

“EV Ready” Requirements for New Buildings: A Best Practice Guide for BC Local Governments



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April 2021

About This Guide

This Guide was prepared by Brendan McEwen (in his capacity as a sole proprietor) and AES Engineering on behalf of the BC Local Government EV Peer Network, with funding from BC Hydro. The intent is to provide guidance to local governments on establishing “EV Ready” requirements for residential and non-residential parking in new construction.

The Guide updates information that was published in a previous guide, “Residential Electric Vehicle Charging: A Guide for Local Governments”, prepared by AES Engineering for the City of Richmond.

The Guide represents the views of the authors, and does not necessarily represent the views, opinions, recommendations or policies of the funders. The publication is not an endorsement of any particular product or proprietary building system.

This resource document does not constitute legal advice. Local governments are expected to seek input from their legal counsel when developing any bylaw or policy amendments.

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1. The Need to Support Electric Vehicle (EV) Charging

Enabling the adoption of electric vehicles (EVs) is critical to fostering more sustainable transportation systems. While local governments are increasingly focusing on improving active transportation, transit, car-sharing, ride-pooling, and other sustainable transportation modes, it is also expected that private automobiles will remain a significant part of our transportation systems. The benefits of transitioning private vehicles to EVs include:

- **Reduced GHG emissions.** On a life cycle basis, accounting for vehicles' manufacturing, operation and disposal, EVs emit about 90% less GHG emissions than fossil fuel vehicles when charging on clean electrical grids like BC's.¹
- **Better air quality and improved health.** EVs eliminate tailpipe emissions. Tailpipe emissions are estimated to cause 900 deaths and \$7.8 billion in health damages (0.5% of Canada's gross national income) every year;² the transition to EVs will eliminate these impacts.
- **Economic vitality.** The fuel cost of EVs in BC is equivalent to about \$0.20 per litre gasoline. Maintenance costs of EVs are half that of gasoline vehicles.³

EVs currently are more expensive than similar models of gasoline vehicles. However, battery

costs have declined by an order of magnitude over the past decade, and are projected to continue to decline. By the mid-2020s, it is expected that the cost to produce EVs will be the same as fossil fuel vehicles, and subsequently less.⁴ At that point, EVs' market share is expected to accelerate dramatically.

Finally, government policy is driving the transition to EVs. The Province of BC's *Zero Emissions Vehicle Act* requires that 30% of passenger vehicle sales be zero emissions by 2030, and 100% by 2040. Likewise, jurisdictions like California and Quebec will require that all passenger vehicle sales be zero emissions by 2035.⁵

In order to support EV adoption, if parking is provided in new developments⁶ it is critical that this parking be adequately futureproofed for EV charging.

Accordingly, this Guide supports local governments in making "EV Ready" requirements for parking in new residential, non-residential and mixed-use developments.

1 See e.g. <https://www.carboncounter.com/>

2 International Council on Clean Transportation and Climate & Clean Air Coalition. 2019. *A Global Snapshot of the Air Pollution-Related Health Impacts of Transportation Sector Emissions in 2010 and 2015*. https://theicct.org/sites/default/files/publications/Global_health_impacts_transport_emissions_2010-2015_20190226.pdf

3 Consumer Reports. 2020. *Electric Vehicle Ownership Costs*. <https://advocacy.consumerreports.org/wp-content/uploads/2020/09/Maintenance-Cost-White-Paper-9.24.20-1.pdf>

4 International Council on Clean Transportation. 2019. *Update on electric vehicle costs in the United States through 2030*. <https://theicct.org/publications/update-US-2030-electric-vehicle-cost>

5 See e.g. <https://policyoptions.irpp.org/magazines/february-2021/why-canada-needs-a-national-zero-emission-vehicle-standard-in-2021/>

6 Requiring parking in new developments effectively subsidizes private automobile travel – parking requirements induce vehicle ownership and driving; make communities less affordable; and can negatively impact urban design (See, e.g., Donald Shoupe. 2018. *Parking and the City*). Many local governments are therefore rightly considering reducing minimum parking requirements and establishing parking maximums. Nevertheless, when parking is implemented in new construction, it is important this parking be appropriately futureproofed for EV charging, so that drivers can choose an EV.

Where Do We Charge?

The “charging pyramid” (see Figure 1) illustrates where EV charging occurs:

- **At home.** The large majority (about 72% in Canada) of charging occurs at home.⁷ Access to home charging is the most critical factor determining whether households will adopt an EV. Unfortunately, unless properly future-proofed, it is often costly and complicated to implement EV charging in multifamily buildings – for example, costs have averaged almost \$7,000 per parking spaces supported by BC’s provincial EV charger incentive programs for multifamily buildings.⁸
- **At work.** Approximately 15% of charging occurs at work.
- **Fleet charging.** For vehicles that are part of corporate fleets, almost all charging usually occurs at fleets’ home depot.
- **Public charging.** A relatively small proportion of private vehicles’ charging occurs at public charging stations. Nevertheless, public charging is important: For households without access to home or work charging; to provide “opportunity charging” (i.e. convenient top-up charging with relatively fast rates of Level 2 charging); and to provide for very fast charging on longer trips.



Figure 1: The Charging Pyramid (US DOE).

