

Solving the MURB problem: A user-friendly tool to facilitate EV charger installation in multi-unit residential buildings

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Summary

Access to home charging is critical in making the decision to purchase an electric vehicle. For detached home owners, this is not usually a significant barrier. Access to home charging is much more difficult for almost half of British Columbians who live in condominiums or attached housing (known as multi-unit residential buildings (MURBs)). There a number of barriers for residents, strata councils and property managers to overcome in getting EV charging in MURBs; a lack of accessible, easy-to-read information is one of those barriers. In this presentation, we present an online resource aimed at removing this hurdle.

Keywords: charging, communication, consumers, education, training

1 Introduction

1.1 Background

In our study region (British Columbia, Canada) transportation-related emissions account for over a third of the region's total greenhouse gas (GHG) emissions. Decarbonisation of the transportation sector is therefore essential to meeting regional GHG emissions. Studies indicate that 80-90% of all passenger vehicles will need to be electric to meet Canada's longer-term climate targets [1]. Electrification of the passenger fleet is an especially viable abatement option in British Columbia (BC), as electric vehicles (EVs) have the potential to reduce GHG emissions from personal vehicle travel 80-98% with today's electricity grid [2].

Electric vehicle (EV) uptake has been growing steadily across the world, increasing six-fold BC over the past two years. Despite this growth, however, EVs account for less than 1% of vehicles on the road. Research indicates that barriers such as a limited EV variety, low technology awareness and limited home charging access (the focus of this paper), are constraining the market for EVs [3]. In order to achieve regional emissions targets, it is necessary to find solutions to remove these barriers and accelerate EV adoption.

1.2 The study region

In BC, multi-unit residential buildings (MURBs) make up a large portion of the building stock (~50%), and most are governed by legal bodies known as strata corporations or “stratas” that are responsible for the management and maintenance of a building’s common property and assets, including parking areas and electrical infrastructure [4]. Strata corporations are managed by a committee (typically several homeowners and/or management professional) who represent the interests of all homeowners. Usually, stratas require approval from homeowners for significant changes to the use and operation of common building property or assets (e.g. the installation of Level 2 chargers). The province of BC is home to over 27,000 strata corporations providing housing for almost half of the population [5].

1.3 EV charging in MURBs

Access to home charging is critical to purchasing an EV because as much as 80% of charging takes place at home [6]. According to the *Canadian Plug-in Electric Vehicle Study*, access to home charging (both Level 1 and Level 2) is a significant predictor of EV interest (more so than non-home charging) [7]. In other words, having the potential to charge at home increases the likelihood that a consumer would want an EV. A similar finding was noted in a 2011 survey of new vehicle buying households in San Diego California [8].

For families living in MURBs, such as apartments, condominiums or townhomes, home charging access is currently limited (see Figure 1) and can be particularly challenging to install. Shared building and parking access, limited electrical infrastructure, unclear or absent policies and regulations, and poor EV and charging knowledge can result in complex and/or costly EV charging installations. Not surprisingly, only a small number of current EV owners live in MURBs. A 2015 survey of a sample of BCs EV owners found that only 8% of respondents lived in apartments, compared to 21% of mainstream consumers (i.e. a sample of conventional vehicle owners in the region) [9]. Home charging access, therefore, could be a significant EV market barrier for individuals living in MURBs.

Providing charging access in MURBs can be a complex process involving a number of steps, including determination of building electrical capacity, obtaining strata approval, establishing or amending strata rules and bylaws, managing energy use and allocation of parking for charging in a way that is fair and equitable. Further complicating the situation is a lack of policy and regulation around EV charging in MURBs. For example, the *Strata Property Act*, which guides how stratas govern and operate, does not contain provisions that require stratas to accommodate charging (i.e. “right to charge”). In addition, stratas tend to be unfamiliar with EV charger installation and usage and are therefore hesitant to approve access to charging.

