Installation of Electric Vehicle Charging Stations on Strata Properties in British Columbia

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CHOA

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The Condominium Home Owners Association (CHOA) is a non-profit association that assists the entire strata industry throughout British Columbia. CHOA promotes the interests of strata property owners by providing advisory services, education, resources, and support for its members and the strata community at large. With offices located in New Westminster (Lower Mainland), Victoria (Vancouver Island) and Kelowna (B.C. Interior & North) CHOA is able to assist all types of strata corporations in all areas of B.C.

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Disclaimer

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Overview

Strata titled properties in British Columbia, known collectively as strata corporations, present unique opportunities, circumstances and conditions for energy upgrades and modernization.

The installation of an Electric Vehicle Charging Station (EVCS) is one opportunity for a strata corporation, or strata lot owner, to upgrade their building in a way that improves air quality, reduces noise pollution and has economic benefits with rising gas prices at the pumps. In addition, British Columbia's hydro renewable resource makes our province one of the most attractive locations in the world for electric vehicles.

There are currently over 27,000 strata corporations collectively representing more than 600,000 strata titled properties that include residential, commercial, industrial, hotels, leasehold marinas and leasehold property, recreation facilities, and combinations that result in multiple varieties of property configuration, use and allocation. Strata corporations are restricted by the allocation and designation of property use that is defined within the report. As a result, property use restrictions or allocations may complicate the ability of a strata corporation or an owner wishing to install an EVCS.

Background:
The project was initiated by the Condominium Home Owners' Association of BC (CHOA) with the partnership and support of the Ministry of Energy and Mines, for the purpose of identifying the options and procedures for strata corporations, and strata lot owners, who are installing an EVCS on common property and within a strata lot.

Objective: Part 1 of this guide will explore the various aspects a strata corporation needs to consider regarding the installation of an EVCS in either a new or existing multi-family strata corporation. Legislative restrictions, opportunities, and frameworks are examined, such as property variables created under the *Strata Property Act* (SPA) and Regulations, the unique current and historic property allocations, designations and limitations created by the registered strata plan, easements and covenants and the bylaws of each strata corporation.

Part 2 provides an overview of the technical requirements for electric vehicle charging in strata titled properties. It provides a general overview of charging technology, an outline of installation costs and requirements, and operational costs.

Methodology:
Twenty-seven (27) properties were identified across the province for their unique configurations or property use, to be able to sample the broadest variety of conditions that strata corporations face when considering the installation of an EVCS.

Five of the properties also underwent onsite assessments to determine the cost and possibility of installing a Level 2 EVCS (defined on page 18).

The following documents were obtained and reviewed for each of the identified properties and a complete paper analysis was conducted on all 27 properties:

1. The Disclosure Statement and any amendments filed by the owner developer with the Superintendent of Real Estate, with a specific focus on the contracts between the strata corporation and the owner developer/ third party for the allocation of exclusive use of parking spaces.
2. The registered strata plan, and any amendments filed with the BC Land Title Registry (BCLTR).
3. Any common property (CP) or general index filing with the BCLTR that indicate a designation of limited common property (LCP) filed by the owner developer or the strata corporation after the registration of the strata plan.
4. All registered bylaws filed by the owner developer, or amended and filed subsequently by the strata corporation, in the BCLTR.
5. Any rules of the strata corporations, where applicable, which indicate a parking assignment, a parking plan or inventory as

utilized by the strata corporation for the allocation and use of parking spaces.

6. Easements filed that grant multiple strata corporations access and use of allocated parking assignments to parking facilities which are not part of the registered strata plan.
7. Air space parcel agreements, with a focus on easements or access to parking facilities and control of parking areas.

Summary of Data Collected

Table 1 summarizes the data collected:

- **The type of building:** identifies whether it is a building that provides parking in an underground facility, a shared facility, a separate strata corporation, a ground use parking facility, or parking allocated in an attached manner to each strata lot.

  Typically high-rise and mid-rise buildings are constructed over a parking garage. Parking in townhouse developments are generally adjacent to each strata lot in either the form of a parking pad, parking carport or enclosed parking garage attached to the strata lot. Parking in bare land developments is generally on the strata lot.

- **Number of strata lots:** determines the capacity of each development and an understanding of how the maximum allocation of the parking spaces is administered. For example, a 540 unit strata corporation has 2 parking spaces per strata lot whereas a 109 unit strata corporation only has 0.95 spaces per strata lot. This provides the strata corporation with an inventory to calculate existing parking, vacancies, and the potential to identify specific locations for the installation of an EVCS.

- **Type of parking:** provides the opportunity to determine whether re-allocation is possible. Parking attached to a specific strata lot, such as a townhouse, may be designated as part of the strata lot, LCP or common property. However, the strata corporation may not have the authority to re-allocate the LCP designation or the owner developer contractual assigned use and access of the parking space to an alternate user.

- **How is parking allocated?** categorizes how the parking is allocated. In British Columbia strata corporations have different variations of use and allocation of parking. Each strata corporation may administer the use of their parking in a different manner based upon the bylaws or rules of the strata corporation, and the assignments of parking created by the owner developer when marketing the strata properties.

- **Number of stalls currently available:** indicates whether there is currently any parking inventory that may be used to designate an EVCS installation. The technical portion and property summary of the 5 building studies determines whether the location of the potential EVCS parking space is feasible.

- **Parking designation:** identifies how the parking is designated on the registered strata plan, such as an LCP designation created by the owner developer, strata corporation or granted use by way of an easement.

- **Lease allocation provided to the strata corporation:** identifies if the owner developer has provided a schedule of the assigned parking spaces to the strata corporation.

Table 1- Summary of Data

Electric Vehicle Research Project - Building Overview

City	Year strata built	Number of Strata Lots		Type of buildings				Type of parking		Stall available for EVCS install			Type of Review		Parking designation / Lease allocation	
		RES	COMM	Low-rise	Mid-rise	High-rise	TH	TH/ apartment mix	lot / space	RES	COM	Visitor	on-site	Paper review	Assignment Form	Provided to Strata
New Westminster	2003	75				X		x		Y		Y		Yes	CP-ODL	N
Vancouver	2006	109				X		x		Y	Y-ASP	Y		Yes	CP-ODL ASP	N
Vancouver	2007	139				X		x		N	N/A	Y/N		Yes	CP-ODL	N
Coquitlam	2008	282				X		x		Y	N/A	Y		Yes	CP-ODL	N
Kamloops	1994	5					X		x	Y-SL	N/A	N		Yes	SL-Unit Garage	N/A
West Kelowna	2006	150	4	X				x		Y	N/A	Y		Yes	CP-ODL	N
Kelowna	2008	151	9			X		x		Y	Y	Y		Yes	CP-ODL	N
Coquitlam	1992	540		X	X	X		x		Y	N/A	Y		Yes	CP-ODL-LCP	Y
Vancouver	1993	153	11	X				x		Y	Y	Y	Yes		CP	N/A
Surrey	1994	278				X		x		Y	N/A	Y	Yes		CP	N/A
Sechelt	1995	32				x			x	Y	N/A	N		Yes	CP	N/A
Burnaby	1997	96				x		x		N	N/A	Y/N		Yes	CP-ODL	N
North Vancouver	2002	56	5	x		x		x		Y-LCP	N	Y	Yes		LCP	filed
Nelson	2007	39		x				x		Y	N/A	Y/N		Yes	CP-ODL	N
Invermere	2008	221						x		Y	N/A	Y		Yes	CP	N/A
New Westminster	1991	72				x		x		Y	N/A	N		Yes	CP-ODL	N
Victoria	1990	44		x				x		Y	N/A	Y/N		Yes	CP	N/A
Sidney	1991	91			x			x	x	Y	Y	Y/N		Yes	CP	N/A
Victoria	1995	112		x				x		Y	N/A	Y		Yes	CP-ODL	N
Nanaimo	1997	229		x				x		Y	N/A	Y		Yes	CP-ODL	Y
Parksville	2001	229					x		x	Y-SL	N/A	Y		Yes	CP-EUSL	N/A
Victoria	2006	105				x		x		Y-LCP	N/A	Y	Yes		LCP	filed
Victoria	2009	155	2			x		x		Y	Y	Y		Yes	CP-LCP-ODL-ASP	N
Colwood	2009	30		x				x		Y	N/A	Y	Yes		CP-ODL	Y
Victoria	2011	41	1		x			x		Y	Y	Y		Yes	CP-ODL	N/A
Whistler	1997	121			x			x		Y	N/A	Y		Yes	CP-ODL	N
Whistler	2002	220	13		x			x		Y	Y	Y		Yes	CP-LCP-ODL-ASP	N

