An EV Plan for the Municipality of Clarington: Research and Recommendations

Prepared by Trent University's Communications and Critical Thinking: Capstone Course

Contents

Preface

This report is the result of a collaboration between Trent University and the Municipality of Clarington. The research was prepared independently as part of a capstone course for Trent University's Communications and Critical Thinking program, and contributes to the ongoing work of the Municipality of Clarington's Interdepartmental Climate Change Working Group.

Our hope is that this report helps the community to mitigate the changes to our climate.

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Executive Summary

The climate is changing. Here, in Clarington, the most recent research by the Ontario Climate Consortium confirms that in the next three decades, our weather will get "warmer and wetter, with larger and more frequent storms."

Because of locked-in changes to our climate, communities are developing climate mitigation plans, which specify a series of actions that promise to reduce the main reason why our climate is changing, greenhouse gases (GHGs). The majority of these plans recommend an important first step in reducing GHGs, reducing the number of people who use GHG-emitting cars (with conventional internal combustion engines) and increasing the number of people who use electric vehicles (EVs).

This report outlines the special role that a municipality can play in increasing EV adoption and overcome common barriers (both functional and symbolic) to EV adoption, including: cost, charging infrastructure, environmental impact, and status.

After a review of Clarington's realities (with attention to the community's features that are key factors in increasing the number of EVs), this research-based report makes the following recommendations:

1. Implement a comprehensive set of specific actions, which are responsive to an evidence-based understanding of the community.

2. Develop a plan that builds on existing municipal visions and policies.

3. Consult with dealerships to let them know the Municipality's plan to encourage EV ownership; work with them to identify partnership opportunities.

4. Continue identifying building policies that would allow or encourage builders, especially those of new single-family homes, to incorporate EV-charger ready infrastructure.

5. Work with builders and their associations to identify partnership opportunities.

6. Phase-in charging infrastructure.

7. Decide on the nature of the relationship with the suppliers of EV charging stations.

8. Ensure there is a comprehensive service plan for all municipal charging stations.

9. Decide on locations for charging stations, emphasizing first use and then accessibility.

10. Phase-in a cost-recovery plan.

11. Offer a low-cost reward and recognition program for people who purchase EVs.

12. Because of the scope (small) and stage (early), opt for a centralized approach for developing and implementing the EV working plan.

13. Develop a comprehensive and long-lasting communications plan that follows these principles and best practices, and addresses different populations, each with its own familiarity with EVs.

Research Methodology

Research for this report consisted of a literature review of immediate contexts (e.g., local climate change mitigation and adaptation plans, the role of municipalities in encouraging EV ownership, the current levels of EV ownership nationally and internationally, EV strategies from comparable municipalities, and marketing for and consumer habits of EV buyers), attendance at a series of workshops (on a municipality's role, charging infrastructure, and future transportation needs), and qualitative interviews with municipal leads and NGOs who have developed robust and successful EV strategies. Please find a list of the literature we reviewed in the bibliography; Appendix A lists all workshops and interviews.

To prepare for this report, the research team wrote three case studies on the EV strategies of the City of Edmonton, the City of Kingston, and Guelph.

Context

The climate is changing. Confirmed at all levels (from global to local), climate change is a reality to which all communities must respond. At the 2019 Climate Change Conference, Hoesung Lee, Chair of the United Nations Intergovernmental Panel on Climate Change, remarked that the main cause of our changing climate, greenhouse gas (GHG) emissions, "are continuing to increase," which will have "more severe impacts than previously understood."[1] In *Canada's Changing Climate Report*, climate change is "one of the defining challenges of the 21st century"; the "effects are evident in many parts of Canada … and are projected to intensify."[2] Closer to home, the most recent data establish, through data collection and robust meteorological modelling, that the climate in Durham region will be "warmer, wetter, and wilder" over the next thirty years.[3]

Across Canada, most levels of government have developed or are working on climate change plans. Some parts of those plans identify actions which will mitigate (or lessen) the changes in the climate, usually by reducing the amount of greenhouse gas (GHG) emissions. Other parts of those plans identify actions which help communities adapt to the changing climate, usually by finding infrastructure or support systems that are better suited to the new or projected climates.

