ELECTRIC VEHICLE CHARGING IN MULTI-UNIT RESIDENTIAL BUILDINGS

Challenges, Rebates and Lessons Learned

EXECUTIVE SUMMARY

Report prepared by Adriana Valentina Farías, UBC Sustainability Scholar 2021

Prepared for Ralph Wells, Energy Manager, UBC Campus and Community Planning

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INTRODUCTION

The commitment of British Columbians to address climate change and decrease carbon emission is evident in the province's increased demand for electric vehicles (EVs) over the last few years. Greenhouse gas emissions from the life cycle of an EV are much lower than those of an equivalent-sized combustion engine car (C2MP & Fraser Basin Council, 2021b). In addition, Metro Vancouver estimates that driving a small EV 13,000km/year could cost around $300-350/year, which is less than $1 a day (Metro Vancouver, 2021c). These two motivations, reducing carbon emissions and low costs, have dramatically increased the number of EVs in the Metro Vancouver region. In line with this, the Metro Vancouver Climate Action Committee found that the use of EVs is critical in the region's efforts to reduce carbon emissions. However, the committee also noted that there is not enough infrastructure at the moment to support EV owners who live in multi-unit residential buildings (MURBs) such as townhomes, apartments and strata buildings (Zeidler, 2021).

According to a February 2021 survey conducted by KPMG Canada, out of all British Columbias looking to purchase a car in the next five years, 77% will buy an electric vehicle (KPMG, 2021). In the first quarter of 2021, there were more than 54,000 light-duty EVs registered in British Columbia. According to the BC Energy Minister, Bruce Ralston, this rapid increase is "the highest reported uptake rate of electric vehicles in North America, making the province a leader in the industry" (CBC, 2021). This boom of electric vehicle ownership begs the question, does British Columbia have enough charging options for EV owners?

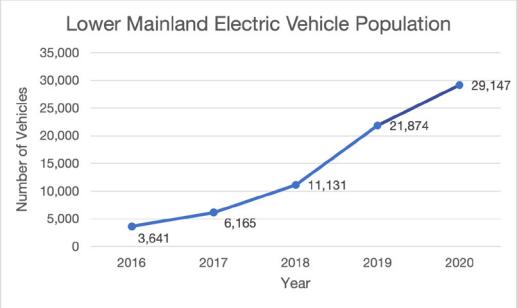

Figure 1: Number of electric vehicles registered in the Lower Mainland from 2016 to 2020 (Source: ICBC, 2021)

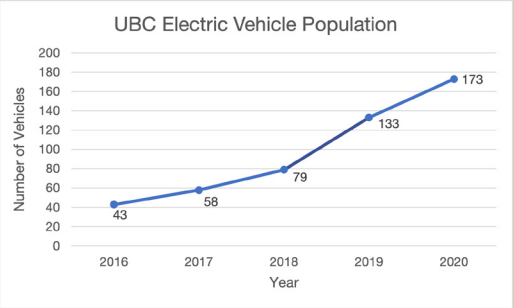

Figure 2: Number of electric vehicles registered in UBC from 2016 to 2020 (Source: ICBC, 2021)

With the growing number of EVs in the Metro Vancouver region, it will become critical for EV owners to charge from home, especially for those who use their EVs to commute. This is why the Metro Vancouver government believes that strata councils will see more requests to retrofit parking stalls with EV charging infrastructure (Metro Vancouver, 2021g).

Strata councils and homeowners often face numerous challenges when retrofitting EV chargers in their buildings; however, they also share similar experiences. The most common locations to place EV charging stations in MURBs are the EV owner's parking stall, visitor parking, or a different homeowner's parking stall. The latter usually means that the residents will swap parking stalls (Metro Vancouver, 2021d). It is important to note that these options will depend on the legal framework of the parking stall's ownership and restrictions established by the Strata Act. The typical costs of EV chargers can range from $300-$2,500 for a level-1 charger or $6,000-$20,000 for a level-2 charger. BC Hydro currently offers rebates to offset these costs (Metro Vancouver, 2021g).

Many municipalities have created or amended bylaws to ensure that newly constructed building can support EV charging. However, it is up to each strata in already-built buildings to retrofit EV chargers in their buildings. Providing EV charging in MURBs is critical for current EV owners and future EV owners, a rapidly growing demographic. Adding EV supply equipment also has the potential to increase property values. Aside from these benefits, strata councils should take advantage of BC Hydro's limited-time rebates through the Clean BC strategy (Metro Vancouver, 2021g).