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SL: strata lot

SL-Unit Garage: Parking is located in a garage or carport attached to the strata lot

CP: Common property assigned and designated for use by the strata corporation

CP-ODL : Common property, owner developer lease assignment

CP-LCP-ODL-ASP: A parking garage with a combination of common property, limited common property, owner developer lease assignments, and an easement allocation use under an air space parcel agreement

CP-LCP-ODL-ASP - common property owner developer lease assignment designated LCP with an air space parcel agreement

CP-EUSL – common property exclusive use for strata lot

CP-ODL-ASP – common property owner developer lease assignment with an air space parcel agreement

CP-ODL-LCP – common property owner developer lease assignment designated LCP

LCP: limited common property

LCP-OD: Limited common property designated by the owner developer

LCP-SC: Limited common property designated by the strata corporation by a sketch plan approved by a ¾ vote resolution

LCP-ODL: Limited common property designated by the owner developer lease assignment

RES – Residential strata lots

COMM – Commercial strata lots

TH – Townhouse strata lots

Part 1: PROPERTY USE AND ALLOCATION

Definition of designations in a strata corporation

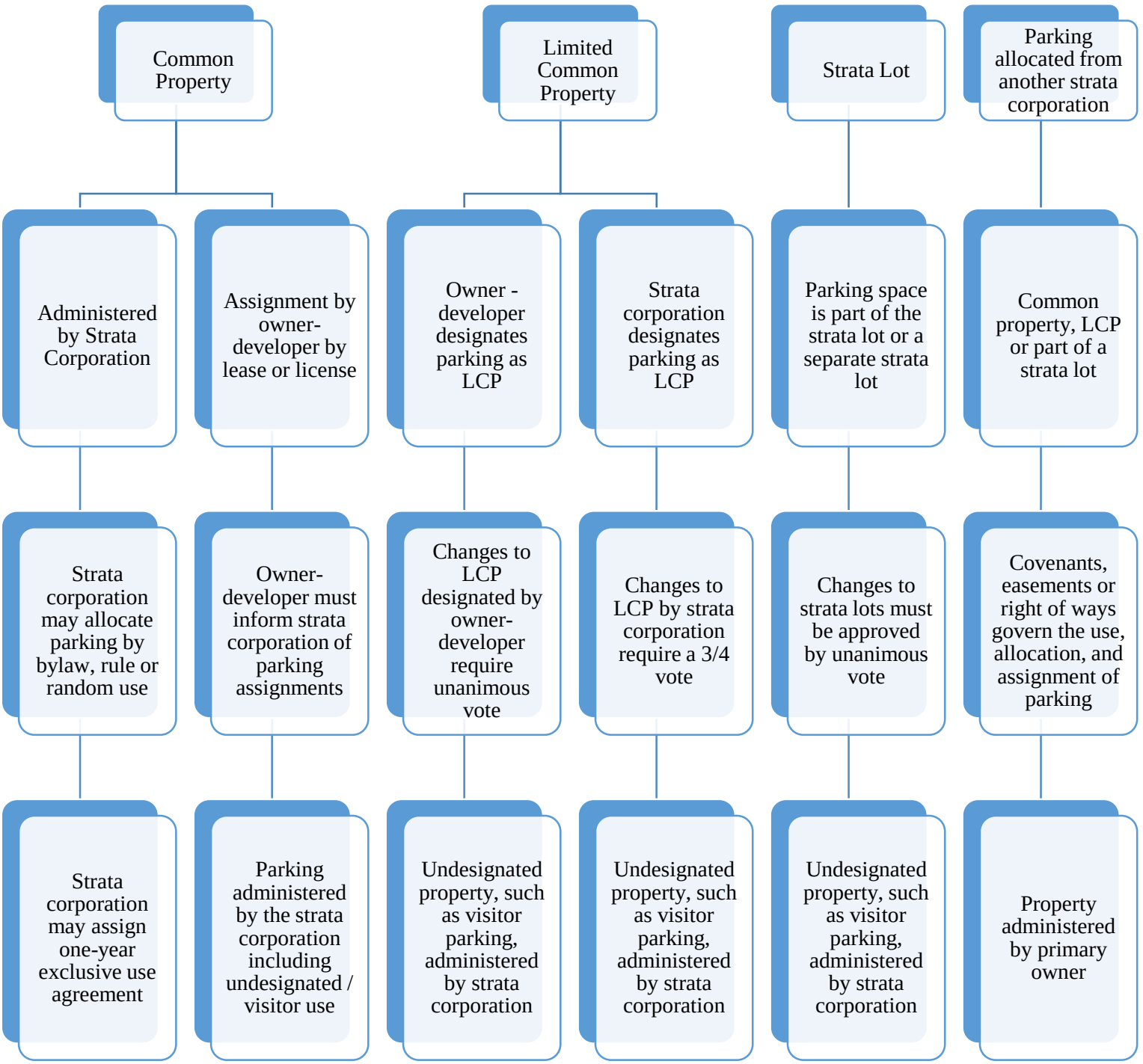
In a strata corporation parking may be one of three following different designations.

1. **Common Property** (CP) – Is any part of the strata plan that is not part of a strata lot or designated as limited common property. The use and allocation of common property is established through the bylaws or rules of the strata corporation, a lease or license issued by the owner developer over the common property, or an easement or right of way which assigns to other strata corporations the use of and access to common property when multiple strata corporations share a single parking garage. This may include owner developer leases or licenses, or a short term exclusive use assignment under section 76 of the *Strata Property Act.*

2. **Limited Common Property** (LCP) – Is any part of the registered strata plan or filing by way of sketch plan that identifies a certain area of the strata common property as LCP, for the exclusive use of one or more strata lots, which may apply to parking spaces. Generally, an owner developer will have created the LCP if it is shown on the strata plan. If the LCP designation was created by the owner developer a unanimous vote of the strata corporation, at an annual or special general meeting, is needed to change the LCP designation. If the strata corporation wants to designate parking as LCP a ¾ vote resolution at an annual or special general meeting is required. However, if the strata corporation desires a change to the strata plan it would require the approval of a unanimous vote. If in the future, the strata corporation wants to amend the LCP that was designated by the strata corporation it may be amended by a ¾ vote resolution. The registered strata plan, common index or general index will show the filing of LCP designations and any easements or covenants and will include the diagram or sketch plan of the designations.

3. **Strata Lot** – Is any part of the registered strata plan that is identified with boundaries as part of a strata lot or a separate strata lot. In addition to parking areas that are identified as part of a strata lot, there may be available parking in a strata corporation available for additional vehicles on a user fee system, visitor parking and designated parking areas for special needs residents and locations for EVCS that are designated as a separate strata lot. A parking space strata lot may also be sold separately or allocated by lease or license if the parking area is in a separate strata corporation. These are commonly found in strata corporations that share a single parking garage where the parking garage is part of one strata corporation but other strata corporations share use, assignment or ownership of parking as a result of an air space parcel agreement. If parking in another parcel is permitted by an air space parcel agreement, it is not necessarily the case that parking stalls are separate strata lots.