Current “pioneering” EV owners living in MURBs have managed to find charging solutions. Some have overcome the challenges of home charging in MURBs by educating their stratas on EVs and charging, champion the installation process, and even paying for the installation itself. In other cases, EV owners have turned to public chargers intended for on-the-go top-up charging to supply their primary charging needs. However, these are second-best solutions that require EV owners to sacrifice time, money and convenience. While these owners were willing to make sacrifices to accommodate EV use, more mainstream consumers with interest in EVs will be less willing to make these sacrifices [10].

Sustained growth of EVs – to the level needed to achieve deep GHG reductions – will require solutions for EV installation challenges in MURBs. Clear policy and regulation for the installation and operation of EV charging, supported by accessible and credible information that assists both residents and stratas in the charging implementation process are needed. Without these solutions, EV charging will continue to be a

significant barrier for a larger number of British Columbians. In the remainder of this paper we discuss the development of a website that addresses the charging challenges facing MURB charging in British Columbia.

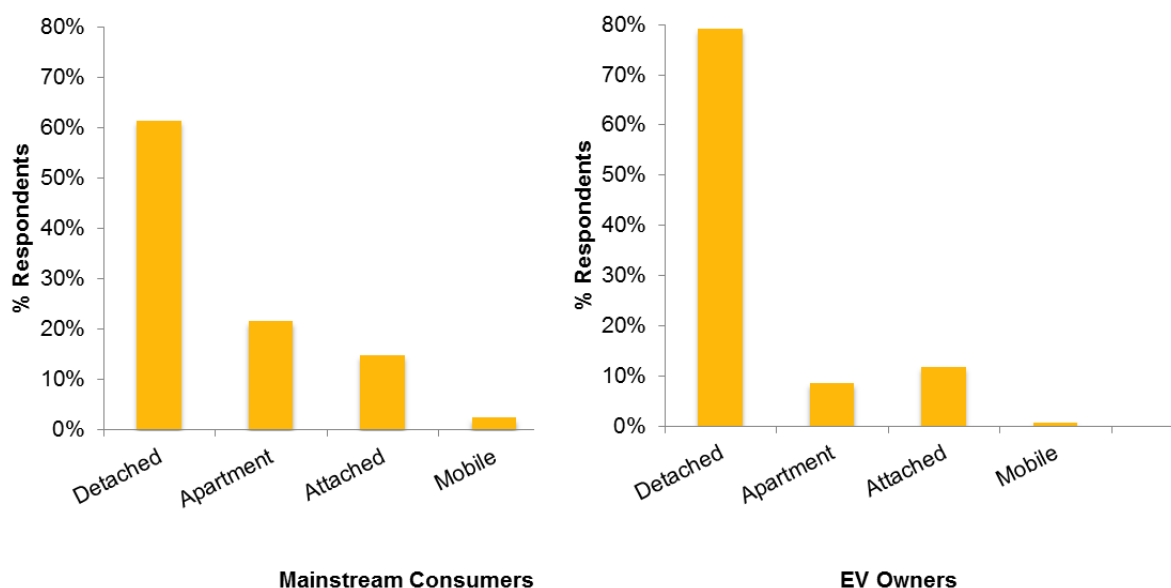


Figure 1: British Columbian Mainstream consumers' potential charging access (level 1 or 2) and EV owners' residential charging access (level 1 or 2) by housing type (n = 528, 154).[11]

2 Method

To address the need for resources related to EV charging in MURBs, Metro Vancouver – a regional district in Southwest BC with a Board-adopted mandate to reduce regional GHG emissions from sources including personal transportation - is developing a website to provide accessible, easy-to-read, and credible content to guide EV charging in MURBs, especially those that are governed by stratas.

