West Vancouver recently received the

support of their Councils to proceed with updating their bylaw requirements for 100% Level 2 EV charging readiness for all non-visitor parking stalls in new multi-residential buildings.

The legal instrument most often used in BC for specifying electric vehicle infrastructure requirements for new development is the Zoning Bylaw, typically in the off-street parking section as well as definitions section. This mechanism allows for all new buildings to be covered. Table 1 provides a summary of municipal requirements on EV readiness for new residential buildings within the Metro Vancouver region.

Table 1: Residential EV Charging Requirements – Metro Vancouver Local Governments

Policy Status	Multi-residential buildings and residential portion of mixed use buildings	Single detached and duplex homes	Policy Approach
City of Vancouver			
Current policy enacted 2011.	20% of non-visitor parking spaces must have energized Level 2 outlet, electric room sized for 100% readiness.	100% for each garage or carport; energized Level 2 outlet.	Vancouver Building Bylaw (VBBL).
New bylaw in development (effective January 1, 2019).	100% of non-visitor parking spaces must have energized Level 2 outlet.	100% for each garage or carport; energized Level 2 outlet.	Parking Bylaw (similar to Zoning Bylaw in other municipalities). Minor changes to VBBL.
City of Richmond			
Former policy enacted Nov 2012.	20% of non-visitor parking spaces with Level 1 outlet; electric conduit for additional 25% of parking spaces.	None	Policy in OCP, secured through rezoning applications.
New policy as of October 2017, effective April 2018.	100% of non-visitor parking spaces with energized Level 2 outlet.	100% of parking spaces energized with a Level 2 outlet.	Policy in OCP and Zoning Bylaw.
City of Port Coquitlam			
New policy enacted January 2018, effective July 2018.	100% of parking spaces with roughed-in Level 2 raceways for conduit. Separate single electrical meter and disconnect provided at panel.	One parking space per dwelling unit and legal secondary suite with roughed-in Level 2 EV charging capability.	Zoning Bylaw
City of North Vancouver			
Enacted 2016, prior to changes in BC Building Act. Council approval April 2018 to update policy.	Currently, 20% of parking spaces with energized Level 2 outlet. Electrical panel sized for remaining 80% of spaces.	None	Defined in Sustainable Development Guidelines and applies to Rezoning applications and Development Permits.

City of Burnaby			
Current policy	10% of non-visitor parking stalls with energized Level 2.	None	Secured through Rezoning application.
New policy enacted May 7, 2018.	100% of non-visitor parking stalls energized with Level 2 outlet.	100% of parking spaces with energized Level 2 outlet, excluding secondary suites.	Zoning Bylaw
District of West Vancouver			
Policy approved April 23, 2018.	100% of non-visitor parking stalls energized with Level 2 outlet.	None.	Zoning Bylaw
City of Port Moody			
Draft proposal as part current Zoning Bylaw review.	Buildings with three or more units to include electrical infrastructure and space to accommodate electric vehicle supply equipment for 10% of non-visitor parking spaces and at least one visitor space.	None	Zoning Bylaw

Based upon recent advances in load sharing and load management systems for EV charging in mid-size and larger multi-residential buildings, and that it is similarly cost effective to pre-wire parking stalls in single-detached and ground-oriented multi-residential, staff recommends developing a mandatory EV readiness requirement for Level 2 (208 volt to 240 volt) charging capacity at the time of construction.

Staff recommends consulting with builders and developers on the proposed Level 2 electric vehicle charging requirement for 100% of non-visitor parking stalls in residential buildings.

New Commercial/Institutional Buildings

The City of Richmond’s zoning bylaw provisions covers residential uses only. The main rationale for this policy choice is that most charging is done at home and therefore residential buildings would be the priority for Richmond in its zoning bylaw amendment. Similarly, the City of Vancouver’s most recent bylaw update to support 100% EV charging readiness in multi-residential buildings, they did not update EV requirements for commercial buildings. The current policy in Vancouver applies to commercial buildings with ten or more parking spaces, with an EV-readiness requirement of one parking space for every ten parking spaces. Both cities identify this as an area of future work.

Table 2 summarizes commercial EV charging requirements in Metro Vancouver.