COMMON VARIATIONS of PARKING ALLOCATIONS



Before the strata corporation considers the installation of an EVCS.

Understanding the procedures necessary to determine the accessibility of location, governance requirements, user provisions, and technical information will be essential for a strata corporation before they consider the installation of an EVCS or permit an owner to alter common property or a common asset for the installation of an EVCS.

A step by step process is essential for each strata corporation to undertake, prior to considering the installation of an EVCS. Whether it is the strata corporation installing the EVCS or an owner requesting permission to alter common property or strata lot to install an EVCS, the undertaking may require significantly different conditions and procedures by both the strata corporation and the owner making the application.

Step 1: Parking & electrical service availability

- Identify the designation of the property and parking space(s) that may be utilized for an EVCS installation.
- Identify if sufficient electrical service is available at the location or whether it requires an installation of electrical services to the location.

Step 2: Identify / establish who is installing the EVCS:

- Strata corporation,
- strata lot owner
- strata lot owner where an alteration to a strata lot requires the approval of the strata corporation under the bylaws.

Step 3: Approvals and Funding

- Seek the approvals and funding necessary for
    - the installation of the EVCS,
    - modifications required for the electrical service and monitoring,
    - charging user fees,
    - user agreements, and
    - alteration agreements to establish obligations for maintenance, repair, insurance, liability and renewal of the EVCS.

Step 4: Rules, bylaws and user fees

- Establish rules, bylaws and user fees if necessary to offset the cost of electricity[1] and operations provided to the EVCS users.

The following schedules identify the strata corporation and owners' requirements in assessing the requirements and conditions for the installation of an EVCS for their strata property. However, due to the complexity and diversity of strata corporations, strata councils are recommended to seek legal advice on

- the procedures for installing an EVCS,
- resolutions to approve parking re-allocation or significant changes to use or appearance of common property or a common asset,
- the bylaws or rules that will be required to offset additional electricity costs that are exclusive to the EVCS[1], and
- any alteration agreements required for an owner's application for the obligations of cost recovery for maintenance and repairs, damages, renewals, and future costs and liabilities associated with the EVCS.

[1] As electricity is a common expense, the preferred method for cost recovery is a charge point system. The user directly pays for the exclusive use of the charging station and electrical costs only for the actual real time consumption.

Determining Parking/Site Availability

When determining parking availability in a strata corporation the following documents must be reviewed. Parking allocations and any other agreements with the strata corporation will be identified during this review and will assist the strata corporation to determine if parking is available, if specific allocations are required, or changes to the parking allocations are necessary either for technical, mechanical or access requirements.

Document Review

- ☐ Registered strata plan
- ☐ Registered limited common property designations
- ☐ Common index identifying property designations, easements and covenants
- ☐ General index identifying bylaws and limited common property
- ☐ Bylaws and parking plans
- ☐ Rules, parking plans and exclusive use assignments
- ☐ Original disclosure statement and amendments identifying parking leases or licenses
- ☐ Easements, right of ways and air space parcel agreements

Schedule 1

Owner seeking approval from the Strata Corporation to install an EVCS and alter common property or limited common property.

1) An owner submits a written request for an alteration to common property, LCP or a strata lot to install an EVCS.
2) Strata council receives the request and reviews the bylaws applying to alterations and the request.
3) The strata council or owner requesting the alteration as required by council:
    a. identifies the request for the installation of an EVCS
    b. determines whether a suitable location/parking space is available
    c. determines what type of EVCS is requested Level 1, 2 or 3 (see page 18)
    d. obtains all documents relating to parking allocations and property designation
    e. identifies parking that will be designated by the strata corporation for the EVCS
    f. if a parking re-allocation is required, coordinates a special general meeting to approve the re-allocation by ¾ vote resolution or unanimous resolution, or the negotiation for re-assignment of parking as set out in the bylaws, strata plan, and parking agreements
    g. identifies the technical requirements and costs to install EVCS and establishes the conditions for electrical-mechanical engeering or other services as may be required (i.e. strcutural engineering for coring to permit conduit installations)
    h. identifies any changes to the electrical-mechanical services to determine if upgrades or permits are required for the provision of the service
    i. seeks legal advice and establishes an alteration agreement to identify the responibilities of the strata corporation and the strata lot owner for the purchase of the EVCS, installation and alterations to mechanical systems, who is liable for the maintenance, repair, renewal requirements, the insurance requirements of the EVCS and who is responsible for the costs of the EVCS, cost of electricity consumption, cost of the installations, and any future costs associated with maintenance and renewal of the EVCS
    j. if required, seek approval of a ¾ vote resolution to approve any expenses borne by the strata corporation for the EVCS installation
    k. in the event the installation is a significant change in the use or appearance of common property or a common asset a ¾ vote resolution is required at an annual or special general meeting
    l. establish a bylaw or rule to offset additional electricity costs that are exclusive to the EVCS

Schedule 2
Before the Strata Corporation installs an EVCS

1) The strata corproation decides to install an EVCS and seeks approval of the owners.
2) The strata council reviews the availability of parking and location for the EVCS.
3) The strata council:
   a. determines a suitable location for the EVCS
   b. determines what type of an EVCS is appropriate Level 1, 2 or 3 (see page 18)
   c. identifies parking that will be designated by the strata corporation for the EVCS
   d. if a parking re-allocation is required, coordinates a special resolution at a special or annual general meeting to approve the re-allocation by ¾ vote resolution or unanimous resolution, or negotiates for re-assignment of parking as set out in the bylaws, strata plan, or parking agreements*
   e. identifies the technical requirements and costs to install an EVCS and identifies the requirements for electrical-mechanical engeering or other services as may be required (i.e. strucutural engineering for coring to permit conduit installations)**
   f. identifies any changes to the electrical-mechanical services to determine if upgrades or permits are required for the provision of the service
   g. if required, seek approval of a ¾ vote resolution at an annual or special general meeting to approve any expenses borne by the strata corporation for the EVCS installation or in the event the installation requires a significant change in the use or appearance of common property or a common asset***
   h. establish a bylaw or rule to offset additional electricity costs that are exclusive to the EVCS or other related costs****

* Before the strata corporation convenes an annual or special general meeting for the approval of the EVCS, review all of the conditions that may require the approval of the owners, to be included in the unanimous or ¾ vote resolution.This may include: a significant change in the use or appearance of common property, alteration of property, re-allocation of property, acquisition of an asset, approval of costs for installation and electrical, mechanical and structural alterations, and the establishment of a rule or bylaw that auhtorizes the strata corporation to collect user fees or an on demand user fee service to offset electricity costs for the provision of the EVCS.

** The acquisition and installation of an EVCS may become an asset of the strata corporation. Unless the bylaws of a strata corporation have been amended, the acquisition of an asset over $1,000 requires the approval of the owners at a general meeting by ¾ vote resolution. The asset may also become an insurable asset, and continue to be the obligation of the strata corporation for maintenance, repairs, and renewals, and must be included in the depreciation report of the strata corporation if provided.

*** Funding grants or credits for the installation of an EVCS may be restricted to access by only the strata corporation and will still require the approval of the strata corporation by ¾ vote resolution at a general meeting as part of an acquistion of an asset valued at greater than $1,000. An EVCS that has been funded by an independent agency may also require monitoring and reporting for energy use and cost. This may restrict the location of the EVCS to ensure monitoring services and technology can be provided.

**** The costs of maintenance, repair, insurance, monitoring and reporting may also be included in the costs projections of operations and user fee recovery.