The vast majority of the government climate change plans recommend as a mitigation measures initiatives designed to increase EV ownership. The federal government, for example, has set targets for zero emission vehicles (including or especially plug-in EVs), aiming for "sales of light-duty vehicles reaching 10% in 2025, 30% in 2030 and 100% in 2040."[4] To do so, the federal government has offered initiatives which include rebates of $5,000 for a select range of vehicles. In another instance – this time at the provincial level – the Government of British Columbia offers rebates for vehicles and charging stations, among other initiatives. At the municipal level, the City of Edmonton's EV strategy emphasizes community education, charging infrastructure supported by public-private partnerships, and the electrification of its municipal fleet and public transportation.

There are good reasons for governments, of all levels, to find ways to encourage EV ownership. Namely, transportation is one of the main contributors of GHGs, the prime cause of climate change. Across Canada, transportation is the second-largest contributor of GHGs, accounting for 23% of all emissions.[5] In Durham, that number is higher. Transportation accounts for 47% of all GHG emissions in the region.[6] While communities of all sizes would benefit from sustainable and active models of transportation (encouraging walking, cycling, and public transportation over cars), EVs

[1] Lee, Opening Statement, 2019.
[2] Canada's Changing Climate Report, 2019.
[3] Towards Resilience: Durham Community Climate Adaptation Plan, 2016.
[4] Framework for Municipal Zero Emission Vehicle Deployment, 2019.
[5] Accelerating the Deployment of Plug-In Electric Vehicles in Canada and Ontario, 2016.
[6] Durham Community Energy Plan: Baseline Study, 2017.

of all kinds are a good first step to reduce GHG emissions. EVs are frequently referred to as “low-hanging fruit”; an easy and necessary part of any climate mitigation strategy.[7]

The majority of this report offers a series of recommendations that will encourage private EV ownership within Clarington. But first: if EVs are the low-hanging fruit, why isn’t everyone picking it? What are the barriers which keep people from adopting EVs?

Barriers

Despite the increased availability of EVs, they are not yet as popular in Canada as they are elsewhere in the world, whether measured by global or national market share. China has the largest market for EVs; it has approximately 40% of the world’s 5.1 million EVs on its roads. EVs have the largest market share in Norway, as they account for 46% of all vehicles.

In Canada, those numbers are smaller, but growing.[8] In 2019, there were more than 119,000 EVs on the road in Canada, which accounted for 2.3% of the world’s total EVs. In terms of market share, EVs comprise 3.3% of all passenger vehicle sales in Canada.[9] That amount of sales represented a 34% increase from 2018.

In Ontario, the market is similar, in size and trajectory. In 2019, Ontario had the second highest number of EVs on the road in Canada, trailing Quebec and just ahead of BC. In terms of percentage of sales, Quebec’s EV sales account for 48% of the total; BC’s sales account for 34%; in Ontario, EV sales account for 15%.[10]

These statistics indicate both size and promise of the market for EVs in Canada and Ontario. The overall totals remain low for Canada and Ontario, especially when measured against other countries (such as China, the United States, and Norway) and other provinces (such as BC and Quebec). Yet nationally there has been exponential growth over the past nine years. While Ontario saw a 55% drop in the number of EVs sold between 2018 and 2019, until then it had seen an increase every year since 2011.[11]

The literature – academic research in the fields of marketing and sustainability studies, guidebooks and position papers compiled by non-governmental organizations (NGOs), and market research carried out by communities interested in evaluating their capacity to increase EV ownership – provides some explanation why Canada and Ontario lag behind other countries and other provinces. Coupled with our research group’s interviews with some key communities across the country (each having good

[7] This metaphor appears in *Framework for Municipal Zero Emission Vehicle Deployment*, and was confirmed by our research team in interviews with *eMERGE* (an NGO in Guelph), the City of Kingston, and the City of Edmonton.
[8] Global EV Outlook, 2019.
[9] Goldberg and Wickens, Accelerating EV Adoption: A Local Government Approach, 2019.
[10] “Electric Vehicle Sales in Canada – Q1 2020,” 2020.
[11] That drop was “largely due to the abolition of the Ontario government's purchase incentive program in July 2018” (“Electric Vehicle Sales in Canada – Q1 2019,” 2020).

experience developing their own EV strategies, the literature identifies a set of common barriers which keep people from purchasing EVs, which might help explain what is keeping the numbers low in Canada and in Ontario. A synopsis of these barriers should also frame a thorough discussion of the way to increase EV ownership in Clarington. Only by identifying what is stopping people from buying EVs can a community determine how to help people overcome those barriers.

