

EV Charging for Non-Residential New Development

Policy Brief Drafted for the BC EV Peer Network

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1.0 Introduction

This policy brief draws on discussions and input from the following sources:

- EV Peer Network - a working group of municipal staff, BC Hydro and other policy partner organizations across BC that collaborate on EV policy.
- EV Non-Residential Workshop - a meeting hosted by the City of Burnaby, involving input from Burnaby staff, and representatives of the City of Vancouver, City of Surrey, City of Coquitlam, City of North Vancouver and Township of Langley.

Recommendations presented in Section 3 are intended to be general and used to advance further discussion and are not meant to dictate or represent the specific policy direction of any local government.

1.2. Electric Vehicle (EV) Trends and Policy Recap

BC has adopted a mandate for 100% of light duty cars and trucks sold by 2040 to be zero emissions, and interim targets of 10% by 2025 and 30% by 2030. This will further strengthen the trend of rising popularity and market penetration of EVs. In addition to personal benefits (driving performance, reduced maintenance and fuel cost), greater use of EVs can also significantly reduce greenhouse gas (GHG) emissions and air pollution, supporting local government sustainability and GHG policy.

The projections for EV market share and price-point competitiveness with internal combustion engine (ICE) vehicles are continually being updated, with earlier projected milestone years¹. Bloomberg is forecasting the global EV market share to reach 11% by 2025, and 55% by 2040².

BC is leading in EV market penetration, with EVs accounting for over 15% of new car sales in the third quarter of 2018, as compared to 3% in the same period in 2016³.

Access to charging is a key factor that can enable or constrain the uptake of EVs, and many local governments have enacted requirements for EV charging in new development, and are providing public charging.

¹ In 2017 the crossover point when EVs become cheaper than ICE equivalents was predicted to occur in 2026; in 2018 it was adjusted to 2024; and in 2019 it was updated to 2022. Bloomberg Opinion, 2019-04-12. [Electric car price tag shrinks along with battery cost.](#)

² Investor Intel, 2017-03-27. The era of electric transportation has arrived - [EVs boom and ICE gloom.](#)

³ <https://www.fleetcarma.com/electric-vehicles-sales-update-q3-2018-canada/>

1.3. Charging Locations and Types

EV Charging can take place at various locations.

- **At home** - Home charging has been shown to be the most important primary location for charging, since it is most convenient and vehicles can be charged overnight, and necessary to support most people's decision to buy an EV. Several BC local governments have enacted bylaws requiring all residential parking spaces (or one per dwelling unit) to have energized Level 2 outlets for charging. While retrofitting single family homes for charging is relatively low-cost and feasible, it can be cost-prohibitive and complicated to install charging in existing multi-family buildings. Residents of some single family homes, particularly in older neighbourhoods, may also lack on-site parking and be unable to charge a vehicle at home. For these reasons, for the foreseeable future it will be necessary to have opportunities for charging in a variety of other locations in the community.
- **At the workplace** - For drivers who have longer commutes and/or those who do not have access to home charging, charging at work can be a primary or secondary location for charging. Access to workplace charging can therefore also be a key factor influencing the choice to buy an EV. Charging at work may also help to balance the electric grid during off-peak hours.
- **At commercial and public places around the community** - These locations can also help fill a gap in the absence of access to home charging, and can allow drivers to "top up" to allow more flexibility in driving distance and patterns, helping to reduce "range anxiety" and also support more EV uptake generally.
- **Along highways** - Having fast-charge stations at appropriate intervals along major highway corridors allows for long distance travel.

Having charging available in all of these locations contributes to building a robust charging network, and allows flexibility and convenience, helping to reduce some of the key barriers to owning an EV, and thus enabling greater uptake and realization of associated societal benefits.

The most appropriate type of charging may vary by location. At home, where vehicles are parked overnight or longer, Level 1 or load-shared Level 2 charging may be sufficient. Workplaces also have longer dwell times that can allow for slower charging at a reduced electrical load; Level 2 load-shared is most appropriate due to the ability to track usage and allow for billing. For public locations such as shopping centres and civic facilities, with typical dwell times between half an hour and several hours, Level 2 with dedicated power is most appropriate. Some public locations and highway routes are best served by fast-charging (DCFC). These factors are summarized in Table 1.

Table 1. Summary of charging locations, objectives and suitable types of charging

Location	Role / Objective	Typical dwell time	Suitable charging types
Home	Primary/preferred charging location; usually required for owning an EV	8-12+ hours	Level 1 Level 2 dedicated Level 2 load-shared
Workplace	Secondary charging location, or alternative primary location in the absence of home charging	6-12 hours	Level 2 dedicated Level 2 load-shared
Public - commercial areas & civic facilities	Charging “on-the-go”, helps to fill a gap in absence of home charging	0.5 - 3 hours	Level 2 dedicated
Public - strategically located “hubs”	Charging “on-the-go”, helps to fill a gap in absence of home charging, supports long distance travel	up to 45 min	DCFC
Highways	Supports long distance travel	up to 45 min	DCFC

2.0 Considerations in Non-Residential New Development

As compared with residential charging, there are some different considerations for other types of new development. Following a recent BC Utilities Commission decision, any EV charging provider is now allowed to charge fees for the service, whereas previously only some landlords and government organizations were allowed to charge fees. Now that costs can be recouped, it makes a requirement for provision of charging for new development more feasible and cost-effective.