Overview of 5 detailed inspections for EVCS installation and operation

The following table provides a summary of the information collected from the five site surveys that were completed. The site surveys included a governance review of the legal definitions of the strata corporation property, adjacent use agreements or location conditions, technical requirements to identify the possible location of the EVCS and estimates of installation costs. In each case, at an annual or special general meeting, the owners must approve: the acquisition of an asset greater than $1000, altering parking spaces to designate them as exclusive use for the sole purpose of an EVCS, altering building common property and the related costs for the alterations. Depending on the location of the EVCS the charging facility costs ranged from $8,700 to $13,500, for the EVCS component and installation.

Cost recovery is often a concern of strata corporations. While electrical outlets exist within parking buildings, they are intended for the routine use of common area cleaning services and the occasional use of owners. Even though a Level 1 charging system does not require additional electrical services, if a strata lot owner continually uses the common area electrical it will impose a higher cost of electricity on the common budget of the strata corporation but leaves the strata corporation unable to charge a user fee as the service is not exclusive. User fees are generally implemented when there is an exclusive benefit to a strata lot, such as an assigned additional parking space at a monthly rate. Electricity is not exclusive, which makes it difficult to charge a user fee.

The review anticipated that each of the 5 locations would install a conventional Level 2 or 3 charging station and that a metered function would be included to permit strata corporations through a user grid system to pay directly or be billed for their exclusive use through an authorized user fee approved in a rule or bylaw of the strata corporation, commonly known as charge point systems.

The re-allocation of LCP parking space designated by the owner developer is a significant problem, especially for the residents assigned those spaces now looking for an opportunity to switch or reallocate to accommodate an EVCS. While the requirement for a unanimous vote provides certainty to the purchaser, it also restrains the purchaser in the event they wish to consensually change their parking location. A switch may be acceptable for the short term by agreement or contractual basis with other owners; however, in the event of a sale of a strata lot, the allocations may be required to revert back to their original state. The result may be a significant cost for the relocation or removal of the EVCS.

The location of the electrical services and the absence of roughed in future services is also a significant barrier to strata corporations considering the installation of an EVCS. Several of the market EVCS components provide wireless monitoring and billing services. However, the location of the electrical vaults may be found 3 floors below, either requiring a major alteration to upgrade the electrical service or the location of the EVCS at the lowest parking level may prevent visitor use, public access and wireless communications with the stations.

Summary of the Five Site Surveys

Type of Project	Are parking spaces available for installation of EVCS	Are electrical modifications required to power the EVCS	Estimated cost - technical modifications and installation of the EVCS Level 1	Estimated cost - technical modifications and installation of the EVCS Level 2	Will a dual EVCS Level 2 increase the energy demand and cost	Will the strata corporation be required to re-allocate parking	Will the strata corporation be required to seek the approval of the owners at a general meeting
Vancouver - Mixed use: - 153 Residential - 11 Commercial Midrise, Townhouse, Commercial Access	The parking is allocated as common property and at the discretion of the strata corporation for allocation. There are currently 25 additional parking spaces available	The main electrical service is located within 3 metres of the premium secured EVCS installation locations	Material - EVCS Labour Coring Engineering Permit Less than $1,000	Material - EVCS Labour Coring Engineering Permit $ 9,387	There is sufficient capacity within the grid and on site to accommodate the additional access without an increase of demand rates	No, all parking is common property and allocated in accordance with the bylaws by the strata council	Yes, acquisition and approval of the costs of the EVCS, creation of a bylaw or rule for user fees and costs
Surrey, Exclusively Residential 278 units	The parking was allocated as limited common property by the owner developer and requires a unanimous vote to re-allocate use or designation	The main electrical service is conveniently located within 6 metres of the proposed secured EVCS installation locations	Material - EVCS Labour Coring Engineering Permit Less than $1,000	Material - EVCS Labour Coring Engineering Permit $ 10,535	There is not sufficient capacity within the grid and onsite to accommodate the EVCS without an increase of demand rates, or upgrades to the service	No, all parking is common property and allocated in accordance with the bylaws by the strata council	Yes, acquisition and approval of the costs of the EVCS, creation of a bylaw or rule for user fees and costs
Colwood, Phased Development, Sections, High Rise and Low Rise	The parking was allocated as limited common property by the owner developer and requires a unanimous vote to re-allocate use or designation	The main electrical service is available, subject to location of the EVCS	Material - EVCS Labour Coring Engineering Permit Less than $1,000	If a convenient location for the EVCS is accommodated, Material - EVCS Labour Coring Engineering Permit $ 8,669	Unknown until the phases are complete. Additional panels if required will cost $4,500 each	Only if approved by unanimous vote to re-allocate use for the convenience of the EVCS installation and strata corporation access	Yes, acquisition and approval of the costs of the EVCS, creation of a bylaw or rule for user fees and costs, re-allocation of parking by unanimous vote if required
Victoria - High Rise Exclusive Residential 105 units & Air Space Parcel Agreement	The parking was allocated as limited common property by the owner developer and requires a unanimous vote to re-allocate use or designation	The main electrical service is available subject to location of the EVCS	Material - EVCS Labour Coring Engineering Permit Less than $1,000	If a convenient location for the EVCS is accommodated, Material - EVCS Labour Coring Engineering Permit $ 9,542	There is sufficient capacity within the grid and on site to accommodate the additional access - Additional panel cost of $4,500 if required	Only if approved by unanimous vote to re-allocate use for the convenience of the EVCS installation and strata corporation access	Yes, acquisition and approval of the costs of the EVCS, creation of a bylaw or rule for user fees and costs, re-allocation of parking by unanimous vote if required
North Vancouver mixed use: 56 High Rise/ Residential & 5 Commercial	The parking was allocated as limited common property by the owner developer and requires a unanimous vote to re-allocate use or designation - Visitor parking 4 possible allocations, with significant cost	The main electrical service is available subject to location of the EVCS in visitor parking; however, the electrical is 3 levels below adding significant cost	Material - EVCS Labour Coring Engineering Permit Less than $1,000	If visitor parking is located for the EVCS Material - EVCS Labour Coring Engineering Permit $ 13,306	There is sufficient capacity within the grid and on site to accommodate the additional access - Additional panel cost of $4,500 if required	Only if approved by unanimous vote to re-allocate use for the convenience of the EVCS installation or the allocation of visitor parking for the EVCS installation	Yes, acquisition and approval of the costs of the EVCS, creation of a bylaw or rule for user fees and costs, re-allocation of parking by unanimous vote if required

Part 2: TECHNICAL REQUIREMENTS

This section provides an overview of the technical requirements for electric vehicle charging in strata titled properties. It provides a general overview of charging technology, an outline of installation costs and requirements, and operational costs.

Technology Description

There are three main categories of electric vehicle charging infrastructure, also known as Electric Vehicle Supply Equipment (EVSE). Levels 1, 2 and 3, of EVSE vary in voltage and charging times.

Table 2 - Considerations for Level 1, 2, and 3 Charging Stations

Considerations[2]	**Level 1**	**Level 2**	**Level 3 (aka DC Fast Charging)**
Voltage	~1.4kW	3.8kW – 16.8kW	30kW – 60kW
Charging Times[3]	10-25hrs	2- 8hrs	20 minutes – 1hr
Primary Application	Residential and when other options aren't available	Primary method for public charging stations and faster residential applications.	High speed charging intended to approach the functionality of gasoline fuelling stations.
Advantages	• Inexpensive equipment, included with most EVs • Uses conventional outlets • Lower demand on electrical systems and minimal impact on utility demand charges • Simpler approval process for stratas	• Relatively fast charging • Many equipment options readily available	• Very fast charging, enabling recharging on the go.
Disadvantages	• Slow	• Requires installation of specialized equipment • Increases demand on electrical systems and associated utility demand charges • Moderate-high installation costs	• Very high installation costs • Frequent charging may be hard on vehicles • Very high demand on electrical systems and associated utility demand charges.