⁷ Fleetcarma. 2020. *Charge the North*. <https://www.fleetcarma.com/resources/charge-the-north-summary-report/>

⁸ Fraser Basin Council. 2020. *Personal communication*.

About EV Charging

Levels of EV Charging

Different “levels” of EV supply equipment (EVSE) are defined by the standard SAE J1772, summarized in the table below.

TYPE	POWER SOURCE	VOLTAGE OUTPUT (V)	CURRENT OUTPUT (A)	POWER OUTPUT (KW)	SPEED OF CHARGE	RANGE PER HOUR (KM)
AC LEVEL 1	1 phase outlet (NEMA 5-15R or 5-20R)	120	12-16	1.44-1.92	Slow	3 - 8
AC LEVEL 2	1 phase	208V-240	≤80	≤19.2	Medium	~15 - 120
DC FAST CHARGE	Not specified (typically 3-phase/480V AC)	50-1000	<400	<400	Fast - Very Fast	~150 - 2500

For new construction, it is most appropriate to require Level 2. Level 2 provides significantly better charging experience than Level 1, while still being cost effective in new construction when new developments can design for load sharing using EV Energy Management Systems.

What is “EV Ready” Parking?

“EV Ready” parking features an adjacent electrical outlet (e.g. either an electrical junction box or a receptacle) at which EVSE can be installed in the future. EV Ready parking avoids costly electrical renovations to provide a source of power for EV charging. As drivers adopt EVs, EVSE can be installed at parking spaces to provide access to EV charging.

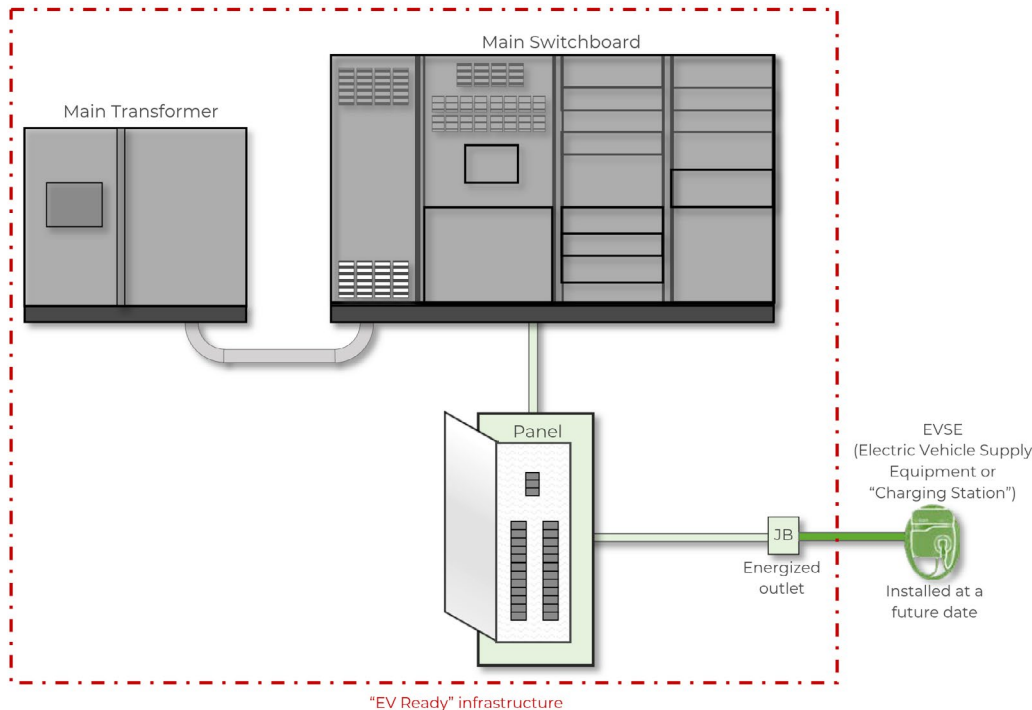


Figure 2: EV Ready Parking. Source: AES Engineering.

About EV Energy Management Systems

EV energy management systems (EVEMS – i.e. “load sharing,” “power sharing,” or “smart charging”) are technologies that allow multiple EVs to charge on the same electrical circuit.⁹ In contrast to a “dedicated EVSE” where one circuit serves one EV, EVEMS can allow multiple EVs to charge simultaneously by controlling the rate and timing of charging without exceeding the capacity of the circuit.