2.1 Website development

The development of website content was a multi-stage process that involved:

- **Reviewing existing resources** to inform the development of website content and to identify target users; resources include reports, guides and technical information related to EV charging installation that is relevant to the local context.
- **Interviewing key stakeholders** to augment resources and profile target users, which includes interviewing homeowners, technology providers, property managers, electricians (project resources limited interviews to a small subset of these stakeholders).
- **Identifying key content**, which includes distilling the best and most useful information from the resource review and stakeholder interviews to highlight key themes and information, concerns and opportunities relevant to each target user.
- **Developing a site-map and website**, which includes tailoring the style and substance of website content to target users.
- **Pre-testing content with a selection of target users and stakeholders** to ensure content is useful, relevant, accessible, and accurate.
- **Working with web-developers** to develop a user-friendly and solutions-oriented website with easy navigation and accessible resources for target users.

2.2 Target Users

Target users of the website were identified to guide the development of the website site-map and content. Two target user groups are identified: “Residents” who are potential EV owners living in MURBs and “Stratas” who are the groups of residents that manage strata corporations. We develop target user profiles

largely from interviews, as well as findings from the *Canadian Plug-in Electric Vehicle Study* [12], which surveyed over 500 new vehicle buyers in BC (with close 40% of respondents living in MURBs); results provide important data on the charging access, EV interest, driving behaviour and demographics of potential future EV owners in the region. Below, a brief description of each target user was provided.

2.2.1 Residents

Residents are potential EV owners living in MURBs. According to the *Canadian Plug-in Electric Vehicle Study* [13] just over a third of the British Columbians surveyed expressed interest in purchasing an EV in the next five to ten years. Residents have the greatest need for information on both charging and electric vehicles, and are most likely to be influenced by access to home charging. [14]

Residents represent a sub-set of potential EV owners in BC who [15]:

- are more likely to have a post-secondary degree (relative to the general population);
- have higher than average rates of homeownership;
- have limited potential for home charging if they live in a MURB (less than 25% of respondents living in apartments have access to a standard outlet near their parking stall);
- prefer plug-in hybrid vehicles over battery electric vehicles; and
- have diverse interests and motivations related to electric vehicles that range from environmental and technical, to novelty.

It should be noted that we do not specifically focus on current electric vehicle owners in BC. While current electric vehicle owners are not our target user, much of the information on the site will be useful and beneficial to them, especially for the small percentage that do not currently have home charging access. The majority of current EV owners have home charging access (97%), live in single-family detached homes (82%), and are already very knowledgeable about electric vehicles and charging.[16]

2.2.2 Strata

“Stratas” represent the individuals that manage strata corporations; this includes the homeowners who volunteer their time to serve on strata councils and the management professionals who support them. Although drawing on a small sample, interview data indicate that the homeowners that manage strata corporations are:

- well educated;
- resource constrained, and thus prioritize items like capital depreciation planning, and critical upgrades;
- not typically open to changes from the status quo;
- lack information about EVs, charging, and charging installation;
- risk averse, especially when it comes to costs, safety and liability (Level 2 charging installs, and any associated upgrades are considered both costly and risky);
- value cost reduction and fairness (costs borne by the strata to install or maintain a charger may be considered both costly and unfair); and
- time constrained (stratas need to be heavily involved in the charging installation process).

3 Website Structure

This online resource, which will have the vanity URL EVCondo.ca, will centralize the best available information on the installation of EV chargers in stratified MURBs. The following is the site map for EVCondo.ca.

