IMPLEMENTING ELECTRIC VEHICLE CHARGING INFRASTRUCTURE IN MULTI-UNIT RESIDENTIAL BUILDINGS

A Guide for Multi-Unit Condominium & Rental Building Owners

Plug In BC
A program of the Fraser Basin Council

BRITISH COLUMBIA
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GLOSSARY

DCFC: Direct Current Fast Charging

EV Ready: The parking space features a complete electrical circuit terminating in a junction box capable of providing level 2 EV charging

EV: Plug-in Electric Vehicle

EVEMS: Electric Vehicle Energy Management Systems

EVSE: Electric Vehicle Supply Equipment (the technical term for an EV charging station or "charger")

MURB: Multi-Unit Residential Building (includes mixed-use buildings with commercial/institutional and residential occupancies)

OCPP: Open Charge Point Protocol (an open protocol for communications between EVSE and EVSE operators)

ZEV: Zero Emissions Vehicle (includes EVs, as well as hydrogen fuel cell vehicles)

ABOUT THIS GUIDE

This guide provides information about how to implement EV charging infrastructure in multi-unit condominium and rental apartment buildings. It is intended for building owners, managers, and operators of multi-unit residential buildings (MURBs) considering implementing electric vehicle (EV) charging.

This guide was developed by the Fraser Basin Council in partnership with the Government of British Columbia's CleanBC Go Electric Program and consultation with industry experts.

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WHY IMPLEMENT EV CHARGING INFRASTRUCTURE IN MULTI-UNIT RESIDENTIAL BUILDINGS?

In response to growing demand from residents, more and more condominiums and rental apartment owners are implementing electric vehicle (EV) charging infrastructure. Demand for EV charging in BC is expected to increase rapidly. A 2021 survey by KPMG suggests that of British Columbians planning to purchase an automobile within the next five years, 77% are in the market for an EV.[1]

The Benefits of EVs

The benefits of EVs include:

- **Cost savings.** The fuel cost of EVs in BC is equivalent to about $0.20 per litre of gasoline. Maintenance costs of EVs are half those of gasoline vehicles.[2] On a lifecycle cost basis, EVs are already typically competitive with conventional internal combustion vehicles.[3] Also, the purchase and lease costs of EVs are declining, making them more and more competitive.[4]
- **Improved performance.** EVs typically have superior handling. Additionally, EVs are quieter inside, which many drivers report makes for a more enjoyable environment for music and conversation.[5]
- **Reduced GHG emissions, better air quality and improved health.** EVs' lifecycle [6] GHG emissions are about 90% less than fossil-fuel vehicles when charging on clean electrical grids like BC's. Moreover, EVs have zero tailpipe emissions, improving the health of our communities.[7]

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[1] https://www.newswire.ca/news-releases/the-next-new-vehicle-purchase-for-nearly-70-per-cent-of-canadians-will-be-an-electric-model-kpmg-in-canada-survey-889637501.html

[2] 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

[3] See e.g., https://www.carboncounter.com/

[4] See e.g., 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., http://www.emotivebc.ca/

[6] Lifecycle emissions include resource extraction, manufacturing, operations and disposal of vehicles

[7] The International Council on Clean Transportation and Climate & Clean Air Coalition estimate that transitioning on-road transportation to EVs in Canada would avoid 900 deaths each year from tailpipe emissions, and save $7.8 billion in annual healthcare costs. See: 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

Declining Battery Prices and Government Policy are Driving EV Adoption

Industry average EV battery costs have declined from about $1,200/kWh in 2010 to $135/kWh in 2020 and are projected to decline with technology improvements and economies of scale.[8] Due to this battery price decline, EVs' upfront costs (i.e., the cost to manufacture and sell the vehicles) are expected to reach "cost parity" with conventional internal combustion vehicles between 2023 and 2028 (depending on vehicle type), and be lower cost thereafter.[9] Lower-cost EVs will further accelerate their adoption. Accordingly, the world's largest automakers have announced plans to phase out sales of conventional internal combustion engine vehicles.[10] Governments are also driving the transition – BC's Zero Emission Vehicle Act requires that all passenger cars and trucks sold by 2035 be zero emissions vehicles (ZEVs).

In short, **we are moving towards a future where most households will own an EV if they own a vehicle.**

Home Charging is Critical for EV Drivers

Charging an EV at home overnight is typically the most convenient and cost-effective charging option. Across Canada, 72% of all charging takes place at home. While some households can do workplace charging or public charging, most prospective EV drivers want access to home charging.

Therefore, **properly future-proofing multi-unit residential buildings to support EV charging is critical.** Providing for convenient, at-home charging will improve EV drivers' conditions and is expected to improve property values even for those who do not currently drive an EV.

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[8] Bloomberg New Energy Finance. December 2020. "Battery Pack Prices Cited Below $100/kWh for the First Time in 2020, While Market Average Sits at $137/kWh". https://about.bnef.com/blog/battery-pack-prices-cited-below-100-kwh-for-the-first-time-in-2020-while-market-average-sits-at-137-kwh/

[9] 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

[10] See e.g., Annie White. February 21, 2021. "Here Are All the Promises Automakers Have Made about Electric Cars" Car and Driver. https://www.caranddriver.com/news/g35562831/ev-plans-automakers-timeline/

ABOUT EV CHARGING

Charging Levels

TYPE	Voltage (V)	Power Output (kW)	Speed of Charge	Vehicle Range Added per Hour of Charging (km)	Cost
Level 1	120	1.44–1.92	Slow	3–8	$–$$
Level 2	208–240	≤19.2	Medium	~15–120	$–$$$
DC Fast Charge	200–600	<400	Fast-Very Fast	~150 – 2500	$$$$ – $$$$$$

There are different "levels" of EV supply equipment (EVSE – i.e., an "EV charger"), summarized in the table below.