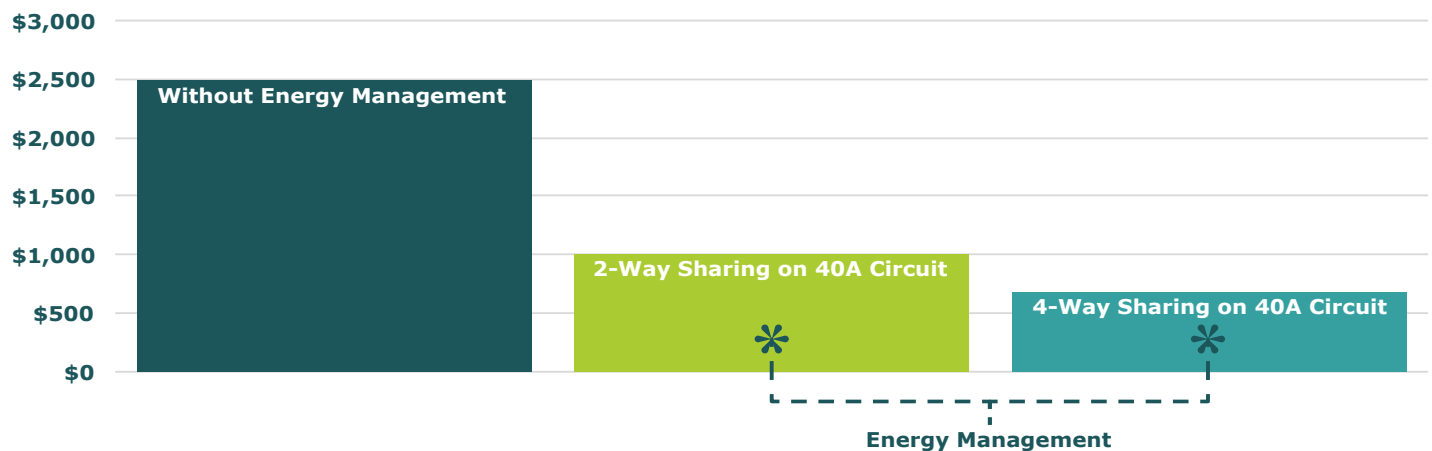


Figure 3: Cost per parking space to provide 100% “EV Ready” parking in a new 6 storey multifamily building. Source: AES 2019.

Designing for use of EVEMS can significantly reduce the capacity of electrical infrastructure and the associated capital costs of providing EV charging (see Figure 3). Likewise, EVEMS can minimize the utility costs drivers pay (e.g. by controlling power consumption to reduce demand charges and/or charge when time is less expensive under “time of use” rates). The majority of EVEMS require users to pay ongoing network fees.

Because designing for EVEMS can significantly reduce the costs of providing EV Ready parking in residential and non-residential parking, it is critical for EV Ready parking requirements to allow for appropriate use of EVEMS.

Electric vehicle energy management systems are recognized in the 2018 edition of the Canadian Electrical Code. Technical Safety BC regulates electrical installations in most parts of BC, and has approvals processes for EV energy management systems.¹⁰ Likewise, those local governments with delegated authority under the *BC Safety Standards Act* to enforce the Electrical Code have their own processes for EVEMS implementation.

⁹ This Guide is not intended to provide a detailed technical review of EVEMS. For a review of EVEMS control schemes and their associated electrical infrastructure configurations see CSA Group. 2019. *Electric Vehicle Energy Management Systems*. https://www.csagroup.org/wp-content/uploads/CSA-RR_ElectricVehicle_WebRes.pdf See also AES Engineering. 2018. *Electric Vehicle Charging Infrastructure in Shared Parking Areas*. Prepared for City of Richmond. https://www.richmond.ca/_shared/assets/EV_Charging_in_Shared_Parking_Areas_Report51731.pdf

¹⁰ See: <https://www.technicalsafetync.ca/electrical/electric-vehicle-energy-management-systems-process-faq>

2. EV Ready Requirements in New Buildings

Multiple BC local governments have established requirements for new construction to feature EV Ready parking. The table below summarizes requirements made as of February 2021.

JURISDICTION	RESIDENTIAL	COMMERCIAL
City of Vancouver	100% EV Ready	10% EV Ready
City of Richmond	100% EV Ready	
City of Port Coquitlam	1 EV Capable ¹¹ / dwelling	
City of Burnaby	100% EV Ready	
City of Coquitlam	1 EV Ready / dwelling	
City of New Westminster	100% EV Ready	
City of North Vancouver	100% EV Ready	
City of Port Moody	100% EV Ready	
District of Squamish	100% EV Ready	
City of Surrey	100% EV Ready	20% EV Ready
Township of Langley	1 EV Ready / dwelling	
District of Saanich	100% EV Ready	Varies
City of Nelson	1 EV Ready / dwelling	10% EV Ready
District of West Van.	100% EV Ready	
City of Victoria	100% EV Ready	5% EV Ready
Town of View Royal	100% EV Ready	~5% EV Ready

The 100% EV Ready requirements for residential parking adopted by many of the local governments noted above represent an international best practice, and the recommended approach for other jurisdictions to replicate. As described below, it is recommended local governments adopt more comprehensive requirements for new non-residential parking, to complement leadership in residential requirements.

¹¹ “EV Capable” refers to requiring that space on an electrical panel and electrical conduit from the panel to the parking space is provided. AES does not recommend EV Capable requirements, as it will result in only minimal cost savings for developers and can increase challenges for residents. For more information about different EV charging infrastructure configurations that have been implemented as requirements for new development, and the merits and demerits of these different approaches, see McEwen Climate & Energy, AES Engineering & Integral Group. 2019. EV Readiness Requirements Framework. Prepared for Natural Resources Canada. <https://cleanairpartnership.org/cac/wp-content/uploads/2019/10/NRCan-EV-Readiness-Requirements-Framework-Final-Report-4-11-2019-McEwen-Climate-and-Energy.pdf>

Local Government Authority to Make “EV Ready” Requirements

The Province has clarified that local government EVSE requirements are “out of scope” of the Building Act. The Act therefore does not appear to impede local governments’ ability to implement requirements for electric vehicle charging infrastructure, as noted in the Building Act Guide:¹²

“If the requirements do not concern a matter addressed in the Building Code, they are ‘out of scope’ of the Building Act and local governments can regulate these matters if they have authority to do so in other statutes ... examples of matters that are ‘out of scope’ of the section 5 limitations [include:]

Electric vehicle charging stations/plug-ins: Electric vehicle charging stations concern the number, location, and type of charging stations (and related matters such as signage) required in a building or facility to charge electric vehicles that use the building for parking. This includes wiring or pre-ducting for electric vehicle plug-ins.”