Table 2: Commercial EV Charging Requirements – Metro Vancouver Local Governments

Policy Status	Commercial Buildings	Policy Method
City of Vancouver		
Current policy enacted in 2009	Energized Level 2 outlet for 10% of parking spaces in buildings with more than 10 spaces.	Vancouver Building Bylaw (VBBL).
New bylaw in development, (effective January 1, 2019)	Energized Level 2 outlet for 10% of parking spaces in buildings with more than 10 spaces.	Requirements moved to Parking Bylaw for residential and commercial (similar to Zoning Bylaw in other municipalities). Minor changes to Building Bylaw.
City of Richmond		
Former policy enacted Nov 2012	Case by case (discretionary)	Policy in OCP, secured through rezoning applications.
New policy as of December 2017, effective April 2018.	Case by case (discretionary)	Policy in OCP, secured through rezoning applications.
City of Burnaby		
Draft policy for commercial buildings under consideration.	To be determined.	To be determined.

City staff recommends developing a guidance document for re-zoning applications that may include a requirement for a minimum percentage of parking stalls to be EV-ready in new commercial and institutional buildings, and consult with the development community on the proposed approach.

NEXT STEPS

Should Council direct staff to proceed, the following next steps would be undertaken:

- Consult with development industry in June 2018, and provide information on the City of New Westminster website about the proposed approach, as follows:
 - a) **Residential Uses:** Develop a draft Zoning Bylaw Amendment for all residential uses in line with best practices by other Metro Vancouver municipalities, which is requiring 100% of residential spaces to have access to a Level 2 energized outlet;
 - b) **Commercial and Institutional Uses:** Develop rezoning guidelines for commercial and institutional applications, in line with best practices by other municipalities and in consultation with the development community.
- Report back to Council with the outcome of builder and developer consultation, and with further information on implementation considerations in summer 2018.

- Should Council direct staff to proceed with the proposed approach, develop the necessary Zoning Bylaw amendment and policy document for Council consideration and endorsement.

The proposed Zoning Bylaw Amendment would require a scheduled Public Hearing, and could be timed for fall 2018, with First and Second Reading in November 19, 2018, with the Public Hearing on December 10, 2018, subject to Council approval.

SUSTAINABILITY IMPLICATIONS

Transportation accounts for approximately 50% of community-wide greenhouse gas emissions in New Westminster. As such, low-carbon and zero emission vehicles have a key role to play for achieving our community GHG emissions reduction targets.

Section 4.1 of New Westminster's Official Community Plan recognizes that provision of a wider range of efficient and low-carbon travel options decreases vehicle use, reduces transportation-related GHG emissions, improves air quality, and is beneficial to residents and businesses. These options include clean energy vehicles such as electric cars and electric bicycles, which the City can support by investing in public charging stations and by supporting similar initiatives on private property. The OCP also encourages the City to work with the Province of BC, Metro Vancouver Regional District, as well as regional and local partners to fund programs such as Plug In BC that advance infrastructure to support clean energy vehicles.

Action 33 (*Provide or require enhanced electric vehicle infrastructure*) from New Westminster's Community Energy & Emissions Plan recognizes that the City already encourages larger redevelopments to install electric vehicle plug-ins within parking lots. Notably, the CEEP suggests that this approach should evolve into a specific requirement that applies to all new developments, rather than being an option.

FINANCIAL IMPLICATIONS

An urban planning consultant has been engaged to assist City staff in policy review and advancing recommendations on a Zoning Bylaw amendment in 2018. A budget of \$15,000 has been provided for this work from the City's 2018 operating budget.

INTERDEPARTMENTAL LIAISON

Staff from the City of New Westminster Electrical Utility will be involved in the development of proposed Zoning Bylaw amendments for residential electric vehicle charging and recommended policy approach for new commercial and institutional buildings. This includes technical review of load-sharing / load management options and electrical panel capacity considerations for provision of Level 2 charging in new development.

OPTIONS

The following options are presented for Council's consideration:

1. That Council endorse the process for the development of an electric vehicle charging infrastructure policy for new buildings as outlined in the Next Steps section of this report including consultation with the development community on the following proposals:
 - a) Residential: For new buildings, all residential parking spaces, excluding visitor parking spaces, shall include access to a Level 2 energized outlet;
 - b) Commercial/Institutional: For new buildings and major renovations requiring a rezoning, that policy be formulated to guide development applications.
2. That Council provide staff with alternative direction.

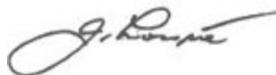
Staff recommends option 1.

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Approved for Presentation to Council



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