[2] Figures for common EVCS and vehicles are shown. Some equipment configurations may operate outside of these ranges.

[3] Based on estimates of complete battery recharge; recharge times for partially depleted batteries will be substantially less than the figures shown.

Level 1 Charging
Level 1 charging utilizes standard 3-prong plugs and 110/120-volt, 15-20amp outlets and therefore does not require the installation of a special EVCS. Level 1 chargers will typically operate at 12 amps and draw about 1.4kW of electricity. Most electric vehicles come with a Level 1 cord-set. While convenient for these reasons, Level 1 charging is slow and therefore its application is considered by many to be limited to recharging batteries when no other options are available. It can take up to 25 hours for an EV with a large battery capacity to reach a full charge using this method[4]. In most circumstances users will be recharging batteries that are only partially discharged or have lower capacity so it is unlikely that such a long charging time would be required. Some users find that Level 1 charging is all that they require in their homes if they don't regularly drive their vehicles long distances of if they have faster charging infrastructure available to them at other convenient locations.

Level 2 Charging
Level 2 charging is generally considered the primary method of electric vehicle charging and is the focus of this report. Level 2 chargers require dedicated 208-240-volt service, the same as what is used for an electric oven or clothes dryer. They typically operate at 30amps and draw up to 7.2kW of electricity, though a vehicle's on-board electronics will often limit charging to 3.3kW or 6.6kW. Charging times of 4-8 hours are common for a full charge but, as mentioned above, most users are unlikely to require a full recharge on most occasions.

Level 3 Charging
Level 3 charging, also referred to as DC fast charging, is quite rare and requires a much higher power draw. It typically operates at 480 volts but can operate at up to 600 volts and up to 125amps and draw up to 60kW of electricity. It is intended to be capable of charging a vehicle in about 30 minutes with a 50% charge being reached in 10-15 minutes, giving it a utility similar to that of gasoline fuelling stations. While details on costs of these charging stations is beyond the scope of this report, costs are expected to be very high; likely tens of thousands of dollars per station.

Brands and Models of Chargers

There are many products available for Level 2 EVCSs. Most charging stations and vehicles use a standard connector (SAE J1772), though the Tesla Roadster was designed with a different type of connector so an adapter is required (and readily available) for use with most EVCSs. Appendix 1 contains a list of products that qualify for funding through the provincially funded Clean Connect Program[5], which provides incentives towards the cost of the installation of an EVCS. Note that to be eligible for this program charging stations must either a) include energy use data measurement and data access and reporting capabilities, or b) be accompanied by a utility grade meter. Some models of chargers allow for direct billing to consumers through a service provider.

Indoor vs. Outdoor
Chargers are available for both indoor and outdoor applications. Indoor chargers are generally intended for residential applications (e.g. inside a homeowners' garage), whereas outdoor chargers are often used in commercial and institutional applications. They are typically more robust units and are available with additional features such as billing/payment systems or access cards that control usage. While the outdoor stations are designed to withstand the elements, indoor stations are generally designed to operate in a wide range of temperatures and are suitable for use inside parking structures that are not heated.

Types of Vehicles
There are three main types of electric vehicles: plug-in hybrid electric vehicles (PHEV), extended-

[4] Note that charging times vary significantly according to equipment.

[5] Administered by BOMA BC

range electric vehicles (EREV), and battery electric vehicles (BEV).[6]

Plug-in Hybrid Electric Vehicles (PHEV)
PHEVs are similar to the more common Hybrid Electric Vehicles (HEV) but have larger battery capacity and can be plugged in to recharge the batteries. The larger batter capacity allows these vehicles to run on all electric power at low speeds.

Examples of vehicle models:

- Toyota Prius PHV
- Honda Accord Plug-in Hybrid

Extended-Range Electric Vehicles (EREV)
Unlike PHEVs, EREVs use an electric motor to drive the car at all speeds but also have an on board gas-powered generator that allows the batteries to be recharged while driving to extend the range of the vehicle without requiring plugging it in to recharge.

Examples of vehicle models:

- Chevrolet Volt
- Cadillac ELR

Battery Electric Vehicles (BEV)
BEVs are all-electric and use only an electric motor and batteries to power the car. Their range is greater than the electric-range of the EREVs or the PHEVs.

Examples of vehicle models:

- Nissan Leaf
- Mitsubishi I MiEV
- Tesla Model S
- Ford Focus

While all of these types of vehicles can be charged using a Level 1 charging station at a conventional outlet or a Level 2 charging station, the BEVs are most likely to benefit from a Level 2 station as they have larger battery capacity, with longer charging times, and do not have the option of relying on gasoline. Level 1 charging may meet the needs of many PHEV and EREV users; it is expected that BEV users are more likely to desire a Level 2 charging station.

Technical Issues with the Installation of Level 2 Charging Stations

In addition to the issues with parking allocation and governance that need to be addressed before an EVCS can be installed in a strata corporation there are certain technical issues that need to be investigated.

Electrical Capacity
The current electrical system in the building must be assessed to determine if there is sufficient capacity to allow for the installation of one or more EVCSs on existing panels. This may require the assistance of an electrical engineer. If the existing electrical panels do not have sufficient capacity a new panel may be installed provided the main electrical service for the building is sufficient to accommodate the additional load.

If the main electrical service is not sufficient to accommodate additional load it is possible that this service could be upgraded, though this would require consultation with the utility provider and may involve excessive costs, making installation impractical. When electrical capacity is being investigated it is recommended that a strata not only seek information on whether there is capacity for the number of EVCSs that are of immediate interest, but also how much capacity is available for additional stations in the future.

Installation Process, Professionals, and Permitting
Installation of EVCSs will require a qualified electrician and may require additional contractors

[6] HEVs, which use a small electric battery and motor to supplement a conventional gas engine at low speeds are not true electric vehicles in that they are solely powered by gasoline and do not plug-in to recharge their batteries. HEVs (e.g. Toyota Prius, Ford C-Max) are beyond the scope of this report.

for any required civil works (e.g. coring through concrete). The ease of installation (and associated costs) will depend largely on the proximity of available electrical service to the desired EVCS location and any barriers that may be in between. In an ideal install there will be sufficient electrical capacity in the existing electrical infrastructure and the EVCS will be located in close proximity to the electrical service without the need for coring through structural concrete. If, for example, the location available for an EVCS is far from the available electrical service and on another level of a multi-story parking structure significant coring may be required. This would require a scan of the concrete and consultation with a qualified engineer, which adds to the cost of installation. If the existing infrastructure requires upgrading further costs will be incurred.

In all cases permits will be required from the BC Safety Authority and/or local authorities. This will ensure that the work is performed to code requirements. Relevant code requirements include the stipulation that charging equipment must be supplied by a separate branch circuit that supplies no other loads (except ventilation equipment intended for use with the EVSE, where applicable). The total connected load of a branch circuit supplying the EVSE shall be considered continuous. Each receptacle must be labelled appropriately to identify it as an electric vehicle charging receptacle and must be of an approved configuration.[7]

Accounts and Metering Configuration

Another important consideration related to the installation process is which electricity account the EVCS will be connected to. There are three situations to consider:

1. Installation of the EVCS on the strata corporation's main account: Each strata corporation will generally have an existing electricity account that serves the building's common area. The EVCS (or multiple EVCSs) could be connected to this account. This would not require a new electricity account or meter, though without a separate meter the strata corporation will not be able to track the electricity consumption of the EVCS(s). Some charging stations have built in metering capabilities with services that allow consumption to be tracked online. These stations tend to be more costly than stations without this capability; this also entails ongoing service costs. These costs are discussed in the Operational Cost section of this report. If a strata corporation chose to install the EVCS on its existing electricity account it could still choose to install a separate meter for the purposes of tracking consumption. The strata corporation needs to consider that this approach would require administrative effort to track the consumption.