The vast majority of BC local governments have implemented their EV Ready requirements as part of parking requirements in their zoning or parking bylaws, under BC local governments’ authority to regulate parking design.

12 Province of British Columbia. 2017. *Changes for Local Governments Under Section 5 of the Building Act, Appendix to Section B1 of the Building Act Guide*. Office of Housing and Construction Standards, Victoria, BC

Recommended EV Ready Requirements

It is recommended that local governments define an “EV Ready” parking space as: A parking space that features an adjacent energized electrical outlet capable of providing Level 2 charging.

It is recommended local governments require that:

- **All residential parking in new developments be “EV Ready”.**
- **A proportions of non—residential in new developments be “EV Ready”, with different requirements for parking intended for “workplace charging” versus “opportunity charging”:**
 - Workplace charging - Approximately 20-40% of parking intended for employee parking is recommended to be EV Ready. Like residential uses, workplace charging requirements should allow for significant amounts of load sharing using EVEMS, reflecting that relatively slow rates of EV charging are appropriate for the typically long dwell times of the workplace parking spaces.
 - Opportunity charging - Approximately 15-20% of parking intended for non-residential visitor (e.g. retail customers, etc.) is recommended to be EV for “Opportunity Charging”. This Opportunity Charging should provide a relatively fast rate of Level 2 charging (e.g. minimum 6.6kW), given that the dwell times on this parking is shorter.

For these requirements, it is recommended that cities specify that when EVEMS is designed for, minimum performance standards will apply.

The following subsections provide the rationale for structuring EV Ready requirements in this way. Appendix-1 includes model bylaw language for local governments consideration. Appendix-2 includes model language that can be included in local governments’ technical bulletins, explaining requirements to applicants and providing the minimum performance requirements for a given jurisdiction.

Rationale for EV Ready Residential Parking Requirements

Requiring all residential parking to be EV Ready is appropriate because:

- The large majority of EV charging occurs at home.
- Access to home charging is likely the most important factor determining whether a household will choose an EV as its next vehicle.
- It is extremely difficult or impossible to legally trade parking spaces between residents under most forms of parking tenure in condominiums; having legal access to the parking space is likely to be desired by anyone installing an EVSE. Likewise, it can be challenging to trade parking spaces in rental buildings. 100% EV Ready parking ensures access to EV charging.
- To achieve local, Provincial and Federal emissions reductions targets, all passenger vehicles will need to transition to zero emissions vehicles in the next few decades. EVs represent the most cost-effective, efficient, and technologically viable zero emissions vehicle opportunity¹³.
- Use of EVEMS can make 100% EV Ready parking relatively affordable. Costing studies consistently find costs in the range of \$500 - \$1000 per parking space for 100% EV Ready multifamily buildings.¹⁴ Costs in single family homes will typically be significantly less.

13 See, e.g. Volkswagen. 2020. "Battery or fuel cell, that is the question" <https://www.volkswagen-newsroom.com/en/stories/battery-or-fuel-cell-that-is-the-question-5868>; carboncounter.com; Transportation and Environment. 2020. *How clean are electric cars?* <https://www.transportenvironment.org/sites/te/files/T%26E%E2%80%99s%20EV%20life%20cycle%20analysis%20LCA.pdf>

14 See, e.g. AES Engineering. 2017. *Electric Vehicle Charging Infrastructure in New Multifamily Developments: Requirement Options and Costing Analysis*. Prepared for the City of Richmond; AES Engineering. 2020. *Electric Vehicle Ready Residential Parking: Costing Analysis*. Prepared for the City of Abbotsford; Prism Engineering. 2018. *Electric Vehicle Charging Costing Study Update*. Prepared for City of North Vancouver.

Rationale for EV Ready Non-Residential Parking Requirements

EV Ready non-residential parking can be implemented relatively cost effectively.¹⁵ EV Ready non-residential parking can support either workplace charging or opportunity charging.

Workplace charging

Workplace charging refers to EV charging in employee parking spaces, where vehicles will tend to be parked for longer periods of time. Given the typically long dwell times of this parking, significant load sharing using EVEMS is appropriate. Providing workplace charging:

- Supports drivers without home charging** – Workplace charging provides charging for drivers without access to home charging or other reliable forms of charging (e.g. existing MURB residents; “garage orphans”; etc.). While data sources are limited, AES Engineering roughly estimates that perhaps 63% percent of residents of Metro Vancouver currently do not have access to home charging. Based on projections of EV adoption and access to home charging, AES estimates approximately 40% of workplace parking in new developments would optimally be EV Ready (see Figure 4 below).