Our research confirms the existence of three common perceptions – some are grounded in reality, some are misinformed – which seem to keep people from purchasing EVs. The barriers are divided here into two categories, supply-side (those which affect the number of EVs available) and demand-side (those which affect consumers as they consider purchasing an EV).

Supply-Side Barrier (i.e., realities which affect the supply of EVs)

Barrier: Availability

In Canada and especially in provinces without high-incentives or quotas for sellers (like Quebec) or rebates for buyers (like British Columbia), some EVs are difficult to find, let alone purchase. Wait times of four or five months are common; and some dealers know little about EVs. For example, a study conducted by the City of Toronto found that "only 40% of dealerships had at least one EV on the lot, with estimated wait times of new vehicles taking between 3 to 18 months."[12] This supply-side barrier "reflect[s] the difficulty in finding an EV at a new car lot in Canada."[13] See pages 13-14 for a detailed summary of our findings on the supply of EVs in Durham region.

There are many reasons for this supply-side barrier. One reason is that it seems that manufacturers divert their supply of EVs to national and provincial markets where there is higher demand. For example, some dealerships talk about their difficulty in knowing when particular models will be available because they might be diverted elsewhere perhaps to the larger market that is the United States (instead of Canada) or to Quebec (instead of Ontario), where they are more likely to be purchased. Another reason for the difficulty of finding EVs is that they tend to have smaller profit margins; so, there is little financial incentive for dealerships or salespeople to promote EVs. Another reason for the scarcity is that not all dealerships are allowed to sell EVs; EVs must be sold by authorized dealers, if there is seemingly low demand.

There is some reason to see that the supply-side is changing. There is an upward trend in the number of EVs available and the number of different models available in Canada. Moreover, the higher supply of EVs in British Columbia and Quebec (two provinces with robust provincial government support) suggests that manufacturers are willing to send vehicles where there is higher demand.

Demand-Side Barriers

Barrier: Lack of Awareness

One of the biggest barriers to increasing EV ownership within a community is a general lack of awareness about EVs, what kinds there are and how they work. In a recent

[12] "City of Toronto Electric Mobility Strategy Assessment Phase," 2018.
[13] Driving EV Uptake, 2017.

study, the Sustainable Transportation Research Team at Simon Fraser University identified in people who had recently purchased a gas-powered vehicle a general lack of awareness in three categories: the number of models available, the differences between an electric vehicle and a hybrid vehicle, and the method of charging both.

That study concludes that "clear lack of knowledge" and "demonstrated confusion" are significant barriers, mostly because they prevent people from forming preferences about which EV would be suitable and then from forming intentions to purchase.[14]

Barrier: Cost

The high price at the point of purchase of EVs is cited as a common barrier to purchasing an EV. In a national study carried out by the Angus Reid Institute, 59% of Canadians ranked price as at least one of their top two most important considerations when purchasing a car.[15] Closer to home, in a survey commissioned by *Plug 'N Drive* and carried out by Research Now, when gas-powered car drivers in the Greater Toronto were asked why they did not buy an EV, its high price tag was the most cited reason (almost a third of the time).[16]

This barrier is the product of a limited view of measuring the cost of a vehicle. Certainly, for most EVs, the initial purchase price is higher than for their equivalent gas-powered models. Most EVs cost between $30,000 and $45,000, which makes "them slightly more expensive than their gas-powered counterparts." However, if measured by total cost of ownership rather than the cost at the point of purchase, some EVs are a more economical choice and save owners approximately $2,000 in fuel and maintenance costs every year. A recent study confirmed these claims. The Nissan Qashqai (a gas-powered vehicle) costs, initially, $36,000. After ten years of service and fuel, the total cost of ownership is approximately $87,000. The equivalent EV model, a KIA Niro, costs $55,000 at the point of purchase. After ten years of service and fuel, it is estimated to cost $86,000.[17]

Barrier: Range Anxiety

Most people who are unfamiliar with EVs express concern about the distance that they can travel on a single charge. Commonly referred to as "range anxiety," this perception keeps people from purchasing EVs, contributes to their view that EVs are inferior or inconvenient, and, in some cases, motivates potential buyers to look for and even support publicly-accessible charging. In a recent Angus Reid poll, 62% of respondents said they would be more likely to get an EV if more public charging was available.[18]

There is evidence, though, that range anxiety is misplaced. While most EVs can now travel at least 200 kms on a single charge, most Canadians commute, on average, 50 km / day, returning home where the majority of EV charging takes place (at least

[14] Axsen et al., "Electrifying Vehicles: Insights from the Canadian Plug-in Electric Vehicle Study," 2015.
[15] "Canadians Charged Up about Electric Vehicle Incentives," 2018.
[16] Driving EV Uptake, 2018.
[17] For a detailed explanation of the assumptions and calculations in this study, see Wallcraft, "So you think electric vehicles cost more? A 10-year comparison shows they're actually cheaper," 2020.
[18] "Canadians Charged Up about Electric Vehicle Incentives," 2018.