2. Creation of a new electricity account that is dedicated solely to EVCS(s): BC Hydro currently allows a strata corporation to create a new utility account with separate metering for the purpose of EVCS(s). They will only allow one additional account for each strata corporation so if multiple EVCSs are to be installed they would be metered collectively on one account. This approach will allow a strata corporation to easily monitor all consumption and costs associated with EVCS(s), though it will not enable the strata corporation to differentiate between the consumption and costs of each EVCS if there are multiple EVCSs. An additional advantage of this approach is that it could reduce or eliminate the demand charges that a strata corporation might otherwise be subject to if an EVCS were to be installed on the existing strata corporation account. Demand charges are discussed further in the Operational Costs section of the report.

[7] See section 86 of the Canadian Electrical Code, Part 1 for further details.

3. Installation of an EVCS on a strata lot owners electricity account: While BC Hydro's policy prevents the creation of multiple new accounts at a building, in some cases it may be possible to have an EVCS installed on a pre-existing account held by the strata lot owner. This is most likely to be practical in situations where the existing electrical panel or meter serving the strata lot of interest is in close proximity to the location of the EVCS. For example, a townhouse complex may have a private garage with an electrical panel that the EVCS could be connected to. With appropriate authority and approval this may alleviate the strata corporations' responsibility for the costs associated with the EVCS' electricity consumption. It may be possible for this option to be used in an apartment-style strata corporation, though this would depend on the metering configuration and this is not expected to be a practical option in many circumstances. Another advantage of this approach is that it would eliminate any demand charges that might be incurred if the EVCS were connected to a strata corporation's existing account. Demand charges are discussed further in the Operational Costs section of the report.

Note: It is understood that there is one example of a building that did have BC Hydro install electrical meters for each parking stall, in addition to the meters for each strata lot. In this case no additional accounts were created; the consumption associated with these meters will be amalgamated with the consumption associated with each strata lot's meter and charged on one account. This appears to be an exception to BC Hydro's policy and it is not known whether this approach would be permitted on future projects.

Installation Costs and Requirements

This project involved rough cost estimates on the installation costs of EVCSs at five apartment-style strata corporations located in Metro Vancouver and the Capital Regional District. These buildings represent a range of complexity with regards to installation. Key considerations that affect installation cost include:

- Available capacity on the existing electrical infrastructure.
- Proximity of the desired EVCS location to the electrical panel it will be connected to.
- Barriers between the EVCS location and the electrical panel it will be connected to.
- The specifications of the EVCS. Key factors are:
    - Whether the unit is intended for commercial or residential purposes (commercial units are more expensive and typically include network capabilities that allow for consumption tracking, billing, and may also include Radio-frequency identification (RFID) access that restrict use to authorized users).
        - NOTE: Networked stations typically utilize a built-in wireless modem, so cellular reception must be available at the EVCS location. This may be a limiting factor in underground parking garages where cellular reception is not available.
    - Whether the unit is designed for outdoor use or indoor use (outdoor units are more expensive).

Based on the initial site review, in all five strata corporations the buildings' electrical systems appeared to have sufficient capacity for the installation of an EVCS without the need for upgrading. The electrical panels that were in close proximity to the most ideal EVCS locations appeared to have capacity for between 1 and 7 EVCSs. More detailed investigation would be required to more accurately determine available capacity in the buildings.

The range of estimated costs for the installation of a single EVCS in the subject buildings ranged from **$6,400 to $11,100**. This includes materials, labour, coring, engineering, permits, and taxes. The range of estimated costs, per station, for the installation of two EVCS stations the subject buildings ranged from **$5,700 to $8,000.** These figures are based on the lowest cost option for a 7.2kW station; see Appendix 1 for more details on the cost estimates.

The lowest cost installations are those where the potential EVCS location is in close proximity to the electrical room, there are no structural concrete barriers in between, and there is sufficient electrical capacity on the existing system. The most expensive installation for a single EVCS is expected in a building where the EVCS location is in a parking garage multiple floors from the electrical room. This requires coring through structural concrete and associated engineer costs, including a scan of the concrete. The most expensive location for the installation of two EVCSs is expected in a building where the electrical system requires upgrading, specifically the addition of a 208V 200A 3 phase panel. Interestingly, apart from the need to upgrade the electrical system this building was otherwise a relatively straightforward installation. Had an electrical upgrade been required in the building where the EVCS location was two stories above the electrical room the per-station cost would have been about **$9,900.**

The costs presented do not include any financial incentives that may be available, nor do they include any costs associated with the installation of additional metering[8] or setting up a new electricity account.

Incentives
Financial incentives can be a major inducement to support the installation of an EVCS. In 2013 the province of BC funded "Clean Connect", a program that offered funding up to $**4,500** towards the cost of each EVCS. Suitable strata corporations had to meet program requirements and eligibility criteria (see Appendix 1 for details).

As funding incentives and eligibility varies depending on available programs, a strata corporation considering installing an EVCS is encouraged to determine if there are any applicable programs available at the time of installation.

LiveSmart BC (www.livesmartbc.ca) is a good place to check for available incentive/rebate programs. In addition, a strata corporation may want to contact:

- Ministry of Energy and Mines
- Municipal governments
- Utility provides

Operational Costs

Electricity and Maintenance Costs
The primary costs associated with the operation of EVCSs are the electricity costs. These costs can include both electricity consumption and, in some cases, electricity demand. The rate structures that apply to electricity use in strata corporations are quite complex and there is a wide range in potential costs. The applicable rate classes are[9]:

- **Small General Service** (SGS): fixed rate for consumption; no demand charges.
- **Medium General Service** (MGS): rates for consumption vary as per the conservation rate; demand charges apply.
- **Large General Service** (LGS): rates for consumption vary as per the conservation rate; demand charges apply.
- **Residential**: rates for consumption vary based as per the conservation rate; no demand charges.

[8] BC Hydro has suggested that setting up a new meter would cost $92, but it is unclear whether this applies to all account types or if there are any other account set up costs. This issue will need to be clarified.

[9] See Appendix 1and www.bchydro.com for more information on applicable rates.

Table 3 - Range of Potential Electricity Costs

Rate	Electricity Cost Per Year (lowest potential cost)	Electricity Cost Per Year (highest potential cost)
SGS	$238	$316
MGS	$141	$1,042
LGS	$118	$1,042
Residential	$177	$326

There is a large range in potential costs for EV charging. The expected range of potential electricity costs for Level 2 EV charging was estimated for each rate class*; all estimates are based on the same quantity of electricity consumption*. (See Appendix 1 for assumptions)

For the SGS rate there is a small range in potential electricity costs - $238 to $316 per year. This is because this rate has a fixed charge for consumption and there are no demand charges. The only reason for variation is that if a separate account was set up for the purpose of EV charging there would be an additional basic charge applied.

For the MGS rate there is a very large range in potential electricity costs - $141 to $1,042 per year. This is partially a result of the fact that consumption costs range from 6.05 cents/kWh to 10.54 cents/kWh depending on levels of consumption. Most of the variation is a result of the potential for demand charges. Depending on demand, charges can range from $0/kW to $10.07/kW.

As with the MGS rate, there is a very large range in potential electricity costs for the LGS rate - $118 to $1,042 per year. This is partially a result of the fact that consumption costs range from 5.09 cents/kWh to 10.54 cents/kWh depending on levels of consumption. Most of the variation is a result of the potential for demand charges.

Depending on demand, charges can range from $0/kW to $10.07/kW.