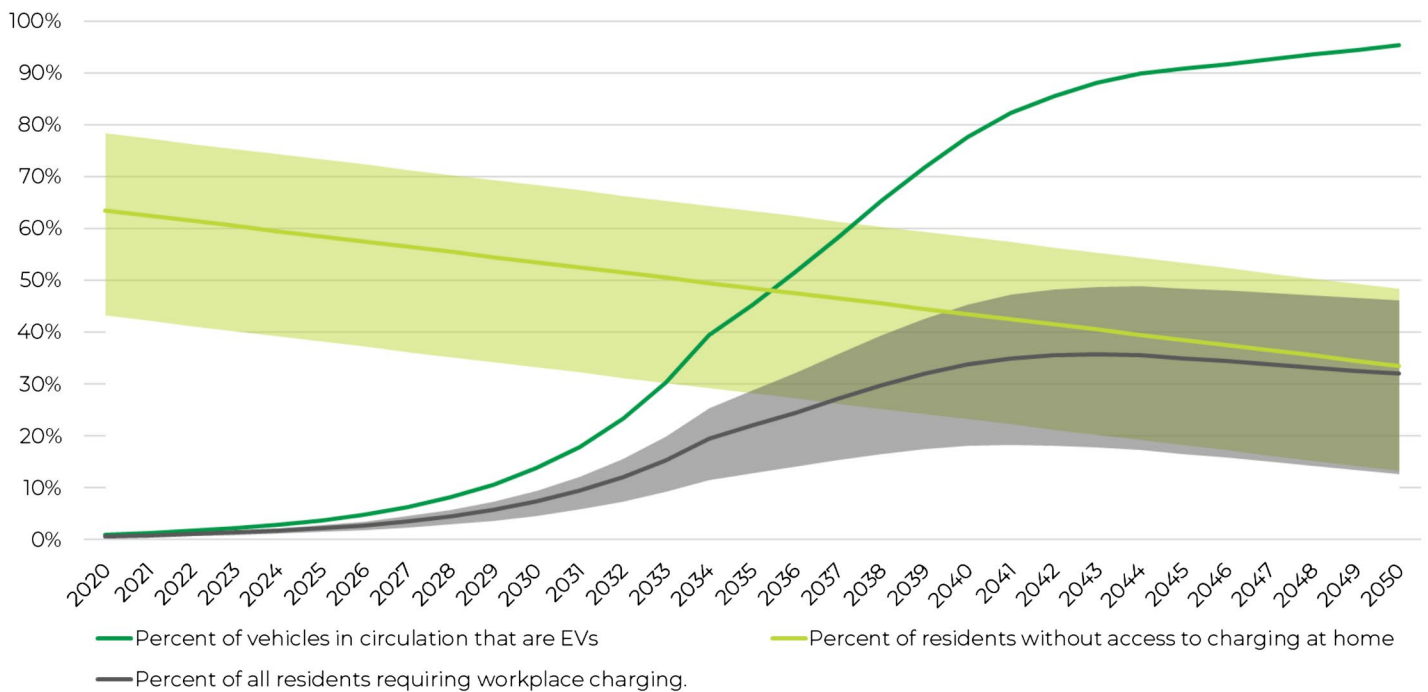


Figure 4: Percent of all residents requiring access to workplace charging in Metro Vancouver.

¹⁵ See, e.g.: AES Engineering. 2020. *Electric Vehicle Charging Infrastructure Requirements for Non-Residential Buildings*. Prepared for City of North Vancouver.

- **Provides for long-distance commuters and limited range EVs** - Workplace charging also provides charging for long-distance commuters or vehicles with limited electric range, for whom home charging may not suffice.
- **Uses clean, low-cost daytime power** – Workplace charging provides an opportunity to maximize daytime charging, anticipating future potential for significant amounts of low-cost energy due to growing solar energy supply. Spreading charging opportunities over 24 hours, rather than relying on only overnight charging will reduce electrical grid impacts, and can support future “load shifting” and flexibility to respond to variable renewable energy.

Opportunity charging

Opportunity charging refers to EV charging at establishments where vehicles tend to be parked for shorter periods of time (e.g. retail uses; assembly uses; visitors to offices; etc.). Given the typically shorter dwell times, faster rates of charging are appropriate. Providing some EV Ready parking for opportunity charging:

- Enables households without good access to home or workplace charging to adopt EVs.
- Supports longer trips and limited range EVs.

3. Ensuring Effective Implementation of EV Ready Requirements

Enforcing EV Ready Requirements

Local governments are recommended to follow the EV Ready compliance process noted in the diagram below and further described in the model Bulletin language in Appendix 2.

Note especially that local governments are not recommended to enforce electrical safety requirements of the Canadian Electrical Code (unless they have delegated authority under the BC Safety Standards Act); electrical safety is typically enforced by Technical Safety BC. Local governments should simply enforce for the presence of an EV Ready outlet and that minimum performance requirements have been adhered to in developments that have designed for use of EVEMS.