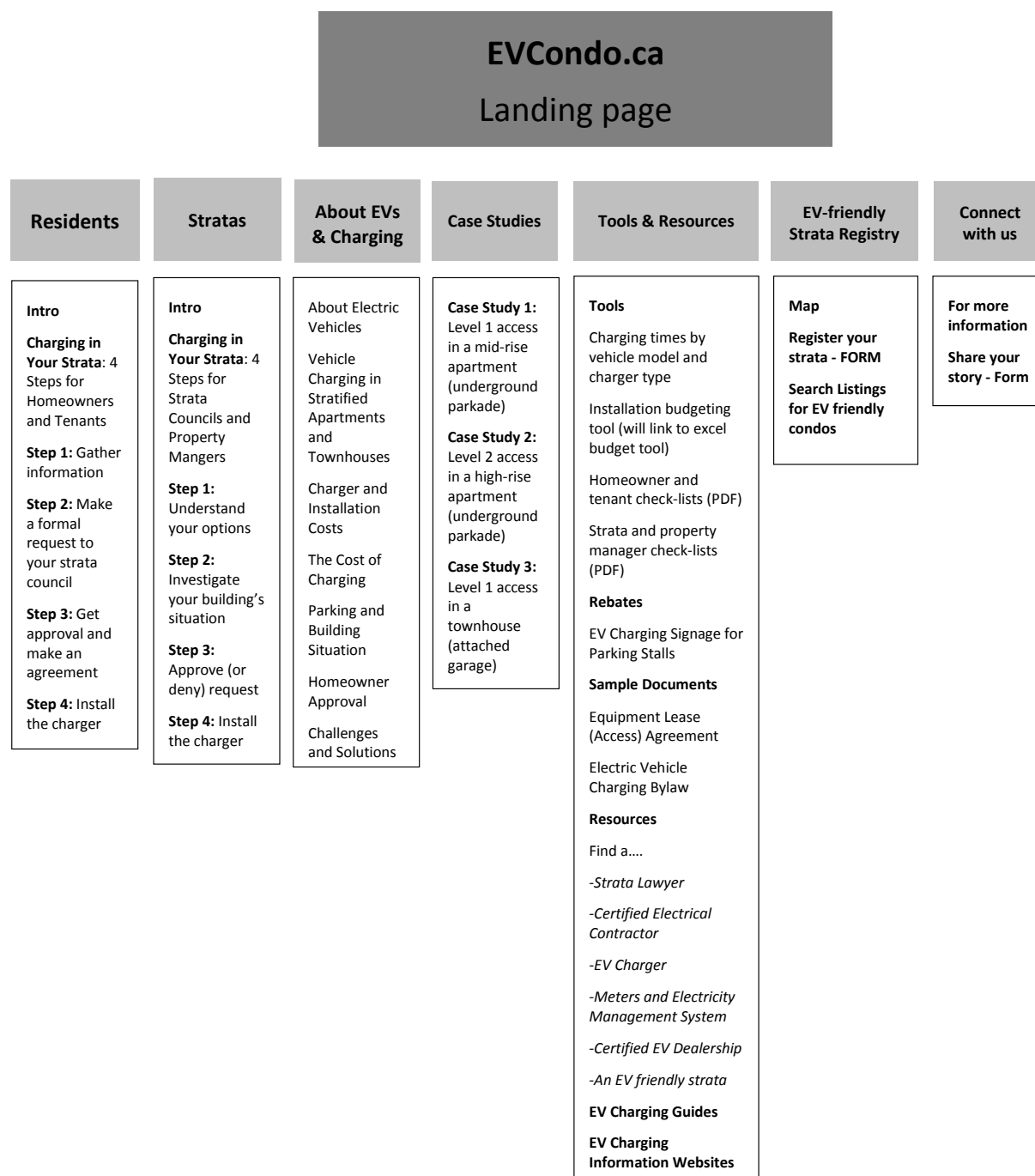


Figure 3: EVCondo.ca website map

This website provides the necessary information and steps for home charging including: technology information; technical and cost details; case studies; and resources for additional inquiry (such as listings of available chargers and rebates). It will also have two micro-sites which will contain check-lists and installation guides specific to target users (residents and strata councils).

The online resource will also contain a registry to allow “EV-friendly” strata corporations to self-identify and promote on a map of the region. The intent of this registry will both be to support EV owners looking to relocate to a strata building with access to home charging, and to create an incentive for strata corporations to become EV-friendly.

When complete, this resource will be a key tool for residents and strata councils wishing to install chargers in MURBs. It will serve as the centrepiece for a broader program to address “the MURB problem” in Metro Vancouver. Other program elements may include a strata advisor, webinar training and workshops.