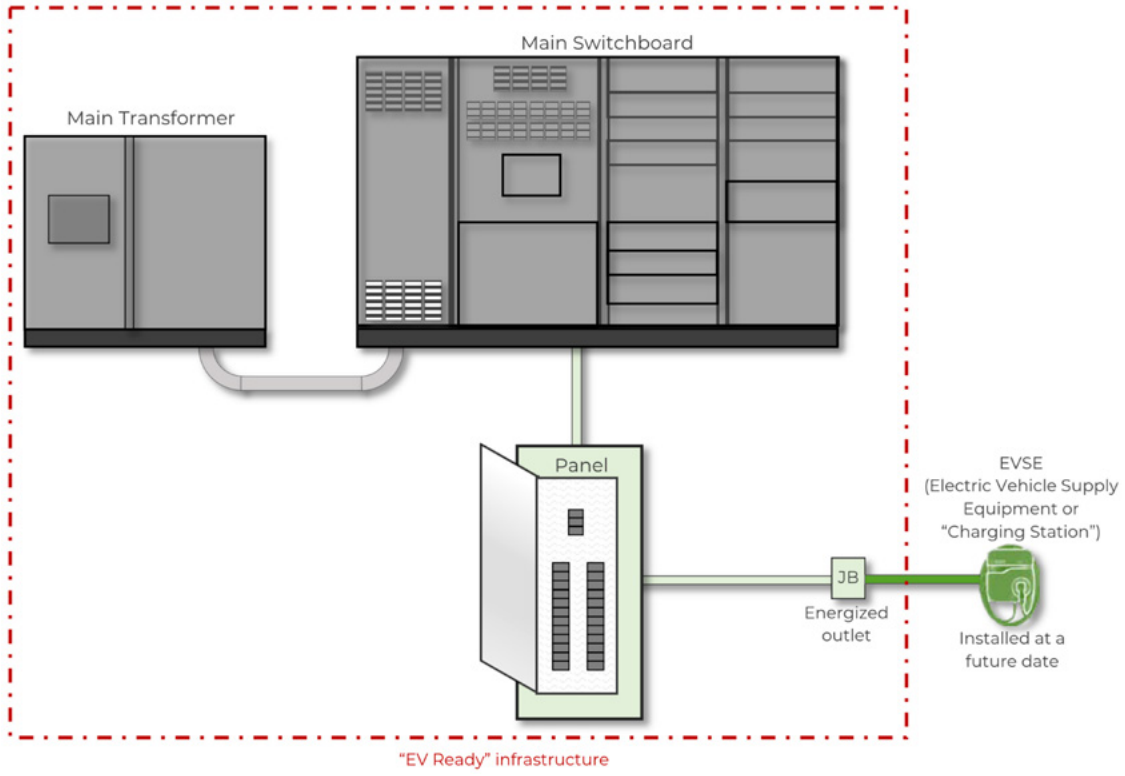
Level 1 (120 VAC)
Level 1 charging uses 120-volt (V) alternating current (AC), delivered by a standard three-prong household plug. Generally, EVs come with a Level 1 charger as standard equipment. Level 1 can be sufficient for some drivers, however, it is too slow a rate of charge to meet all drivers' needs. New Level 1 outlets are rarely installed for EV charging, but existing outlets can sometimes provide economical access to charging where Level 2 is not available.

Level 2 (208/240 VAC)
Most multi-unit residential buildings add Level 2 charging, which can provide a sufficient rate of charging to meet all drivers' needs, when properly designed.

Level 3 (DC Fast Charging)
DC fast charging (DCFC) provides high-speed rates of charging, but is expensive (e.g., $40,000 to $100,000+ per charging station), and therefore is usually used only for public charging stations, and not usually in MURBs.

About EV Ready Parking

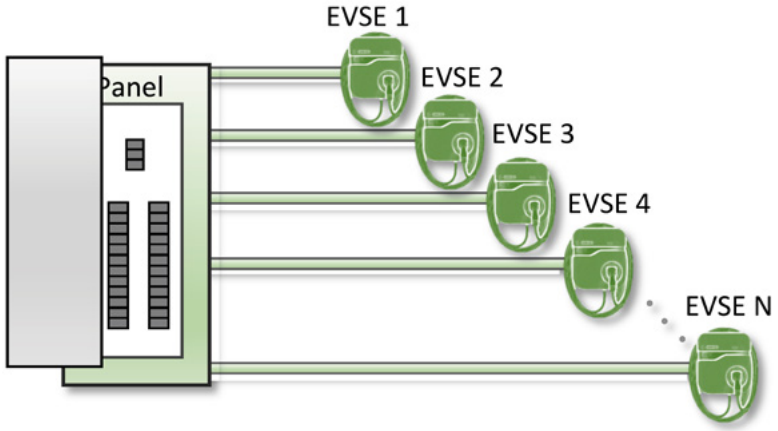
"EV Ready" parking spaces feature an adjacent electrical outlet (e.g., an electrical junction box or receptacle) at which Level 2 EV chargers can be installed in the future. Once a driver adopts an EV, they then install a charger. Multi-unit residential buildings can be future-proofed for increasing EV adoption by making parking spaces EV Ready (as explained in more detail below). The diagram below illustrates "EV Ready" parking.



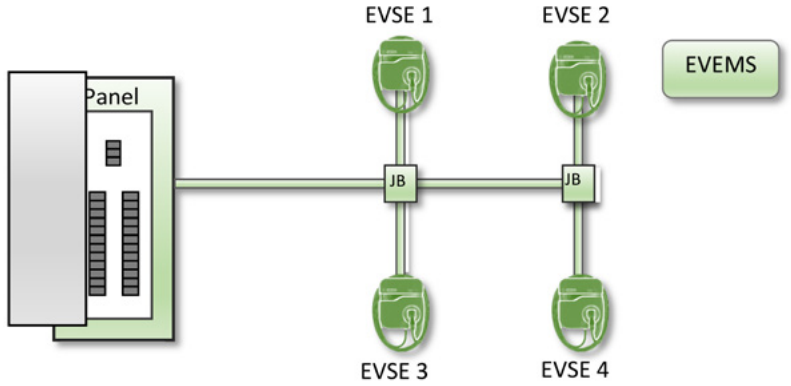
EV Ready Parking. Source: AES Engineering.