INQUIRY	DP/REZONING APPLICATION	BP DAPPLICATION	BUILDING INSPECTIONS
<ul style="list-style-type: none"> Distribute Bulletin. 	<ul style="list-style-type: none"> Indicate EV Ready outlets on plans. Check for presence on plans. 	<ul style="list-style-type: none"> Indicate EV Ready outlets on plans. Check for presence on plans. Where an EVEMS is designed for, signed & sealed letter from electrical engineer, confirm design meets performance requirements. Electrical Plan Review by electrical engineer consultant (for consideration - potential future service that could be shared between local governments to ensure optimal EV Ready design strategies) 	<ul style="list-style-type: none"> Inspect for the presence of an outlet: <ul style="list-style-type: none"> At each parking space in MURB parkade. In each parking garage in SF/TH/Duplex. Before occupancy, where an EVEMS is designed for, signed & sealed letter from electrical engineer confirming EVEMS was installed and meets requirements. Technical Safety BC manages electrical safety compliance (or local government, if local government is AHJ for electrical).

Issues Relating to Resale of Power

In order for stratas and building owners to recoup the cost of EV charging, they will frequently wish to charge user fees. Previously, there were certain regulatory barriers to charging user fees in BC, though most have been rectified in recent years, or else are expected to be rectified soon. Pertinent issues are summarized below:

- **Strata user fees for use of electricity.** Effective March 7, 2018, the Province of BC made amendments to Strata Property Regulation 6.9 to clarify that variable user fees are permitted for the use of strata common property. This is intended to allow consumption-based user fees, notably to allow for stratas to recover costs for EV charging via user fees.¹⁶ Before this time, there was concern that stratas might be prevented from charging user fees due to the previous provisions in the Strata Property Regulation.
- **Exemption from BC Utilities Commission Action for resale of electricity.** Effective March, 22, 2019, the Ministry of Energy Mines and Petroleum Resources provided exemptions under the *Utilities Commission Act* for the resale of power for the purposes of EV charging. Prior to this, there was concern that charging user fees for use of electricity would require regulation of the seller as a utility.¹⁷
- **Requirements for revenue grade metering for volumetric sale of electricity.** Under Canada's *Electricity and Gas Inspection Act*, Measurement Canada has the mandate to protect the right of consumers to accurate and reliable measurement when they make a purchase based on measurement. To date, they have thus required revenue grade metering in EV charging service providers charge for power on a volumetric (i.e. per kWh) basis. Many "smart" charging systems can measure electricity consumption to within reasonable degrees of accuracy but are not certified revenue grade. This has presented a barrier to user fees that charge per use of kWh. However, proxies (e.g. time based user fees) are not prevented. To enable volumetric-based user fees, Measure Canada has initiated a process they expect to allow existing and new electric vehicle (EV) charging stations that meet established technical standards to charge based on kilowatt-hours (kWh) consumed.¹⁸

16 Ministry of Municipal Affairs and Housing. "Clarifying strata user fees for Common Property (March 2018)". <https://www2.gov.bc.ca/gov/content/housing-tenancy/strata-housing/legislation-and-changes/changes-to-legislation>

17 BC Utilities Commission. March 22 2019. Order Number G066-19. https://www.bcuc.com/Documents/Proceedings/2019/DOC_53649_G-66-19-BCUC-EV-Inquiry-Exemption.pdf

18 <https://www.ic.gc.ca/eic/site/mc-mc.nsf/eng/lm04949.html>

4. Appendix 1 – Model EV Ready Bylaw

NOTE: The following language is provided for local government consideration as they integrate EV Ready requirements into their parking requirements. Some explanatory notes are provided in the text in *[bracketed red italics]*, and are not intended for use in the bylaw.

This model language does not constitute legal advice and is intended for illustrative purposes only, without any express or implied warranty of any kind, including warranties of accuracy, completeness, or fitness for any particular purpose. Use of this model language is without any recourse whatsoever to Brendan McEwen (DBA McEwen Climate and Energy), AES Engineering, BC Hydro, or any other parties. Local governments should seek the advice of their legal counsel to develop their own bylaw amendments.

Definitions

“DC Fast Charging” means DC Fast Charging for an Electric Vehicle as defined by SAE International’s J1772 standard. *[NOTE: Optional text. See below.]*

“Electric vehicle” means a vehicle that uses electricity for propulsion, and that can use an external source of electricity to charge the vehicle’s batteries.

“Electric vehicle energy management system” means a system to control electric vehicle supply equipment electrical loads comprised of monitor(s), communications equipment, controller(s), timer(s) and other applicable devices.

“Electric vehicle supply equipment” means a complete assembly consisting of conductors, connectors, devices, apparatus, and fittings installed specifically for the purpose of power transfer and information exchange between a branch electric circuit and an electric vehicle.

“Energized outlet” means a connected point in an electrical wiring installation at which current is taken to supply utilization equipment.

“Level 2 charging” means a Level 2 electric vehicle charging level as defined by SAE International’s J1772 standard and includes variable rate charging that is controlled by an electric vehicle energy management system.

“Opportunity Charging” means Level 2 Charging for an Electric Vehicle supported by a dedicated electrical circuit rated to at least 40A to each Parking Space.

“Shared Vehicle” means an automobile owned and operated by an organization which provides car-sharing services to its members.

“Shared Vehicle Parking Space” means a parking space reserved for the exclusive use of a Shared Vehicle.