2.1. Employees vs. Visitors

One of the key issues is determining the appropriate level of service for each of two general use cases:

- (a) Employee parking: Since vehicles are usually parked for eight hours or more, charging could be provided at a lower level of power, such as Level 2 with EV Energy Management Systems (EVEMS), also called load-sharing. Consideration should be given to servicing a higher percentage of stalls in this case, since workplace charging may be more fundamental to enabling EV ownership.
- (b) Visitor parking. Visitors to retail, office and other commercial places typically park for shorter durations. In this case, dedicated Level 2 service is thought to be more appropriate, in order to obtain a useful charge in a shorter duration. A smaller percentage of stalls, compared with employee parking, may be appropriate.

2.2. Parking Management and Allocation

Many retail and other office/commercial situations have a shared parking garage or lot, and parking stalls may or may not be specifically allocated to individual businesses. The types of businesses may also change over time. Furthermore, there are complex relationships between property managers, land owners and tenants. For example, businesses may want to install charging for their customers but are

prevented from doing so by property managers. This problem would be avoided by installation at the time of construction. Therefore, rather than specifying different standards by type of business, it is recommended that a single generic standard (percentage of stalls) be specified. The EV charging should also be distributed evenly throughout the parking area, rather than clustered in one location to more easily allow use by various businesses, and also to facilitate future expansion of the charging network.

2.3 Geographic Considerations

Parking requirements are sometimes reduced for developments near rapid transit, and this is thought to be the appropriate mechanism for managing demand, regardless of whether the parking is for EV or non-EV vehicles. However, in some cases where the development is not well served by transit and is located in a more remote location of the community, consideration could be given to increasing the amount of EV charging provided, to enable more employees to choose to own an EV and reduce their commuting emissions.

2.4 Costs and Future-Proofing

The cost of installing EV charging after a building is constructed can be prohibitively high, for electrical supply and installing conduit, particularly where coring and trenching through concrete is required. The cost of installing EV charging at the time of construction is comparatively more modest. For the purpose of future-proofing, “energized outlets” rather than more limited pre-servicing (e.g. conduits/wiring) is generally the preferred approach for most of the same reasons as for new multi-family new construction^{4,5}, with a lower total cost and only slightly higher initial costs compared to other options, and to avoid downloading complex logistics of installation to individual businesses in shared parking situations.

While Level 1 charging has the lowest lifecycle cost, it does not allow for maintaining a specific performance standard and networking to allow for tracking usage and allocating billing, therefore is not recommended as a standard⁴. The upfront cost of installing Level 2 with EVEMS is comparable or less than Level 1 dedicated circuits. The cost of Level 2 energized outlets range from about \$750 per stall for load-shared, to \$2600 per stall for dedicated circuits; this is based on a modeling study for multi-family installations⁴ but these costs are thought to also be applicable to non-residential construction. There would be additional cost for running conduit to the remainder of stalls for future expansion that is not captured in the above figures.

While there is acknowledged to be an incremental cost associated with installing EV charging outlets, it is relatively small compared to total construction costs. Furthermore, property and business owners stand to benefit from providing charging as a service to employees and visitors.

3.0 Recommendations

Based upon the above considerations, the following general recommendations have been developed. Requirements could be specified in a Bylaw and/or in a policy/guideline, and modified to suit specific local government needs.

1. **Need:** There is general agreement that charging requirements for non-residential development are important for future-proofing and encouraging the uptake of EVs.

⁴ City of [Burnaby Council Report](#), September 2018.

⁵ [AES study](#) for City of Richmond

2. **Type of Charging:** Level 2 charging is most appropriate. Dedicated circuits are recommended for visitor parking, whereas load-shared (EVEMS) may be appropriate for staff parking, where such areas can be separately designated.
3. **Percentage and Distribution of Stalls:** A requirement of at least 25% (dedicated Level 2 energized outlets) is a suggested standard. If feasible, EV charging should be evenly distributed throughout the parking area, rather than concentrated in one section, particularly in multi-tenant parking areas. The rationale for 25% is based upon the following factors.
 - Only a modest increase from 20%, a precedent established in several jurisdictions, including City of Surrey, City of Port Moody, San Francisco and Palo Alto, CA.
 - Allows the option to serve up to 100% of stalls if converted to EVEMS later, with the most common load-sharing configuration being currently four outlets on a single circuit.
 - More flexibility to fit among typical underground parking garages with supporting columns⁶.
 - Achieves a balance that could effectively serve both visitor and employee-dominated parking areas, with or without EVEMS.
4. **Commercial Loading Bays:** Electric medium and heavy duty vehicles are becoming more available, although are still not widely used. To reduce the future retrofit costs, while not imposing unreasonably high costs for technology still in development, it is recommended that raceways/conduit, and space in the electrical room, be provided for these loading bays.
5. **Flexibility:** Various configurations of EVEMS systems could be developed to meet an equivalent standard to 25% dedicated, and allowed in a policy guideline. Provision could also be included for phased build-out where appropriate. A clause should be included allowing for a variance to address “exceptional circumstances” where the prescribed system may trigger a new transformer or other significant supply upgrades.
6. **Change of Use / Renovations:** More work may be needed to determine an appropriate threshold of renovation or change of use that would trigger the requirement to provide EV charging. Until then, a site specific standard could be negotiated where feasible.