About EV Energy Management Systems

An EV energy management system (EVEMS – i.e., "load sharing," "power sharing," or "smart charging") is technologies that allow multiple EVs to charge on the same electrical circuit.[11] In contrast to a "dedicated EVSE" where one circuit serves one EV, an EVEMS can allow multiple EV chargers to share a circuit. An EVEMS controls the rate and timing of EV charging to ensure that an electrical circuit's capacity is not exceeded. While charging slows when multiple EVs are charging simultaneously on a shared circuit, reasonable amounts of load sharing using an EVEMS are perfectly appropriate in multi-unit residential buildings, where charging takes place for relatively long periods of time overnight.



Dedicated circuits (no EVEMS). Source: AES Engineering.



Circuit sharing using an EVEMS. Source: AES Engineering.

[11] For technically minded readers interested in understanding more about EVEMS control schemes and their associated electrical infrastructure configurations, see e.g., CSA Group. 2019. Electric Vehicle Energy Management Systems. https://www.csagroup.org/wp-content/uploads/CSA-RR_ElectricVehicle_WebRes.pdf

Designing for the use of an EVEMS can significantly reduce the cost of implementing EV Ready parking — see the chart below.

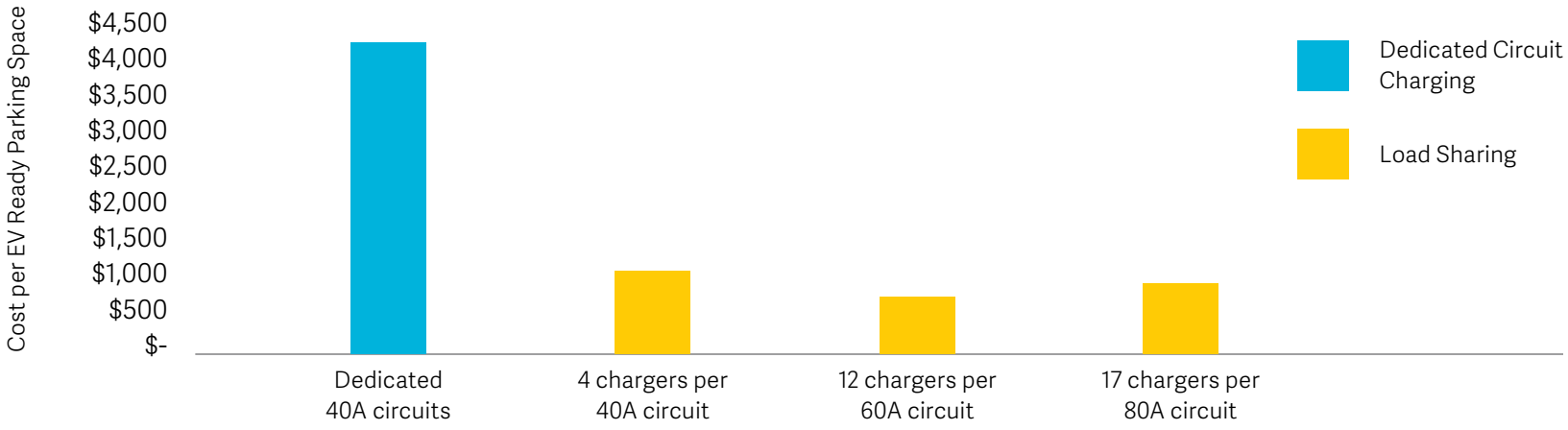


Figure 3: Cost per parking space to make all parking EV Ready in a multi-unit residential building in Vancouver, BC. (Note: These cost estimates were produced for a specific building. Costs will differ depending on the building, but typically load sharing using an EVEMS will substantially reduce the costs per parking space. As drivers adopt EVs, they would pay for the additional costs of EV chargers at their parking space, typically $700–$2000. Source: AES Engineering, 2021.)

Networked Chargers

In response to growing demand from residents, more and more condominiums and rental apartment owners are implementing electric vehicle (EV) charging infrastructure. Demand for EV charging in BC is expected to increase rapidly. In response to growing demand from residents, more and more condominiums and rental apartment owners are implementing electric vehicle (EV) charging infrastructure. Demand for EV charging in BC is expected to increase rapidly. The CleanBC Roadmap of 2030 notes that BC has an accelerated ZEV target of 26% of new light-duty vehicles by 2026, 90% by 2030 and 100% by 2035.[12]

The benefits of EVs include:

- Use of an EVEMS to conduct load management.
- Billing and payments (e.g., allowing drivers to recompense the strata or building owner for utility costs).
- Payment card use.
- Key fob access.
- Mobile app integration.
- Remote monitoring and updating.
- User access controls.
- Online reservation systems.
- Reporting.

Open Versus Proprietary Charging Services

For networked chargers to communicate with one another (e.g., as part of an EVEMS) and/or a building's EV charging network operator, they must use compatible communications protocols. Communications may be based on "open" or proprietary protocols.

The Open Charge Point Protocol (OCPP) is an open communication protocol that facilitates communication between EVSE and a network operator. There are a growing number of vendors providing EV charging services for multi-unti residential buildings that use OCPP-compliant systems.

Open systems are intended to provide greater flexibility for users — open systems can allow for the use of multiple compatible EVSE brands and/or the ability to switch charging services (e.g., if vendors go out of business or another vendor offers better value to the building). However, it should be noted that just because systems are OCPP compliant does not necessarily mean they will be fully compatible with one another — for example, they could use incompatible physical infrastructure or network systems. Additionally, at the time of writing this guide, real-world deployments of EVEMSs with multiple different OCPP-compliant charging stations were very rare. Some of the largest, most-used EV-charging service providers have not yet fully implemented OCPP and are using proprietary systems (though most have committed to using some version of OCPP in the future).

