CITY OF
PRINCE GEORGE

BUILDING TRUST IN ELECTRIC VEHICLES

Supporting the Electric Vehicle Strategy for the City of Prince George

EXECUTIVE SUMMARY

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Prepared by:
Pulkit Kathuria
UBC Sustainability Scholar, 2021

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DISCLAIMER

This report was produced as part of the UBC Sustainability Scholars Program, a partnership between the University of British Columbia and various local governments and organisations in support of providing graduate students with opportunities to do applied research on projects that advance sustainability across the region.

This project was conducted under the mentorship of City of Prince George and BC Hydro staff. The opinions and recommendations in this report and any errors are those of the author and do not necessarily reflect the views of City of Prince George and BC Hydro or the University of British Columbia.

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Introduction

According to the Climate Change Mitigation Plan for the City of Prince George (City), transportation sector emits 51% of the total community Green House Gas (GHG) i.e., 286,000 tons of CO_2-eq in the City. Emissions from transportation also form a major portion of the corporate GHG emissions. Corporate emissions constitute less than 1% of the total community GHG emissions. City of Prince George aims to reduce and mitigate the community and corporate GHG emissions from transportation by encouraging a shift towards Electric Vehicles (EVs). The City considers EVs a better alternative to conventional gasoline powered vehicles to reduce GHG emissions. To encourage a shift towards EVs, the City intends to develop an Electric Vehicle (EV) strategy. Undertaking and implementing an Electric Vehicle strategy to reduce community GHG emissions has been listed as a High Impact Action. It estimates to reduce 1,800 tonnes of CO2e/ year. The EV strategy aims to address action T4 - *'Develop an electric vehicle strategy to identify initiatives that will increase the community-wide uptake of low-carbon and electric vehicles.* Further, the action is planned to be implemented in the next 2-5 years.

Electric Vehicles have proven to be a better alternative to Internal Combustion Engine (ICE) vehicles. They are both environmentally (zero tail pipeline emissions) and economically (lower maintenance cost) sustainable alternatives. Advent of various federal and provincial incentive programs has increased the sales of EVs at both federal and provincial level. EV strategies at local government level could play a vital role to bolster these programs by identifying and addressing barriers to EV adoption at local level.

The existing EV policies for larger urban areas may not be appropriate for Prince George due to its unique demographic, climatic, and topographic characteristics, thereby giving rise to the need for an EV strategy which considers these factors.

Purpose

The purpose of this report is to provide recommendations to support the EV strategy for the City of Prince George.

Objectives

1. Conduct a literature and policy review to understand the existing situation and community context.
2. Conduct a review of the best practices to address the recommendations for the EV strategy.
3. Engage with community stakeholders to seek necessary support for encouraging EV uptake.
4. Summarise findings and provide recommendations such as policy and bylaw updates which would support and inform an EV strategy for Prince George.

Note: For the purpose of the study the focus would be on encouraging and addressing barriers to BEVs and PHEVs, since several factors affect owning and operating these two variants efficiently.

Methodology

To provide suitable recommendations to bolster EV transition the process included three stages, beginning with literature review, followed by review of best practices in EV strategy preparation, ensued by stakeholder engagement and finally using the observations from the previous stages to provide recommendations.

1. Literature Review

Local characteristics of a city play a vital role in influencing planning of a community strategy. Stage one involved conducting a literature review. As mentioned above, peculiar local characteristics of the city including cold weather, sprawl development and reliance on personal vehicles were studied in correlations with EVs. Other community aspects such as demography, income, existing transportation scenario, housing and parking were reviewed, since these directly affect EV adoption. Further, benefits of using EVs, EV adoption at federal and provincial level, incentives offered by senior governments for encouraging EV adoption, types of charging infrastructure including EVSE & EV-EMS and types of charging plugs available was also reviewed.