EV Ready Requirements

Residential uses

For major renovations and new single family homes, duplexes, and townhomes with private onsite residential Parking Spaces, an energized outlet capable of providing Level 2 charging shall be provided for each dwelling unit. *[NOTE: The intention is to provide at least one energized outlet for each households' onsite parking, if onsite parking is provided for that household. If a household's onsite parking area contains two or more parking spaces, the vehicles could all make use of the same outlet – e.g. in a two-car garage, a doubled headed EVSE could be installed, or a single headed EVSE shared between two vehicles.]*

For major renovations and new multifamily buildings, each residential parking space, excluding visitor parking, shall feature an adjacent energized outlet capable of providing Level 2 charging or higher to the parking space.

Non-residential uses

For Retail and Assembly uses *[NOTE: local governments may specify the uses as defined in local government bylaws, e.g. "store", "restaurant", "movie theatre", etc.]* in new developments and major renovations:

- A minimum of 15% *[NOTE: local governments could consider other values]* of Parking Spaces or one Parking Space, whichever is greater, shall include an Energized Outlet capable of supporting Opportunity Charging.

For all other non-residential uses in new developments and major renovations:

- A minimum 30% *[NOTE: local governments could consider other values; 20%-40% recommended]* of Parking Spaces shall include an Energized Outlet capable of providing Level 2 Charging or a higher charging level for an Electric Vehicle; and *[NOTE: It is anticipated these parking spaces may support workplace charging. Use of electric vehicle energy management systems to provide significant levels of electrical load sharing is appropriate in these contexts, given the long dwell times of parking in these parking spaces. It is recommended the same charging performance requirements as apply to residential uses also apply to parking that may support workplace charging.]*
- A minimum of 10% *[NOTE: local governments could consider other values]* of Parking Spaces or one Parking Space, whichever is greater, shall include an Energized Outlet capable of supporting Opportunity Charging.

[NOTE: Optional text to allow for implementation of fewer DC Fast Charging stations instead of Level 2 EV Ready parking in non-residential parking.] For all non-residential uses, a development may comply by providing DC Fast Charging Electric Vehicle Supply Equipment capable of providing an equivalent amount of power as can be delivered by the above requirements for Energized Outlets.

Disability Parking

All Disability Parking Spaces required for Residential Uses shall include an Energized Outlet capable of providing Level 2 Charging or a higher for Electric Vehicle charging.

A minimum of 50% of Disability Parking Spaces required for non-residential uses or a minimum of one Disability Parking Space, whichever is greater, shall include an Energized Outlet capable of supporting Opportunity Charging.

Shared Vehicles

All Shared Vehicle Parking Spaces shall include an Energized Outlet capable of supporting Opportunity Charging.

Fractional Number of EV Ready Parking Spaces

When the calculation of Parking Spaces requiring Electric Vehicle charging infrastructure results in a fraction of 0.5 or more of a space, one Parking Space shall be equipped with Electric Vehicle charging infrastructure to meet this fractional requirement.

Labeling

Energized outlets shall be labelled for the intended use for electric vehicle charging.

Charging Performance Requirements

The Director of _____ *[NOTE: Designate appropriate official, e.g. Director of Planning; Director of Transportation; etc.]* may specify minimum charging performance requirements and management guidelines for designs using an Electric Vehicle Energy Management System.

For designs where an Electric Vehicle Energy Management System is intended, the electrical infrastructure shall include all communications equipment, control systems installation, licensing, and permitting required to operate.

Metering

The electrical infrastructure shall include metering that provides for apportioning of energy costs to persons when electric vehicle supply equipment is installed.

5. Appendix 2 - Model Bulletin – EV Ready Requirements

Summary of Requirements

On *[date]* the *[name of local government]* adopted requirements in *[bylaw citation]* for residential and non-residential parking in new developments and major renovations to be EV Ready. Requirements are summarized below. Definitions for key terms are included at the end of this document.

It is required that:

- For **single family homes, duplexes, and townhomes with private onsite residential Parking Spaces**, an energized outlet capable of providing Level 2 charging shall be provided for each dwelling unit.
- For **multifamily buildings**, each residential parking space, excluding visitor parking, shall feature an adjacent energized outlet capable of providing Level 2 charging or higher to the parking space.
- For **non-residential Retail and Assembly** uses *[NOTE: specify the uses as defined in local government bylaws, e.g. "store", "restaurant", "movie theatre", etc.]*:
 - A minimum of 15% *[NOTE: local governments could consider other values]* of Parking Spaces or one Parking Space, whichever is greater, shall include an Energized Outlet capable of supporting Opportunity Charging.
- For **all other non-residential uses**:
 - A minimum 30% *[NOTE: local governments could consider other values]* of Parking Spaces shall include an Energized Outlet capable of providing Level 2 Charging or a higher charging level for an Electric Vehicle.
 - A minimum of 10% *[NOTE: local governments could consider other values]* of Parking Spaces or one Parking Space, whichever is greater, shall include an Energized Outlet capable of supporting Opportunity Charging.
- **All Disability Parking Spaces required for residential uses** shall include an Energized Outlet capable of providing Level 2 Charging or a higher for Electric Vehicle charging.
- A minimum of 50% of **Disability Parking Spaces required for non-residential uses** or a minimum of one Disability Parking Space, whichever is greater, shall include an Energized Outlet capable of supporting Opportunity Charging.
- All Parking Spaces for **Shared Vehicles** shall include an Energized Outlet capable of supporting Opportunity Charging.