80%).[19] For example, even though people in Edmonton commonly cited concerns about the range of EVs as a reason why they wouldn't buy one, a City-led survey revealed that the average car trip in Edmonton is 9.4 km while the average round trip commute is 25.6 km, well within the range of all EVs.

There is some validity to concerns about how far an EV can travel and how frequently it needs to be charged. In winter temperatures, EV batteries lose some range (up to 25%).[20] Chargers are difficult or expensive to place in multi-unit residential buildings or in residences without garages. Both situations have the potential to contribute to concerns about the distance EVs can travel on a single charge.

Barrier: Environmental Impact

While environmental impact is, for most EV owners, a major motivating factor, there are two misconceptions which keep some people from buying. Two recent studies confirm that the environmental impact is a key motivation. In a study by *Plug 'N Drive,* in the Greater Toronto Area, concern for the environment is the most common motivation for people who buy an EV: "Drivers who currently own EVs in the region cited environmental benefits (36% of the time) most frequently as their top reason for doing so."[21] Moreover, a national study on the evolution of attitudes towards EVs indicates that environmental impact is a growing and main motivating factor. Between 2015 and 2018, it saw the biggest shift; "Canadians are acknowledging more and more that there is a link between the environment and the vehicle they choose and this aspect is being discussed in their peer groups."[22]

Yet, there are two misconceptions about the environmental impact of EVs which keep some people from buying them. Some prospective buyers suspect that the environmental costs of battery production (including the mining of lithium, a key but small component of EV batteries) outweigh the prospective environmental benefits of purchasing an EV. Other potential buyers believe that the environmental cost of producing electricity, in some global regions by way of coal-fired power plants, outweighs the prospective benefits of an EV.

Both concerns are common, but misinformed. While there are improvements to be made to the production of EVs (including the mining for lithium) to lessen their environmental impacts,[23] most studies see the impact of production (and disposal) of EVs to be equal to or less than gas-powered cars.[24] Furthermore, the energy supply is relatively clean, nationally and provincially. Specifically, in Ontario 60% of electricity produced is from nuclear power; 24% is hydro, and the remainder is a mix of renewables and fossil fuels. While there is room for improvement, a recent study states

[19] Accelerating EV Adoption: A Local Government Approach, 2019.
[20] Richardson, "The Trouble with Electric Vehicles – Winter," 2019.
[21] Driving EV Uptake, 2017.
[22] Ferguson et al., "The Evolution of Canadian Consumer Attitudes on Electric Vehicles: 2015-2018," 2018.
[23] Global EV Outlook, 2017.
[24] "Electric Cars and Global Warming Emissions," 2015. See also "Are Electric Cars Worse for the Environment: Myth Busted," 2018.

that Ontario is ready to "support . . . the overall electrification of transportation . . . as well as supporting national and international climate commitments."[25]

Barrier: Status
Some people seem to buy for functional reasons (e.g., the cost or range of an EV); some buy for social reasons (e.g., environmental impact). Others buy (or not) an EV for its symbolic meaning, what they believe an EV says about who they are. So, in some cases, some potential buyers are not yet convinced that driving an EV reflects who they are or aspire to be. To them, EVs might seem weak or unimportant; they might seem to be for political leftists, tech nerds, or the moneyed elite – individual identities or social groups.

The Role of Municipal Governments

While there is no single institution, level of government, or private company that can, on its own, increase EV ownership to levels that will meet or exceed national targets, it is clear that municipal governments will need to play a key role. They have local knowledge, which should inform a range of decisions, including which messages will appeal to its citizens and where to site charging infrastructure. Municipal governments also have the ability to develop building bylaws, policies, and programs that encourage or oblige charging stations or rough-ins for new buildings (commercial or residential) and parking lots. Finally, municipal governments are able to build a coalition of support, across stakeholders, for initiatives that can increase EV ownership.