Planning regulations including zoning bylaws and building bylaws were reviewed to gauge the feasibility of including EV requirements. Section 7 of the Zoning Bylaw and Section 9 and 10 of the Building Bylaws could be evaluated for updation and inclusion of EV requirements. Official Community Plan was also reviewed and certain sections which could be updated to include provision for EVs were shortlisted. Observations were also gleaned from the consultation report for Climate Change Mitigation Plan for the City of Prince George. The report provided suggestions of the internal staff, external stakeholders and the public including several key insights pertaining to EV adoption, EV infrastructure, steps undertaken by the City and people's perspective towards EVs. The consultation report provides results of an EV workshop which was attended by the internal staff. The suggestions provided by various entities, in addition to the results of the EV workshop, provided a foundation for the recommendations for the proposed EV strategy. Further, federal and provincial policies pertaining to EV adoption were also reviewed.

2. Best Practice Review

Stage 2 of the process involved conducting review of best practices in EV strategies. EV strategies of cities with similar geographical and demographic characteristics were considered. EV strategies and other plans consisting of provision for EVs were reviewed for Nanaimo, Thunderbay and Kamloops. However, the list was not limited to cities with similar characteristics. Cities like Surrey and Richmond were also considered owing to their recommendations pertaining to equity and home & workplace charging respectively.

3. Stakeholder Engagement

Stage three consisted of conducting stakeholder interviews. As a part of the stakeholder engagement process, six professionals representing different organisations including City of

Prince George, City of Kamloops, Prince George Electric Vehicle Association, Prince George Air Improvement Roundtable, Tourism PG and Community Energy Association were interviewed. The aim of the engagement process was to understand the perspective and role of a variety of organisations supporting and encouraging EV adoption. Observations from the stakeholder interviews also supported in informing the recommendations for the EV strategy.

Factors Affecting EV Adoption

Observations from the three stages were summarised and factors affecting EV adoption were identified. These factors formed the basis for providing recommendations to encourage EV adoption. Factors affecting EV adoption have been listed below:

1. **Lack of awareness:** Lack of awareness leads to people developing misconceptions about the EV technology thereby deterring them from shifting to EVs and relying on ICE operated vehicles. Being a relatively new technology, public outreach and education of EV technology is required for clarifying doubts and misinformation that persists among the potential users.

2. **Commuting distance and duration due to sprawl development:** According to Statistics Canada (2016), majority of the trips are made within the city followed by trips made outside region, within region and different province. Trip duration is also a vital aspect which could address barriers such as range anxiety and charging infrastructure. The trip duration for almost 50% of the trips made in the city is less than 15 minutes followed by 15 to 29 minutes category. This factor needs to be considered for planning the provision of public charging infrastructure.

3. **Range Anxiety:** Range anxiety is when users feel anxious about running out of battery charge while completing a trip and getting stranded (Plug'n Drive, n.d.). It is one of the major concerns which deters people from adopting an EV. As compared to ICE operated vehicles, a trust is required to be developed in EV technology among the users. Range anxiety is further exaggerated by lack of charging infrastructure.

4. **Availability of charging infrastructure:** Provision of public charging infrastructure and home/workplace charging is also a factor that has direct implications on a person's choice to adopt an EV. Limited charger availability furthers adds to 'range anxiety' of the user. As discussed in the previous section, users charge their vehicles at home, workplace (trip nodes) and other public areas. Since, majority of the users prefer to charge their EVs at home, absence of home charging infrastructure impacts the uptake of EVs. Other aspects such as housing typology, home ownership, challenges with charging in Multi Unit Residential Building affect the provision of charging infrastructure.

5. **Impact of cold weather:** Cold weather directly impacts the battery performance thereby reducing the range of the vehicles i.e., the distance that a vehicle could travel. Cold weather affects EV battery performance and as a consequence impacts and decreases the range of vehicles. Battery performance reduces in cold weather because the capacity of the alternators to keep the battery charged decreases. A study of EV operation in extreme cold weather conditions at -25 C, estimated that the range of vehicle, in this case Nissan Leaf,

could decrease by 35% i.e., it decreased from 130 kms in normal weather conditions to 85-90 kms in cold weather conditions (IBI Group, 2019).