For the MGS and LGS rates, the best way to mitigate costs is to set up a new BC Hydro account specifically for EVCS(s). This would substantially reduce or even eliminate demand charges. At this time BC Hydro does allow the creation of one additional account per building for EVCS.

For the Residential rate there is a moderate range in potential electricity costs - $177 to $326 per year. This is primarily a result of the fact that consumption costs range from 7.61 cents/kWh to 11.40 cents/kWh depending on levels of consumption. Another reason for the variation is that if a separate account was set up for the purpose of EVSE there would be an additional basic charge applied.

The expected range of potential energy cost savings associated with EV use (with Level 2 chargers) compared with gasoline vehicles was estimated for each rate class (see Appendix 1 for assumptions):

Table 4 - Annual Energy Cost Savings: Electric vs. Gasoline Vehicles

	Comparable Gasoline Vehicle			Average Gasoline Vehicle	
Rate	**Energy Cost Savings/year High**	**Energy Cost Savings/year Low**		**Energy Cost Savings/year High**	**Energy Cost Savings/year Low**
SGS	$1,081	$1,002		$1,707	$1,628
MGS	$1,178	$276		$1,804	$902
LGS	$1,200	$276		$1,826	$902
Residential	$1,142	$992		$1,767	$1,618

As there is a large range in potential electricity costs for EV charging, there is also a large range in potential energy cost savings of electric versus gasoline vehicles. Table 3, shows the estimated energy cost savings per year for both the lowest and highest cost scenarios for each rate class. These figures are shown for a gasoline vehicle that would be 1) comparable to an electric vehicle (e.g. in terms of size and model year) and 2) of average consumption (for all light vehicles on the road regardless of size or year). In all cases electric vehicles were found to have lower energy costs than gasoline vehicles. Savings estimates range from $276/year to $1,826/year.

Under secure conditions EVSE maintenance is comparable to existing electrical services and is expected to be nominal. Consult with EVSE manufacturer documentation to determine any maintenance that may be required.

Level 1 Charging

While the focus of this report is on Level 2 charging, the following information is provided on Level 1 charging, as Level 2 charging may not be available to potential EV users living in a strata corporation. The disadvantage of Level 1 charging is that it is slower. The advantages are that no special charging equipment is required as Level 1 chargers use ordinary 120V outlets. If an electrical outlet is not available in close proximity to a parking stall for an EV user one would have to be installed, but this would cost dramatically less than installing a Level 2 charging station. The lower power demand of Level 1 chargers also makes it easier to have a large number of EV users in a given building as it is less likely that upgrades to electric vehicle infrastructure will be required. The lower power demand also results in lower electricity costs in situations where demand charges apply. The highest expected electricity costs for EV charging using Level 1 chargers compared with Level 2 chargers is shown in Table 5, below (see Appendix 2 for assumptions). Note that for scenarios with the lowest expected electricity costs there would be no difference between costs associated with Level 1 and Level 2 chargers.

Table 5 – Highest Potential Electricity Costs: Level 1 vs. Level 2 Charging

	Electricity Cost Per Year (highest potential cost)		
Rate	**Level 1[10]**	**Level 2**	**Savings (Level 1 v. Level 2)**
SGS	$316	$316	$0
MGS	$414	$1,042	$628
LGS	$414	$1,042	$628
Residential	$326	$326	$0

[10] 1.4kW demand is assumed for Level 1 charging.

There is no difference in charging costs between Level 1 and Level 2 charging for the SGS and Residential rates, as these rates do not have demand charges. For the MGS and LGS rates charging costs are up to $628 per year greater for Level 2 charging than for Level 1 charging.

While Level 1 chargers are slower they are likely to meet the charging needs for most EV users when charging overnight. This is particularly true when a full charge isn't required, either because the user has the ability to charge their vehicle at other locations throughout the day (e.g. at work) or because they don't need to travel a long distance. A Level 1 charger will provide approximately 100km of range when charging overnight (e.g. 6pm to 7am). Conversely, if a user only had a short time to charge their vehicle a Level 1 charger would provide little benefit. For example, if only 2 hours of charging time were available a Level 1 charger would only provide about 15km of range.

Networked EVSE Costs

As described in the Accounts and Metering Configuration section, one way users can track their electricity consumption is through the use of networked EVSE. This equipment uses wireless modems to connect to a service that allows users to see consumption records over the Internet. It can also be used to charge user fees via built-in payment processing systems. Typical service fees are $180/year/station, if the user fees are not being charged. If user fees are being charged typical fees are $240/year/station plus 5% of transaction costs. Users that do not need built-in payment processing and want to track the electricity consumption of their EVSE could have their EV metered by BC Hydro and avoid these service costs, though BC Hydro indicates that they will only allow one additional meter and account per building. As a result, if multiple EV charging stations were present at any given location the meter would only provide information on the total consumption of all stations. Such accounts would be subject to BC Hydro's basic charge, which ranges from $61-$79/year.

Greenhouse Gas Emissions

EV charging in BC produces few greenhouse gas emissions (GHGs), and dramatically less GHGs than gasoline-powered vehicles. Table 6 below, outlines the emissions associated with EV charging as well as the avoided emissions compared with the use of a gasoline-powered vehicle.

Table 6 - Annual EV GHG Emissions and Avoided Emissions

	EV Benefits v. Comparable Gasoline Vehicle			EV Benefits v. Average Gasoline Vehicle	
EV GHGs (tCO_2e)	**Avoided GHGs (tCO_2e)**	**GHG Reduction**		**Avoided GHGs (tCO_2e)**	**GHG Reduction**
.058	2.26	97%		3.37	98%

Development Industry

While the focus of this report is on the retrofitting of EVSE into existing strata corporations it is worth highlighting issues related to the installation of EVSE in new buildings. Installation of EVSE in new buildings is much easier than with existing buildings. EVSE can be incorporated into the electrical infrastructure design and charging locations can be pre-determined and allocated in close proximity to electrical rooms. Additionally, by incorporating EVSE into a building from the outset complex approval processes and parking allocation issues can be avoided.

Many developers may be reluctant to go to the expense of installing EVSE equipment as it is unknown how many purchasers will value having such equipment available. Rather than actually installing EVSE, a developer could make the building "EV ready" by installing an appropriate conduit and ensuring there is enough capacity to accommodate a pre-determined number of charging stations. If a developer were to actually install EVSE this could be done as a lease to the strata corporation, similar to how other equipment (e.g. security systems) is provided to strata corporations by leasing companies. This would allow developers to facilitate EV use while offloading capital costs.

New development offers the greatest potential for Level 2 charging stations due to the ease of installation, lack of complex approval processes, and pre-determined parking allocation. If the province and/or local governments want to encourage EV use appropriate zoning requirements and/or incentives must be in place.