That last role deserves some more explanation. On this issue, there are a lot of stakeholders – different levels of government, non-governmental organizations, and private companies, all of which are needed to raise EV ownership within a community. In Canada, the federal government has set targets and is offering grants for charging infrastructure and rebates for the purchase of EVs. In years past, the Ontario provincial government invested heavily in rebates for purchases. Private companies – Canadian Tire, Petro Canada, and the private division of Hydro One and Ontario Power Generation, among others – have developed or are developing their own networks of chargers.

In other communities, business associations, environmental NGOs, and car dealerships have all contributed to successful EV strategies. The EV strategy for the City of Edmonton, for example, identifies the need to work with private business to support the installation, location, and promotion of EV chargers. An NGO in Guelph highlights the work of a local car dealership, which supports promotional campaigns for EVs. And already the Municipality of Clarington is working with partners in the regional government and other institutions to develop a charging network. There are also possible relationships with real estate developers and construction companies, car dealerships, local businesses and their associations, community environmental NGOs, EV community groups, and utility companies – all of which can support or amplify the effectiveness of an EV plan.

[25] Accelerating Deployment, 2016.

Indeed, the special role for a municipal government is to bring together and work with all of these stakeholders. According to The Framework for Municipal Zero Emission Vehicle [ZEV] Deployment, “There is no single action, or actor, that can accelerate the deployment of ZEVs in municipalities. Rather, accelerating the deployment of ZEVs in municipalities requires multiple concurrent and consecutive actions executed by the municipality and its diverse group of stakeholders.” [26] For that reason, the recommendations in this report reflect Clarington’s current situation and identify a series of actions that will make it easier to work with all of the stakeholders.

[26] Framework for Municipal Zero Emission Vehicle Deployment, 2019.

Clarington: Realities and Opportunities

Any good EV work plan speaks to the specific realities within its community – and identifies the opportunities to increase EV ownership. That is why the City of Edmonton, for example, engaged in a multi-stage market research project before writing its EV strategy. It's also why the success in Guelph can be traced to a deep awareness of the culture of the community it serves. This section presents a snapshot of a series of realities in Clarington. In doing so, it highlights some key features that should help shape its EV work plan.

Realities

Topography

The eastern-most municipality of Durham region, Clarington, is a mix of smaller urban centres and sprawling ruralscapes. The majority of Clarington's population resides within the small urban hubs of Bowmanville, Newcastle, Orono, and Courtice. The remainder of the municipality is comprised of large swaths of rural areas, including farmland and conservation spaces. In the Transportation Master Plan, Clarington is described accurately, as "a transition community between the highly urbanized regions to the west and the more fully agrarian and rural counties to the east. Clarington is not an urban centre, though it contains urban centres, and to name Clarington as a fully rural municipality would be an oversimplification."[27] There are two main conservation areas: the Oak Ridges Moraine and the Greenbelt.

Demographics

Clarington currently has a population of approximately 95,000 citizens and has seen an 18% growth from 2008 to 2018. The average age of a Clarington resident is 39. The people of Clarington have an above average income when compared to the rest of Ontario and Durham region. The average total income for a Clarington household is between $95,753 and $109,266.

Population Increase

Like most municipalities in Durham region, Clarington is projected to experience significant growth in the next decade. By 2031, Clarington is expected to grow to a population of 140,000. Employment is anticipated to grow at a similar rate. In 2011, there were approximately 22,500 jobs in Clarington; by 2031, it is predicted to have 38,500. The majority of this growth is planned to take place in Courtice, Bowmanville, and Newcastle.

Commuting

Of the 95,000 people who live in Clarington, nearly half commute every day, with an average of 2.3 trips per day and a median trip length of 7.3 km for drivers. Of these commuters, approximately 73% commute as the primary driver, 15% commute to work, 47% commute home, and 38% commute for a different reason. Only 24.5% of the people who live in Clarington work within the municipality, but the majority work within

[27] Clarington Transportation Master Plan, 2016.

the surrounding Durham region which is a maximum distance of 50 km (Orono to Pickering) and 3,000 residents of Clarington work from home.

On average, someone who resides in Clarington is making multiple trips a day with an average trip length of 7.3 km for drivers and 4.8 km for passengers. 10,000 people commute only travel 10 minutes and 15,000 people commute an average of 15-30 minutes a day. 11,000 people stay within the municipality for their daily commute. For all ages, the residents in Clarington commute 5.6 times a day on average, while residents over the age of 11 commute 2.3 times a day.