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[12] CleanBC Roadmap to 2030 https://cleanbc.gov.bc.ca/

Selecting a Charging Service Provider

Ultimately, each multi-unit condominium or rental building owner should seek professional advice on the EV charging services available to them and consider the pros and cons of different EV charging service providers and business models. Factors to consider include:

- EVSE purchase costs.
- Any ongoing networking fees.
- Customer service.
- OCPP compliance and commitment to open systems.
- Robustness of EVSE (e.g., against vandalism).
- Vendor reputation and standing.

It is recommended that condominium buildings require that unit owners/occupants may only install EVSE compatible with the building's charging service provider's EVEMS (e.g., through a strata policy or bylaw).

Available Incentives

As of this guide's publication in November 2021, the Government of BC offered incentives for EVs and EV charging infrastructure via the CleanBC Go Electric Program. The CleanBC Go Electric EV Charger Rebate Program provides incentives applicable to multi-unit buildings:

- The EV Ready rebate offers incentives for comprehensive EV Ready retrofits. It provides 75% of the costs to a maximum of $3,000 for an approved EV Ready plan, 50% of the costs up to a maximum of up to $600 per EV Ready parking space, and a max electrical infrastructure rebate of up to $80,000 per MURB complex.
- The EV Charger rebate offers incentives for incremental installations of EV chargers. It provides 50% of the costs of installing Level 2 EV chargers, up to $2,000 per charger and $14,000 per MURB complex.

Other incentive programs, such as Natural Resources Canada's Zero Emission Vehicle Incentive Program (ZEVIP), are also available. ZEVIP offers up to $5,000 per EV charging station. A minimum of 20 chargers must be installed as part of the ZEVIP program; charging service providers may serve as aggregators between buildings.

Finally, some BC municipalities may offer incentives for EV Ready retrofits and/or other EV charging infrastructure.

DIFFERENT STRATEGIES FOR IMPLEMENTING EV CHARGING INFRASTRUCTURE IN MURBS

Broadly, multi-unit residential buildings usually pursue one of two strategies to implement EV charging:

1. **Comprehensive EV Ready retrofits –** A building undertakes an electrical renovation to make all parking EV Ready (or at least all parking spaces where EV charging will be necessary over the foreseeable future). As drivers adopt EVs, EVSE is installed at their assigned parking space. It is important to note that the cost of installation would be the responsibility of the driver.
2. **Incremental additions of EV chargers** – Under this model, a building implements a few chargers at a time. Often, EVSE is located in common parking areas (e.g., visitor parking) and is shared by multiple residents. Over time, as more EVs are adopted by residents, additional EVSE will be added.

The table below compares these two options.

	Comprehensive EV Ready retrofits	Incremental additions of EV chargers
Lifecycle cost per parking space	Less expensive. Average costs of ~$1000 per EV Ready parking space when designing for load sharing using an EVEMS (EVSE costs paid by drivers over time as EVs are adopted). Costs will vary significantly from building to building, and depending on design (e.g., extent of load sharing).	More expensive. Average costs of ~$7,000 per Level 2 EVSE.
Initial project cost	Higher one-time initial cost.	Series of incremental projects. Initial project typically significantly less expensive than comprehensive EV Ready retrofit.
Process	One-time significant electrical renovation.	Repeated electrical renovations.
Location of charging stations	In drivers' assigned parking spaces.	Often initially in commonly accessible parking (e.g., visitor parking). Sometimes in assigned parking.
Process for drivers to install chargers	Simple process to install chargers (after initial comprehensive electrical renovation).	Process to implement new chargers frequently lengthy.
Convenience	Highly convenient for drivers. Parking and EV charging in regular assigned parking spots.	If chargers are located in commonly accessible parking (e.g., visitor parking), it can be somewhat less convenient for drivers.
Future-proofing	With an EVEMS, frequently can ensure sufficient electrical capacity for all parking spaces to have EV charging.	Initial installations may not be designed for later expansion; potential for stranded assets. Potential to exhaust limited electrical capacity if design for an EVEMS not considered. Equity and fairness can become an issue as an incremental approach may allow early adopters to use available capacity, leaving later adopters with either no capacity to install further chargers, or more expensive installations due to required upgrades in electrical infrastructure.
Incentive programs	Supported by the CleanBC Go Electric EV Ready rebate for apartments and condo buildings: • Up to $3,000 (or 75% of costs) for EV Ready plan • $600 per EV Ready parking space • $80,000 maximum per building • Buildings can also take advantage of up to $1,400 per charging station	Supported by the CleanBC Go Electric EV Charger rebate for apartments and condo buildings: • $2,000 per charger • $14,000 maximum per building

Potential to Swap Parking Spaces

If it is possible to "swap" (i.e., trade) parking spaces between residents of a multi-unit building, then it may be possible to implement phased retrofits of EV Ready parking. Building owners and stratas may want to consider designs that allow for all parking spaces to ultimately be EV Ready, but then phase the wiring of EV Ready spaces over time to defer some immediate costs. It should be noted that in many cases, buildings will not save much money in the long term.

For example, a large building might want to ensure that all parking spaces could ultimately feature EV charging. However, they might want to explore whether it was possible to implement EV charging in phases (e.g., making 20% of parking spaces at a time EV Ready), to defer some of the costs of the initial electrical retrofit. The building would ensure that electrical systems installed for EV charging were compatible with ultimately providing EV charging to all parking spaces (i.e., by ensuring electrical equipment like transformers, switchgear, feeders and panels were designed and sized appropriately). But they would wire EV Ready energized outlets in only one area of their parkade. Typically, for load sharing using an EVEMS (which is necessary to minimize costs), all EV Ready parking spaces must be located adjacent to one another in one section of the parkade.