METHODOLOGY & FINDINGS

The research methodology consisted of a scan of policies at the federal, provincial and municipal level, followed by an overview current practices. This process uncovered many techincal and legal challenges that were further discussed through interviews with experts, UBC strata council members, and other stakeholders.

TECHNICAL CONSIDERATIONS

There are three types of EV chargers: Level 1, 2 and 3 chargers. Level 1 chargers can be plugged into a regular house plug (120V). The compatibility with standard plugs makes level-1 charges the least time-efficient. A typical EV can take up to 5-20 hours to charge fully. Level-2 chargers need a 240V circuit and can generally charge an EV in 3-8 hours (Metro Vancouver, 2021d). Level 3 chargers, or direct current fast charging (DCFC), can provide around 80% of an EV's charge in 30 minutes. However, not all EVs are compatible with DCFCs, and they are also very costly, making them less suitable for MURBs (C2MP & Fraser Basin Council, 2021a).

EVEMS can control how and when EVs charge. EVEMS are also referred to as load sharing, power-sharing, or smart charging (C2MP & Fraser Basin Council, 2021a). These technologies allow multiple EVs to charge at the same time using the same circuit. Up to 4 chargers can usually share a single 208V circuit (Metro Vancouver, 2021a). It is possible to split the charge evenly between all the EVs or adjust the charge's rate and timing. EVEMS can also track the use of chargers and bill users accordingly. Using EVEMS can reduce the electrical supply and infrastructure needed to charge multiple EVs (C2MP & Fraser Basin Council, 2021a).

LEGAL CHALLENGES

The most significant legal challenge when addressing EV chargers in MURBs is parking designation. Depending on the strata corporation, parking will either be common property, limited common property, or a strata lot. The legal assignment of parking stalls is outlined in the Strata Plan. It is encouraged for Stata corporations to get in touch with their lawyer to find the best EV charging solution according to their parking designation.

While at times it may seem as if the strata council holds all the power, it is essential to remember that the strata council is composed of volunteers who carry out the owners' will. Critical decisions, such as retrofitting EV charging equipment, will often have to be approved at an Annual General Meeting (AGM) or a Special General Meeting (SGM). For a project to be approved, at least three-quarters of the eligible voters present at the time of voting must agree.

Measurement Canada, a federal agency, has yet to approve a meter that charges owners based on usage. Therefore, stratas cannot charge EV owners based on their individual energy use (kWh), even though BC Hydro has approved strata corporations to charge for this utility. Strata Corporations will have to wait for Measurement Canada to approve meters to use this method to cover costs (C2MP & Fraser Basin Council, 2021).

CONCLUSION

With the increased demand for electric vehicles, it is crucial for all homes to be EV Ready. Many local governments have created legislation to ensure that future builds will support EV charging. However, this legislation does not apply to already-built multi-unit residential buildings, which creates a lot of challenges at the time of retrofitting EV charging equipment in parking stalls.

The research and interview process revealed that the main challenges that stratas face are costs, legal and bureaucratic hurdles, technical concerns, and a lack of general knowledge on best practices and stories of success. These categories encompass many issues within each one and are often very specific to each strata. It is essential for stratas to engage with professionals at the start of the process to understand their buildings capabilities and restrictions, both from a legal and an electrical perspective.

Nonetheless, the provincial and local governments have put in programs and resources that encourage already-built MURBs to adapt their parking stalls to have EV charging facilities available to residents. BC Hydro's rebate program is a prime example of an initiative that encourages homeowners to ensure that their buildings are EV Ready. Although there are some gaps in the program, the funding is significant enough that stratas should take advantage of it and apply, especially given the program's temporary status.

Stratas should also be advised that there are many resources, particularly on Plug In BC's website, that further explain the retrofitting process and provide samples of bylaws and agreements that stratas may need to develop. Through Plug In BC, stratas will also be able to obtain up to five hours of free advising. Although this can be very helpful, it does not replace legal counsel or the need to hire an electrical engineer or contractor.

Retrofitting EV charging equipment in MURBs is a complicated, and at times a lengthy process that will ultimately provide benefits to all residents. Current and future EV owners will be able to charge their EVs at home, and residents who are not looking to purchase an electric vehicle will see a rise in property values.

RECOMMENDATIONS & FUTURE RESEARCH

The purpose of the recommendations is to make it easier for stratas to retrofit EV chargers in MURBs and to provide resources that are fair and take long-term climate goals into account. The recommendations include improved communcations, consolidating decarbonization efforts, addressing gaps in the rebate program, clairy on electrical engineering and electrical contractor duties, and right to charge legislature. The recommendations address gaps in both the rebate program and different levels of government.

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