Additional References

National Energy Board. 2019-01-02. EVs in Canada - the hidden potential of the electric truck market. <http://www.neb-one.gc.ca/nrg/ntgrtd/mrkt/snpsht/2019/01-01|ctrcvhclcmd-eng.html>

ScottMadden Management Consultants, 2019. Charging Up: a Review of Electric Vehicle Workplace Charging. <https://www.greenbiz.com/article/charging-review-electric-vehicle-workplace-charging-sponsored>

⁶ In a typical configuration of parking stalls with sets of three between columns, energized spaces could be configured as sets of three that are evenly distributed, or with one every third space (which would exceed the requirement), or with one for every 4th space (which would leave out some sets, but conduit would still allow future retrofitting). In short, a smaller ratio provides more flexibility.

Appendix A - Non-Residential New Development EV Requirements in Other Jurisdictions

Jurisdiction	Non-Residential New Development EV Charging Requirement	Report / Link
City of Surrey	50% visitor spaces, 20% of commercial; energized Level 2 outlet	Corporate Report
City of Vancouver	Commercial: 10% Level 2	
City of Port Moody	Commercial: 20% Level 2	Website
District of North Van	Commercial: “in the range of” 10% pre-wired for Level 2	Policy report
Atlanta, GA	Commercial: 1 in 5 (20%) of stalls with raceways and space in electrical room	EV Readiness Ordinance No. 17-O-1654
San Francisco, CA	20% of stalls (half with EVSE installed, half EV-ready)	Media release Ordinance
Palo Alto, CA	25% parking spaces (at least 5% with EVSE, the remainder EV-ready)	Media

Appendix B - City of Burnaby Policy and Proposed Requirements

To date, the City of Burnaby is supporting EV charging in the following ways (refer also to www.burnaby.ca/ev):

- Home charging: a recent Zoning Bylaw amendment requires EV charging in new residential development (100% of required parking spaces must have energized Level 2 outlets, excluding visitor stalls and secondary suites). For existing residences, other agencies such as the provincial government, federal government and utilities, are best placed to support retrofitting with grants, as the City has limited jurisdiction in this area.
- Public charging: A public charging “pilot project” focusing on Level 2 charging at City facilities and curbside locations was approved in late 2018 and is currently being implemented. The City is also investigating funding opportunities to install DCFC stations at strategic locations in the City and along corridors/highways.
- The City has communicated to Council that requirements for non-residential new development would be developed in future, which is addressed in the proposed approach below.

Based on the attached policy brief, the following approach is being advanced for discussion with stakeholders. Pending feedback, specific recommendations will be advanced for Council’s consideration.

The applicable land uses for the proposed approach for non-residential new development include new office, retail, commercial, industrial, institutional and agricultural developments; in short, all development that is not “residential”. As these uses may not all be specifically defined or distinguished in Burnaby’s Zoning Bylaw, the term “non-residential” is used to capture these intended land uses. The rationale for including this broad suite of land use is that, as internal combustion engine (ICE) vehicles are phased out and replaced with EVs, charging will be required throughout the community, and this need is not limited to a specific land use.

EV charging is a prudent future-proofing approach regardless of future scenarios of reduced private vehicle ownership and autonomous vehicles. In the event that infrastructure installed in parking garages is not needed for EV charging, it can serve other needs for retrofitting of these structure, for example for indoor agriculture, workspaces, data centres, etc.

Proposed Requirements:

Bylaw (amendment to S. 800.8 of Zoning Bylaw):

- A minimum of **25% (1 in 4) of parking spaces** in all non-residential new development shall be made EV-ready with **energized outlets for Level 2** EV charging, supplied with **dedicated circuits**.
- The EV-ready parking stalls shall be **evenly distributed** throughout the parking area.
- Conduit/raceways are to be provided to the remainder of the stalls, and sufficient space provided in the electrical room, to allow for expansion in the future.
- **Required loading bays** shall be provided with conduit/raceways, and there shall be space provided in the electrical room, to allow for commercial vehicle charging in future.

Policy Report:

- An equivalent level of service using **EVEMS (load-sharing)** for **employee parking areas** would be allowed, targeting 50 to 100% of spaces with energized outlets.