For such a design to work, it would be necessary for drivers to be able to swap parking spaces, so that those residents who first adopt EVs get access to the EV Ready parking. These residents can then pay to install an EV charging station.

However, if residents are going to pay to install an EV charging station, they will usually want assurance that they will have legal access to that parking space indefinitely into the future. Parking tenure in multi-unit buildings can be organized in a variety of different ways (e.g., stratified, limited common property, common property, subject to leases, etc.). Legally swapping assigned parking spaces, while ensuring that the EV drivers getting access to these parking spaces have a long-term right to use that parking, is typically quite complicated. Solutions will vary for each building, and in many cases, it might not be possible to establish a viable swapping system. Stratas that wish to explore these sorts of phased approaches are advised to discuss their options with a knowledgeable strata lawyer or other specialists with experience helping buildings navigate these challenges.

Appendix 2 features a flow chart outlining the impacts of different parking tenure (e.g., common property, limited common property, leases, etc.) on the ability to swap assigned parking.

Determining the Strategy that Makes Sense for Your Building

Start the Conversation

Most EV charging infrastructure installations in condominiums occur when a few "EV champions" successfully engage with their strata council and other strata members. EV champions might begin by raising the topic of EV charging at a strata council meeting. Sometimes, a strata council will form an EV committee to help develop options. It is best to engage your strata council and strata members collaboratively and respectfully. Strata members are more likely to support EV charging infrastructure installations if they are engaged early in the process, have a good understanding of their options, and feel that the process is fair and in their interests.

Engage with an EV Advisor

The CleanBC Go Electric Program offers an EV Advisor service for strata and workplaces. The advisor can provide presentations and education to help your building determine the best opportunities to implement EV charging. Along with this guide, the EV Advisor can help you understand options that work for your building.

Consider the Key Principles or Values that Should Guide EV Charging Implementation in Your Building

- **Cost-effectiveness –** Comprehensive EV Ready retrofits usually have a higher upfront cost, but can substantially reduce the total lifecycle costs of providing EV charging. Careful planning of charging infrastructure can reduce costs in the future. Are minimizing short-term or long-term costs more important? Does your building have a total maximum budget? Is it possible to borrow money to finance the installation? Is it possible to use a special levy to fund the EV Ready retrofits in your strata?
- **Access –** Should all residents in your buildings ultimately be able to access EV charging? Who should have access to EV charging (e.g., anyone who accesses the visitor parking area or only pre-approved residents?).
- **Cost allocation –** Should EV drivers pay for the cost of their EV charger? Should drivers pay for the cost of electricity they use? Who retains ownership of the elements of an installation?
- **Scalability and future-proofing –** How long might the building stand for (e.g., 30+ years?) Is it important to enable all drivers to have access to EV charging, in light of the transition to EVs? Does the strata want to avoid the potential for stranded assets?
- **Ease of implementation –** How important is it that drivers have a simple and assured process to access EV charging as they adopt EVs? Would the building like to solve the issue of EV charging for all drivers as part of one comprehensive process, or is it acceptable that the strata will need to regularly decide on future retrofits to implement EV charging? Would the strata council consider exploring whether it is possible to enable drivers to swap parking spaces between strata members to allow for phased EV Ready retrofits?

Survey Residents

A simple survey is a useful way to determine how many strata members would value having access to EV charging, and to learn about strata members' perspectives about EVs. Plug In BC has developed a template survey that stratas or rental building owners can adapt for use in their buildings.

Consider Options

Once you have considered key principles, received survey results, and had conversations at strata council (or EV committee) meetings, the strata council should consider what broad EV charging strategy they wish to pursue for their building. Two options include:

- **Commission an EV Ready plan –** Consider initiating an EV Ready plan if:
  - o A significant proportion of residents express interest in having access to EV charging; AND
  - o The strata council can foresee the possibility of investing at least $400 or more per parking space to make at least one parking space per residential unit EV Ready (after CleanBC Go Electric EV Ready rebates); AND
  - o Strata are likely to value lifetime cost-efficacy; access to EV charging for all residential units; strong future-proofing; and an easy process for EV drivers to access charging.

  An EV Ready plan is intended to provide detailed professional advice about the design options and costs to implement a comprehensive EV Ready upgrade. Review the Process for Implementing EV Ready Retrofits below.

- **Install a few EV chargers –** If there is limited interest in EVs in your building or no chance of investing significant funds in EV charging, installing a few charging stations in common parking areas may be an appropriate short-term approach. Review the Process for Implementing a Few EV Chargers below.

THE PROCESS FOR IMPLEMENTING EV READY RETROFITS

There are a variety of ways that EV Ready retrofits may be implemented. The steps below explain a general process — steps may not necessarily occur in this order, and some may be taken in parallel. See Appendix 1 for a process chart for implementing EV Ready retrofits involving an electrical engineer or an electrical contractor to manage the project.

1. **Commission an EV Ready plan –** The first step in implementing an EV Ready retrofit is to commission an EV Ready plan. Please refer to the EV Ready Plan Requirements for details.

   The District of Saanich, on behalf of BC local governments, has developed a model Request for Proposal for an EV Ready plan. A strata council or EV committee can distribute the requests for proposal to qualified firms and then select between respondents.

   Depending on stratas' bylaws and the quoted cost of an EV Ready plan, a strata council may be able to approve funding for an EV Ready plan from its operating fund. Alternatively, it may require a ¾ vote at an Annual General Meeting (AGM) or Special General Meeting (SGM). Consult your strata council and property manager.

   Upon completion of the plan, stratas or building owners can submit the plan (please note there is no pre-approval required) for a rebate of up to 75% of the cost of the plan, $3,000 maximum. More information on the EV Ready plan can be found here.