Appendix 1

Vehicle and EVSE Assumptions and Emissions Factors

Assumption		Comments	Source
Annual distance driven	12,892 km	BC Average	*Canadian Vehicle Survey - 2009 Summary Report*, Natural Resource Canada http://oee.nrcan.gc.ca/publications/statistics/cvs09/chapter2.cfm?attr=0
Electric vehicle efficiency	29kWh/ 100mi	2013 Nissan Leaf	http://www.fueleconomy.gov/feg/Find.do?action=sbs&id=32154
Electric Vehicle Power Draw When Charging	6.6kW	2013 Nissan Leaf	www.nissan.ca
Gasoline vehicle efficiency – comparable	7.5l/ 100km	Based on average consumption of 2013 models of • Toyota Matrix 1.8 L, 4 cyl, Automatic 4-spd • Nissan Versa 1.6 L, 4 cyl, Automatic 4-spd • Honda Civic 1.8 L, 4 cyl, Automatic 5-spd	http://www.fueleconomy.gov/feg//bymodel/2013_Toyota_Matrix.shtml
Gasoline vehicle efficiency – average	11.6l/ 100km	Average light vehicle in British Columbia (2009)	*Canadian Vehicle Survey - 2009 Summary Report*, Natural Resource Canada http://oee.nrcan.gc.ca/publications/statistics/cvs09/chapter2.cfm?attr=0
Electricity Emissions Factor	25tCO2e/ GWh	British Columbia	2012 BC Best Practices Methodology for Quantifying Greenhouse Gas Emissions, Ministry of Environment
Gasoline Emissions Factor	2341 gCO_2e/L	On-road vehicles	June 2010, BC Greenhouse Gas Inventory Report 2010

Appendix 2

Electricity Rate Assumptions (GST is added to the following charges)
Small General Service Rate

Basic Charge	$0.1953 per day
Energy Charge	$0.0928 per kWh
Minimum Charge	$0.1953 per day (equal to the Basic Charge)
Rate Rider:	5% Rate Rider applied to all charges, before taxes and levies

Medium General Service Conservation Rate

Basic Charge	$0.1953 per day
Demand Charge	• $0.00 per kW for first 35 kW • $4.76 per kW for next 115 kW • $9.13 per kW for remaining kW
Energy Charge	Part 1: • $0.0885 per kWh for last 14,800 kWh • $0.0549 per kWh for remaining kWh up to baseline Part 2: • $0.0956 per kWh for usage up to 20% above baseline • $0.0956 per kWh for savings down to 20% below baseline (credit) • Usage or savings beyond 20% of baseline are based on Part 1 prices
Rate Rider	5% Rate Rider applied to all charges, before taxes and levies

Large General Service Conservation Rate

Basic Charge	$0.1953 per day
Demand Charge	• $0.00 per kW for first 35 kW • $4.76 per kW for next 115 kW • $9.13 per kW for remaining kW
Energy Charge	Part 1: • $0.0961 per kWh for first 14,800 kWh • $0.0462 per kWh for remaining kWh up to baseline Part 2: • $0.0956 per kWh for usage up to 20% above baseline • $0.0956 per kWh for savings down to 20% below baseline (credit) • Usage or savings beyond 20% of baseline are based on Part 1 prices
Rate Rider	5% Rate Rider applied to all charges, before taxes and levies

Residential Rate

Basic Charge	$0.1527 per day
Energy Charge	• $0.069 per kWh for first 1,376 kWh • $0.1034 per kWh for remaining kWh
Rate Rider	5% Rate Rider applied to all charges, before taxes and levies

Source: www.bchydro.com

Appendix 3

EV Car Charging - On board chargers & Level 2 - 208/240V stations

				16A Evr-green 160	30A Evr-green 300	32A Evr-green 320	40A Evr-green 400
			Leviton Station (Non-Networked)				
			Charging power	3.8kw	7.2kw	7.7kw	9.6kw
			Non GFI breaker	20A 2 pole	40A 2 pole	40A 2 pole	50A 2 pole
Car Type	**Type**	**Battery**	**On board charger**				
Compact & Sub Compact							
Chevy Spark (2014)	BEV	21.3 kWh	3.3kw	X			
Fiat 500E	BEV	24 kWh	6.6kw		X		
Ford Focus EV (2014)	BEV	23 kWh	6.6kw		X		
Mitsubishi miEV	BEV	16 kWh	3.3kw	X			
SMART for two	BEV	17.6 kWh	3.3kw	X			
Mid Size							
Audi A3 Etron	PHEV	22 kWh	Europe..				
BMW i3/i8 (2014) Opt PHEV	BEV	22 kWh	6.6kw		X		
Cadillac ELR	PHEV	16.5 kWh	3.3kw	X			
Chevy Volt	PHEV	16.5 kWh	3.3kw	X			
Chevy Volt 2014	PHEV	17 kWh	3.3kw	X			
Fisker Karma	PHEV	20 kWh	3.3kw	X			
Ford C-Max Energi	PHEV	7.6 kWh	3.3kw	X			
Ford Fusion Energie Plug In Hybrid	PHEV	7.6 kWh	3.3kw	X			
Honda Accord (2014)	PHEV	6.7kWh	6.6kw		X		
Kia Soul EV (2015)	BEV	27 kWh	6.6kw		X		
Nissan Leaf 2013 later	BEV	24 kWh	6.6kw		X		
Nissan Leaf pre 2013	BEV	24 kWh	3.3kw	X			
Porsche 918 Spyder SE Hybrid (2014?)	PHEV	6.8 kWh	3.6kw	X			
Porsche Panarama SE Hybrid (2014)	PHEV	9.4 kWh	3.6kw	X			
Porsche Cayenne SE Hydrid (2014)	PHEV	10 kWh	3.6kw	X			
Toyota Prius plug in	PHEV	4.4 kWh	3.0 - 3.5kw	X			
Full Size							
Mercedes SLS AMG EV (2014?)	BEV	60kWh	22kw				
Tesla Model S	BEV	60 & 85 kWh	10 - 20kw				40A +
Tesla Model X Sedan (2015?)	BEV	60 & 85 kWh	10 - 20kw				40A +
Mini Van - Station Wagons							
Honda Fit	BEV	20 kWh	6.6kw		X		
SUV's / Vans / Trucks							
Ford Transit Connect	PHEV	28 kWh	3.3kw	X			
Toyota Rav 4 (2014)	BEV	41.8 kWh	10.0 kw				X
Bremach T-Rex	BEV	100.0 kWh	N/A				
Bremach T-Rex	PHEV	40.0 kWh	N/A				X
V-TRUX	PHEV	27 kWh	10 kw				50amp

X *indicates best option*

*** confirm with Car Manufacturer for lastest on board charger capability*

Public Network Stations - Level 2 most are 7.2kw

Source: Nedco.ca

Conclusion and Recommendations

Many aging strata corporations in British Columbia have building designs and allocation of common property use that did not plan for the changing technologies or conceptual changes in legislative use. The opportunity for policy discussion on these issues will enable the industry to transform both construction and legislation in a manner that will enhance the use of properties and enable easier operations for strata corporations.

Strata corporations are limited by the allocation of their property designations through the registered strata plan created by the owner developer. The limits on allocation and use of property may create barriers that prevent strata corporations from allocating space for the installation of an EVCS or significant financial costs associated with the installation of an EVCS. During the course of development and construction, a number of technical issues may be considered to enable the future installation of EVCS for the convenience of strata corporations.

- Roughed in 220v or higher service to designated areas of each parking floor to permit installation of the EVCS without the need for coring or structural alterations.
- Additional capacity accommodated in the electrical vault to expand to at least 10 EVCS locations in the property.
- Flexible property use allocations to enable the strata corporation to reassign parking spaces to accommodate expanded use of EVCS installations.

The *Strata Property Act* & Regulations impose exclusive conditions on the limits of user fees and the allocation of property that may be considered for future amendments of the legislation:

- User fees be expanded to include the use of the electrical/utility services for the purpose of non-metered EVCS at a fixed rate with the consent of the users.
- The legislation address the allocation of lease or license parking assignments by the owner developer, and if or how they may be reallocated.

The allocation of parking spaces through leases or licenses by the owner developer as part of new construction is a common practice; however, there is no mechanism with the BC Land Title system to file the allocations created by the owner developer. The absence of a registry creates a significant amount of confusion with strata corporations as they struggle to establish parking allocations and plans for use and assignment. A registry would provide certainty to the owner developer, the purchaser, subsequent purchasers, the strata corporation and strata management industry who are obligated to manage the common property.

- The Land Title Registry to expand the registry for strata corporations to include parking stalls that are allocated through a lease or license created by the owner developer.

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