4 Conclusion

In British Columbia EVs account for less than 3% of new vehicle sales. Research indicates that there is significant interest in EVs, but key barriers are preventing this “latent” demand from being realized [17]. One significant barrier noted in the literature is access to home charging, which has been recognized as a key influence on EV interest and purchase. Access to home charging can be especially challenging for those living in MURBs, where parking areas are shared, installations can be complex and costly, policies are lacking, and knowledge about EVs and charging is low (especially within stratas). Moreover, there is a dearth of accessible and easy-to-read resources to guide residents and stratas through the installation process.

Metro Vancouver is developing an on-line resource to address this gap via its website - EVCondo.ca. The objective of the website is to support accelerated adoption of electric vehicles by removing barriers to setting up electric vehicle home charging in MURBs. The website will centralize the best available information on the installation of EV chargers in MURBs and provide technology information, case studies, check-lists and installation guides, in order to help residents and stratas navigate the EV installation process.

In order to accelerate future EV adoption to the levels necessary to achieve deep GHGs, it is necessary to find solutions to EV charging challenges in MURBs. Resources such as EVCondo.ca will be one tool to increase the awareness of stratas and MURB residents and improve charging access. However clear policies will also be needed. Policies such as the “right to charge” in MURBs (via the BC Strata Property Act) or utility regulations around the sale and tracking of electricity for EV charging will be vital to sustained and significant EV adoption in the future.

References

- [1] O. Bahn, M. Marcy, K. Vaillancourt, J.-P. Waaub, *Electrification of the Canadian road transportation sector: A 2050 outlook with TIMES-Canada*, Energy Policy, 62 593-606, 2015.
- [2] J. Axsen, et. Al., *Electrifying Vehicles: Insights from the Canadian Plug-in Electric Vehicle Study*. Simon Fraser University, Vancouver, Canada, 2015.
- [3] J. Axsen and M. Wolinet, How policy can build the plug-in electric vehicle market: insights from the respondent-based preferences and constraints (REPAC) model, (under review), 2016.
- [4] 2011 Census of Canada, <http://www12.statcan.gc.ca/census-recensement/2011/dp-pd/tbt-tt/Rp-eng.cfm?TABID=4&LANG=E&A=R&APATH=3&DETAIL=1&DIM=0&FL=A&FREE=0&GC=01&GL=1&GID=906054&GK=1&GRP=1&O=D&PID=102237&PRID=0&PTYPE=101955&S=0&SHOWALL=0&SUB=0&Temporal=2011&THEME=91&VID=0&VNAMEE=&VNAMEF=&D1=2&D2=0&D3=0&D4=0&D5=0&D6=0>, accessed on 2016-03-23.
- [5] Government of British Columbia, *Strata Corporations*, <http://www2.gov.bc.ca/gov/content/housing-tenancy/strata-housing/operating-a-strata/roles-and-responsibilities/strata-corporations>, accessed on 2016-03-23.
- [6] D. Littlejohn, *A Primer on the Transition to Electric Vehicles in Metro Vancouver*, Community Energy Association, Vancouver, Canada, 2012.
- [7] J. Axsen, et. Al., *Electrifying Vehicles: Insights from the Canadian Plug-in Electric Vehicle Study*. Simon Fraser University, Vancouver, Canada, 2015.
- [8] J. Axsen and K.S. Kurani, *Hybrid, plug-in hybrid or electric: what do car buyers want?*, Energy Policy 61, 532–543, 2013.
- [9] J. Axsen, et. Al., *Electrifying Vehicles: Insights from the Canadian Plug-in Electric Vehicle Study*. Simon Fraser University, Vancouver, Canada, 2015.
- [10] D. Littlejohn, *A Primer on the Transition to Electric Vehicles in Metro Vancouver*, Community Energy Association, Vancouver, Canada, 2012.

[11] J. Axsen, et. Al., *Electrifying Vehicles: Insights from the Canadian Plug-in Electric Vehicle Study*. Simon Fraser University, Vancouver, Canada, 2015.

[12] *ibid.*

[13] *ibid.*

[14] *ibid.*

[15] *ibid.*

[16] *ibid.*

[17] *ibid.*

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