2. **Explore the ability to swap parking spaces –** Depending on how your building's parking tenure is organized, it may be possible to swap parking spaces. This could enable EV Ready retrofits to proceed in phases. Contact a knowledgeable strata lawyer or EV charging policy specialist to determine your options. It is important to note that at this time, phased projects do not meet EV Ready program criteria and cannot receive rebates.

3. **Consider EV Ready plan and funding options –** Following the development of an EV Ready plan, stratas or rental building owners will need to carefully consider the recommendations. It will be important to consider how the project can be funded, informed by the EV Ready plan's cost estimates and any available incentives. Funding options can include a special levy, expenditure from the Contingency Reserve Fund, receiving a loan, and/or financing mechanisms offered by EV charging service providers.

4. **Get approval of an EV Ready retrofit –** Stratas will typically need to approve their EV Ready retrofit at an AGM or SGM. The strata council can place an item on the agenda of an AGM or SGM. Alternately, it is possible for an owner or tenant to place an item on the agenda of an AGM, or to call an SGM if they present the strata council with a written demand signed by members representing 20% of the strata council votes; however, strata members are encouraged to work collaboratively with strata councils whenever possible.

   Typically, most ways of funding an EV Ready retrofit (e.g., a special levy, expenditure from the Contingency Reserve Fund, a loan, etc.) will require a ¾ vote.[13] Achieving the ¾ vote threshold usually requires substantial engagement with strata members ahead of the meeting, to help present the value of pursuing a comprehensive EV Ready design. It makes sense to share the EV Ready plan and funding strategy in advance and engage strata members on these issues.

5. **Apply for pre-approval for rebates** with BC Hydro and FortisBC – Once your strata or building owner has approved the project, it is recommended that you apply for the EV Ready Infrastructure Rebate to ensure the project is pre-approved.

6. **Get a detailed design –** If you have an electrical engineer completing an electrical plan, please ensure you follow the permitting criteria.

7. **Engage with an EV charging service provider –** Most EV Ready buildings will engage with an EV charging service provider, a vendor who will provide the EVEMS, EV charging stations, and related services (e.g., billing, any warranty and maintenance contracts, etc.) to the building. Typically, viable options will be identified in the EV Ready plan.

8. **Manage permitting, construction and commissioning –** There are different ways to manage the construction and commissioning of the project. Some buildings engage directly with an electrical contractor or an EV charging service provider. Others will work with the electrical engineer who serves as their representative.

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[13] See Government of BC. Types of strata voting. https://www2.gov.bc.ca/gov/content/housing-tenancy/strata-housing/operating-a-strata/meetings-and-voting/types-of-voting

9. **Finalize EV policies/strata rules –** All EV policies and strata rules relating to their use will need to be finalized. EV charging service providers, engineers, contractors, lawyers and/or strata policy specialists can recommend appropriate policies and rules that align with the infrastructure installed. Important issues to consider include:

    a. Who will be responsible for managing charging (installations, access, communication with network providers)?
    b. Who will pay for and retain ownership of chargers (excluding upstream infrastructure)?
    c. What type of charger can be installed (e.g., compatible with the selected EVEMS)?
    d. What is the process for adding new chargers?
    e. How will billing occur? At what price or rate?
    f. Under what conditions may the strata limit access to chargers?
    g. Who is liable in case of malfunction or damage?

10. **Implement EV chargers –** EV chargers are installed over time as drivers adopt EVs.

THE PROCESS TO INSTALL A FEW EV CHARGERS

1. **Consider charger locations and project scope –** Often, buildings will elect to implement a few chargers in visitor parking or other commonly accessible parking spaces. Consider appropriate locations, the approximate number of EV chargers that might meet the buildings' initial needs, and preliminary ideas of the potential budget.

2. **Receive initial consultations and estimates –** Invite electrical contractors, EV charging service providers and/or engineers to assess the site and provide quotes for EV charging services. Communicate your preliminary ideas about the project's scope and ensure that firms you contact understand your intention. It is recommended to obtain quotes from several sources. You will be better served by firms with experience in installations in MURBs. Inquire with firms regarding how EV charging services can be expanded in the future and whether the installation will interfere with a building's long-term ability to implement 100% EV Ready retrofits, if that is considered a future possibility for the building. Encourage firms to propose the best solutions for your building and to provide quotes for this work.

   Access to any electrical rooms, all parking garage levels, and other limited access areas (e.g., office, mechanical rooms) may be required as part of the consultation. Ensure someone is available to provide access for site visits.

3. **Compare and select the preferred scope of work –** Compare quotes for the work. Make sure to understand what is and is not included in the quotes provided to you in order to assess them fairly — separation of costs for the different project elements may be helpful for this, and in planning for future costs.