6. **Vehicle availability:** Lack of availability of Electric Vehicles with local car dealerships and lack of model choice also deters people from buying an EV. According to Statistics Canada, 2016, majority of the trips made in the City (86.3%) are made by vehicle drivers i.e., personal vehicle use. More than 29,960 respondents, carpool to commute. Further, more than 6.24% of respondents preferred SOVs including car, van and truck. The consultation report for Climate Change Mitigation Plan, bolsters the fact that residents of Prince George majorly rely on personal vehicle use especially SUVs (Sports Utility Vehicles) and trucks. Werner Antweiler, Associate Professor & Chair Strategy and Business Economics Division at UBC Sauder School of Business points out that model choice also affects adoption. Although there are several EV models available for purchase now as compared to the previous decade, these tend to be either expensive or compact cars with limited range. Pick-Up trucks, Sports Utility Vehicles (SUVs), commercial vans for goods transportation are certain vehicle variants that need to be introduced in the market.

   Further, car dealerships not fully embracing EV technology is also partially related to EV education and awareness. Salespeople and other people selling cars in dealerships should be fully aware of the technology. This would help them attract customers and increase the likelihood of selling an EV (Fleetcarma, 2020).

7. **Price of EVs**: The upfront cost of buying an EV is also a factor which affects the likelihood of people buying EVs. Cost parity for upfront cost of EVs and ICE vehicles is expected to be achieved between 2022-2024 for passenger vehicles and 2023-2025 for SUVs (ICCT, 2019 as mentioned in GEOTAB, 2021).

Recommendations

The abovementioned factors were considered while providing recommendations for the EV strategy. Four broad recommendations to encourage EV adoption have been provided. For each recommendation, several actions were listed. Of the four recommendations, 'EV Strategy considerations' provides suggestions for important aspects that should be considered while planning and preparing an EV strategy.

1. **Home and Workplace charging infrastructure:** Provision of charging is a vital factor that has direct implications on a person's choice to adopt an EV. As observed from literature review, more than 80-90% of vehicle charging occurs at home due to it's convenience (Lopez-Behar et al., 2019).

   Actions recommended:
   1. EV ready parking in new Multi Unit Residential Buildings (MURBs)
   2. EV ready parking in new non- residential construction (office, public buildings etc.)
   3. EV ready parking in Single Family homes
   4. Provision of EV charging in existing developments through retrofitting
   5. Integrate requirement for EV charging in Building bylaws

6. Include policies supporting Electric Vehicle adoption in Official Community Plan
7. EV Ready Parking Strategy

2. **Public charging infrastructure:** Provision of public charging infrastructure could help eliminate barriers for people with no or limited access to parking at home. This would also help users who commute long distances and also support ‘ón the go’ charging.

   Actions recommended:
   1. Amendments to parking norms to include EVs
   2. Curbside parking pilot
   3. Public charging infrastructure plan
   4. Inclusion of EV charging infrastructure in neighbourhood plans

3. **Education and outreach:** Potential users and other stakeholders need to be educated regarding the EV technology and also the policies introduced by senior levels of government to support EV adoption.

   Actions recommended:
   1. Increase public awareness of EVs
   2. Educate residential property managers of MURBs and business owners about EV charging retrofits
   3. Capacity building for internal staff
   4. Collaborate with local dealerships that are EV certified

4. **EV Strategy considerations:** There are several factors that need to be considered while planning and implementing an EV strategy. Aspects such as public engagement, principles of equity, EVs in city fleets and others could be considered to make the strategy more comprehensive.

   Actions recommended:
   1. Conduct public and industry engagement for the EV strategy
   2. Addressing equity while planning and implementing the policy
   3. Leading by example
   4. Addressing different modes of transportation

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