Compliance procedures for Part 9 developments

- At time of Development Permit application, applicants shall indicate EV Ready parking spaces on plans and in a schedule. For developments with a non-residential component, the schedule shall summarize which parking spaces are for Opportunity Charging (i.e. dedicated electrical circuits of 40A or greater).
- At time of Building Permit Applications, applicants shall indicate EV Ready parking spaces on plans and in a schedule. For developments with a non-residential component, the schedule shall summarize which parking spaces are for Opportunity Charging (i.e. dedicated electrical circuits of 40A or greater). If electric vehicle energy management systems are used, a letter signed and sealed by an electrical engineer shall be submitted with the Building Permit application, confirming the design of the EV charging infrastructure meets Zoning Bylaw requirements and design standards outlined in the Bulletin.
- When construction is complete, inspectors shall inspect for the presence of Energized Outlets for EV charging. If electric vehicle energy management systems are used, a letter signed and sealed by an electrical engineer shall be provided, confirming EV charging infrastructure was installed and meets Zoning Bylaw requirements and associated design and performance standards.

Compliance procedures for Part 3 developments

- At time of Development Permit application, applicants shall indicate EV Ready parking spaces on plans and in a schedule. For developments with a non-residential component, the schedule shall summarize which parking spaces are for Opportunity Charging (i.e. dedicated electrical circuits of 40A or greater).
- At the time of Building Permit Application, applicants shall indicate EV Ready parking spaces on plans and in a schedule. For developments with a non-residential component, the schedule shall summarize which parking spaces are for Opportunity Charging (i.e. dedicated electrical circuits of 40A or greater). A letter signed and sealed by an electrical engineer shall be submitted with the Building Permit application, confirming the design of the EV charging infrastructure meets Zoning Bylaw requirements and design standards outlined in the Bulletin.
- When construction is complete, a letter signed and sealed by an electrical engineer shall be provided, confirming EV charging infrastructure was installed and meets Zoning Bylaw requirements and associated design and performance standards.

Charging performance requirement

- The table below summarizes minimum charging performance requirements. These charging performance requirements are intended to ensure full charging daily for residential (i.e. all night) or workplace (day time) charging applications.

{NOTE: The tables below are representative of center City and inner-ring suburban requirements, and outer-ring suburb or rural requirements, respectively. They are provided for illustrative purpose only. Local governments could consider conducting their own charging performance analysis, considering average vehicle kilometers traveled, vehicle types and efficiency, temperature, and other variables applicable to their community, to determine appropriate charging performance requirements. Please note establishing appropriate minimum performance requirements for future EV charging patterns is subject to sources of considerable uncertainty; the values below were derived for the Cities of Victoria and Abbotsford using available data and a model developed by AES Engineering.}

Charging performance for City and Inner-Ring Suburb (Source: City of Victoria.)

CIRCUIT BREAKER AMPERAGE	MAXIMUM NUMBER OF ELECTRIC VEHICLES
20A	1
30A	2
40A	4
50A	5
60A	6
70A	7
80A	9
90A	10
100A	11
125A	14

Charging performance for Outer-Ring Suburb & Rural (Source: City of Abbotsford)

CIRCUIT BREAKER AMPERAGE	MAXIMUM NUMBER OF ELECTRIC VEHICLES
20A	N/A
30A	1
40A	3
50A	4
60A	5
70A	7
80A	9
90A	10
100A	11
125A	14

Management guidelines

- Where an electric vehicle energy management system is implemented, provisions for management and maintenance are to be provided to the strata or dwelling unit owner.
- The following are recommended to be included in the strata rules or bylaws, as a minimum:
 - The party (Strata or dwelling unit owner) responsible for electric vehicle supply equipment purchase and installation is clearly delineated, and appropriate permissions and procedures outlined to ensure accessibility to energized outlets for the purposes of EV charging;
 - Electric vehicle supply equipment ownership is established as a fixture, chattel or lease;
 - Billing rules and procedures are established;
 - Designation that where an electric vehicle energy management system is implemented, the electric vehicle supply equipment must be compatible with that electric vehicle energy management system.

Definitions

“Electric vehicle” means a vehicle that uses electricity for propulsion, and that can use an external source of electricity to charge the vehicle’s batteries.

“Electric vehicle energy management system” means a system to control electric vehicle supply equipment electrical loads comprised of monitor(s), communications equipment, controller(s), timer(s) and other applicable devices.

“Electric vehicle supply equipment” means a complete assembly consisting of conductors, connectors, devices, apparatus, and fittings installed specifically for the purpose of power transfer and information exchange between a branch electric circuit and an electric vehicle.

“Energized outlet” means a connected point in an electrical wiring installation at which current is taken to supply utilization equipment.

“Level 2 charging” means a Level 2 electric vehicle charging level as defined by SAE International’s J1772 standard and includes variable rate charging that is controlled by an electric vehicle energy management system.

“Opportunity Charging” means Level 2 Charging for an Electric Vehicle supported by a dedicated electrical circuit rated to at least 40A to each Parking Space.