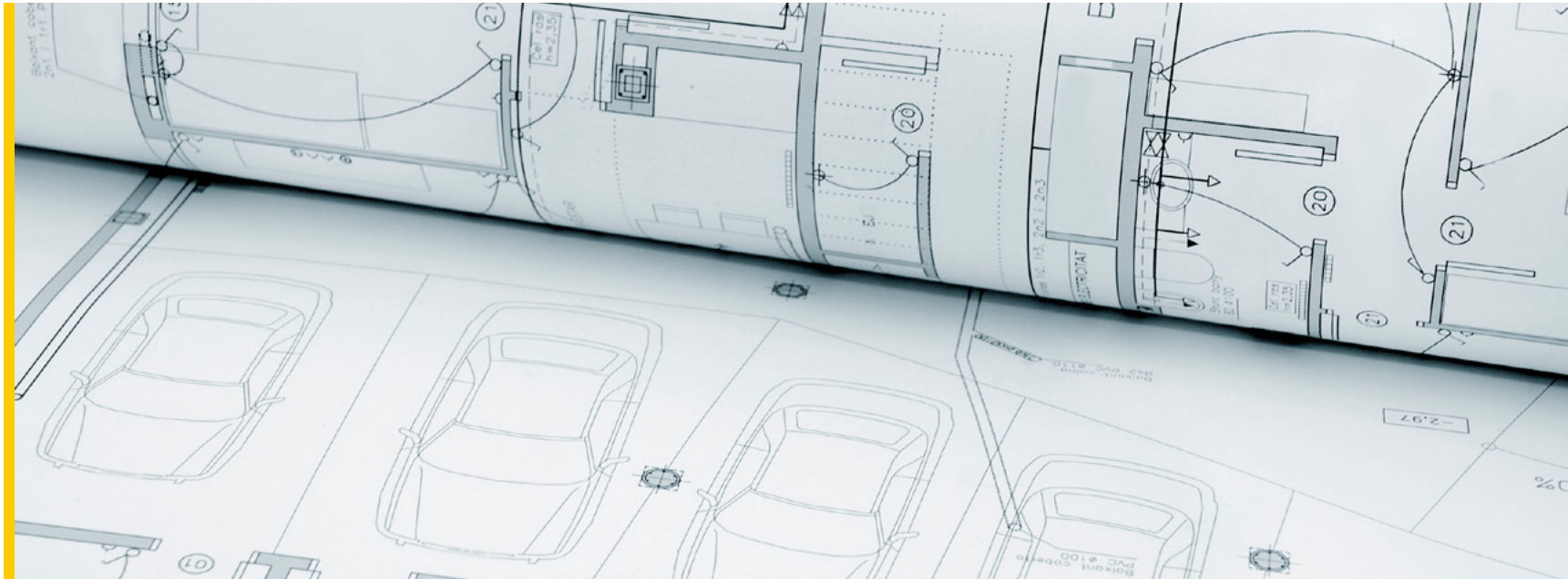
4. **Get approval for charger installation –** Stratas will typically need to approve their EV Ready retrofit at an AGM or SGM (see the Process to Implement EV Ready Retrofits above).

5. **Apply for pre-approval for rebates –** Once your strata or building owner has approved the project, it is recommended that you apply for the EV Charger rebate to ensure the project is pre-approved.

6. **Manage design, permitting, construction and commissioning –** There are different ways to design, construct, and commission the project. Some buildings engage directly with an electrical contractor or an EV charging service provider. Others will work with an electrical engineer who serves as their representative.

7. **Finalize EV policies/strata rules –** All EV policies and strata rules relating to their use will be finalized. EV charging service providers, engineers, contractors, lawyers and/or strata policy specialists can recommend appropriate policies and rules that align with the infrastructure installed. Important issues to consider include:

a. Who will be responsible for managing charging (installations, access, communication with network providers)?
b. Who will pay for and retain ownership of chargers (excluding upstream infrastructure)?
c. What type of charger can be installed (e.g., compatible with the buildings' EVEMS)?
d. What is the process for adding new chargers, including the required additional electrical infrastructure?
e. How will billing occur? At what price or rate?
f. Under what conditions may the strata limit access to chargers?
g. Who is liable in case of malfunction or damage?



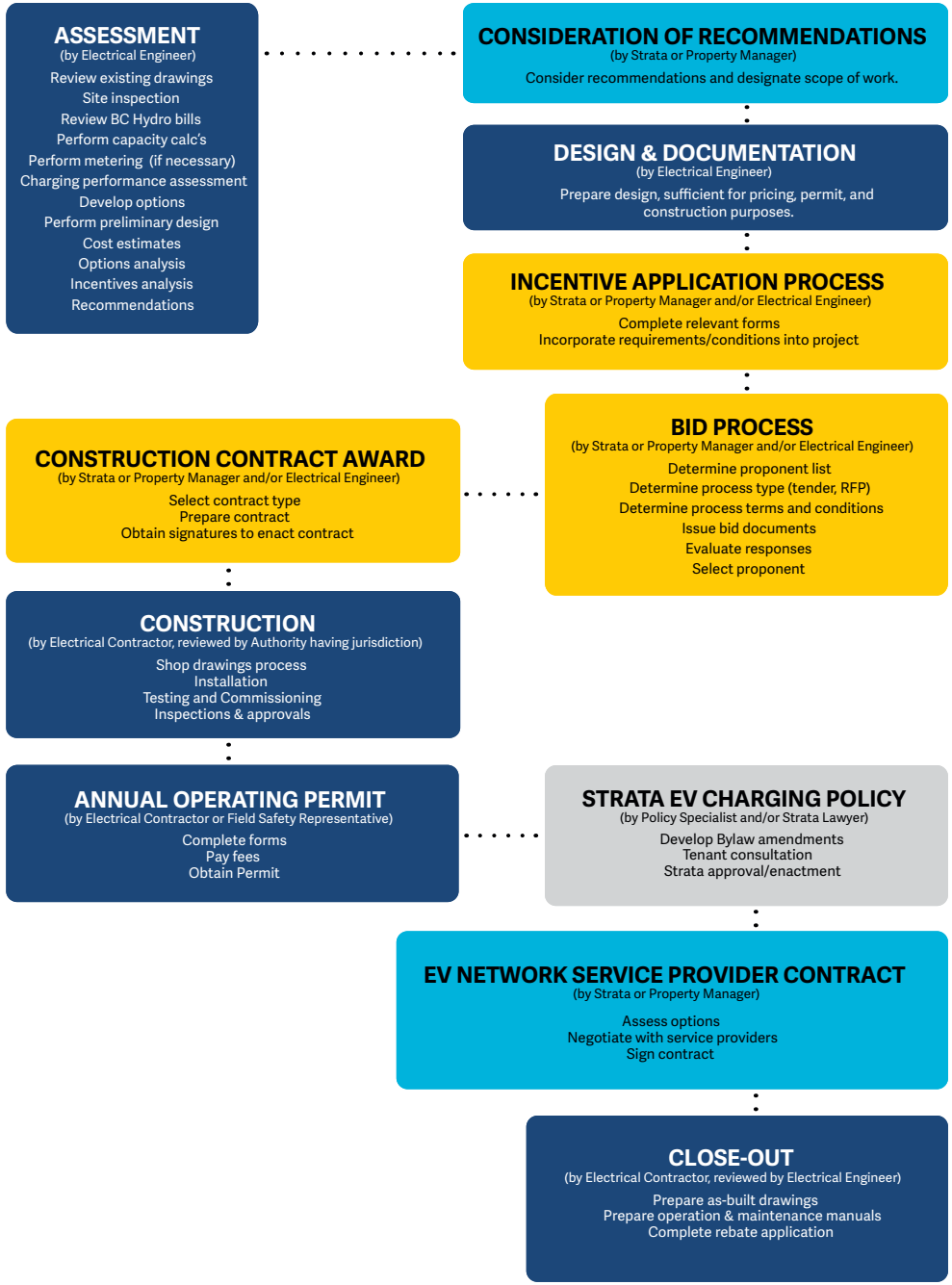
Appendix 1

Implementing an EV Ready Retrofit by Involving an Electrical Engineering or an Electrical Contractor in the EV Ready Plan

The diagram below outlines the process to develop an EV Ready plan and implement EV Ready retrofits by an engineering firm (prepared by AES Engineering).

EV READY PLANNING + INFRASTRUCTRE INSTALLATION

Electrical Engineer Process



Appendix 1

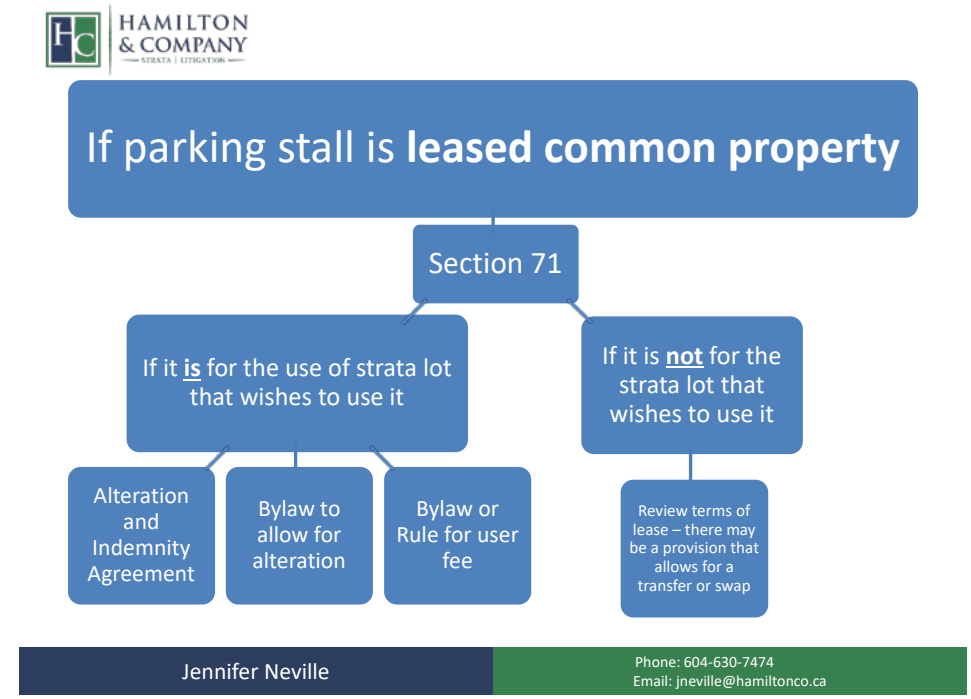
The diagram below outlines the process to develop an EV Ready plan and implement EV Ready retrofit by an electrical contractor (prepared by Cielo Electrical).

EV READY PLANNING + INFRASTRUCTRE INSTALLATION

Electrical Contractor Process

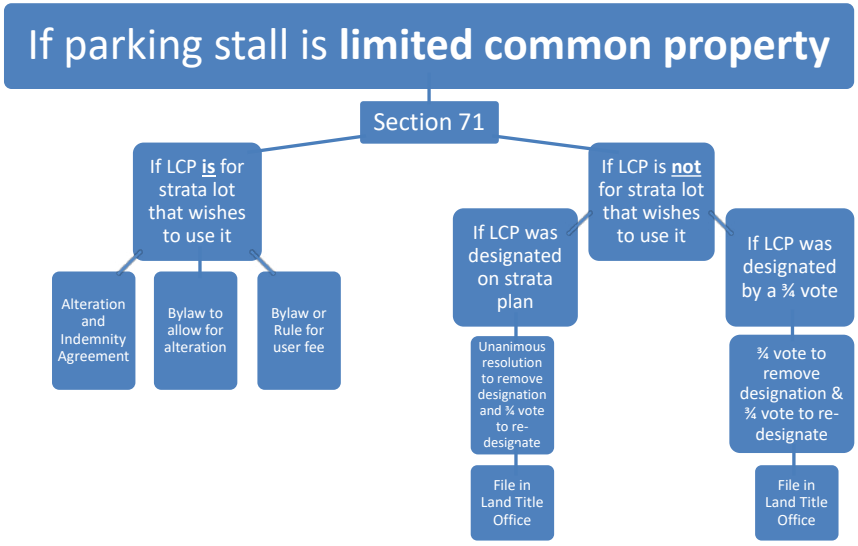
Appendix 2

Implications of Parking Tenure on Ability to Swap Assigned Parking Spaces in BC Condominiums



Appendix 2

HAMILTON & COMPANY
STRATA | LITIGATION



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THANK YOU FOR READING!

You now have the information needed to get started on installing EV chargers in MURBs! The process is complex, yet it is unquestionably important: by taking this important step you are encouraging the further successful uptake of EVs in the future, and helping to create a more sustainable, healthier environment and community.

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