Income
Durham region has an average household income of $95,400 which is $25,100 higher than the Canadian household average income and $11,100 more than the Ontario household average income. That pattern in the region holds for Clarington. Clarington has approximately 33,000 households, and 45% of those households make over $100,000 annually. The average total income of all households surveyed in 2015 in Clarington is $95,753 (before taxes). A one-person household's average income was $46,277. The two-person median income was $107,398.

Education
Of Clarington's population aged 24-64 years old 9% have no degree, 26.9% have a high school equivalent, 7.8% have an apprenticeship or trades diploma (which is 1% higher than the rest of Durham region), 35.7% have a college level diploma (which is 5% higher than the rest of Durham region), 16.3% have a university diploma or degree (which is 4.7% lower than the Durham region average), and only 3% of Clarington's population have a masters or doctorate degree (the Durham region average is 4.8% of the population).

EV Ownership
In Canada, approximately 7% of registered vehicles are some form of an EV. In Clarington, there are 129 EVs, approximately 38,000 drivers and 59,400 cars meaning only 0.2-0.3% of Clarington's registered vehicles are EVs.

EV Supply
There are very few EVs in Durham region. Our team surveyed all of the manufacturer's dealerships in Durham region, and asked how many EVs they had in stock and what models. The results are revealing. Of the 33 dealerships we contacted, 24 of them had no EVs available. One dealership had 15 which had just arrived; three had between 3-5; one had 2; and four had 1 (usually a demo, available for test drive).

Just as revealing are the comments made during the surveys. A few dealership representatives indicated the EVs on the lot were ready for testing, loan, and/or purchase. One indicated that they allowed theirs to be loaned for a period of two days. Most of the comments indicated the delay and difficulty of getting an EV:

- We can order them, generally don't see a lot of them.
- Ordering takes about 8 months and no one has them.

- No dealerships have them, you have to order them in.
- They're built when you order; the one here is to test drive. Then you have to order it. It gets built in about 3 weeks.
- It takes about four months to order other EVs.
- We have some on order but none in stock.

Clearly the supply is low; what's difficult to tell is if it's a cause or an effect of the low EV ownership in the community.

Opportunities

These realities suggest that Clarington has multiple opportunities to increase EV ownership.

Room for Growth
There is ample room for growth. With the current low rate of ownership and the projected population growth, there is a lot of potential to increase EV ownership. The market is not saturated. Such a low rate of ownership suggests that already-proven strategies, such as direct-experience campaigns; an investment in visible, publicly-accessible chargers; and communication efforts which raise the public's level of awareness and knowledge of EVs, will have immediate and significant impact.

Reasonable Distances for Commuting
A common barrier to buying an EV is the suspicion that it won't be able to travel long enough without needing a charge. In Clarington, the average commuting distances seem to be well within the capacity for most EVs (which tend to average 200 kms per charge).

Customer Profile
Demographically, residents of Clarington seem to have some features common to the conventional EV owner. In the GTA, EV owners tend to identify as male, see themselves as tech-savvy, are well educated (with a university education, almost half with a graduate or professional degree), and have a high household income ($114,300 on average, compared to $83,100 on average for owners of gas-powered vehicles). These features seem to correspond with some Clarington residents, where there are some equivalent levels of higher education and some higher than average household incomes.

Potential for Home Charging
A very high percentage of Clarington's citizens live in a single-family home, which has the potential to make home charging easier. The majority of charging (80%) happens at home; so, accessible in-home charging – easier to install in single-family homes with driveways and garages than multi-unit residential buildings or homes with only street parking available – has the potential to reduce range anxiety and encourage EV ownership.

In fact, some research suggests that in-home chargers are more effective in boosting EV ownership than publicly accessible chargers. A recent academic study suggests that availability of in-home charging is a stronger predictor of EV interest than awareness of publicly-accessible chargers.[28]

Environmental Awareness

Since environmental impact is the main driver of EV ownership, Clarington residents have the potential to be interested in becoming EV owners. The *Priority Green Clarington Community Survey* highlights that awareness:

- respondents indicated enjoyment of the municipality's green spaces and proximity to amenities
- respondents showed a strong understanding of ways to become energy efficient, conserve water, access renewable energy, and use environmentally favorable materials
- many respondents (69%) were "totally likely" to make green home improvements if undertaking renovations; the main barrier that stopped residents from making greener choices was the cost
- almost 80% of respondents stated protecting the environment to be more favorable and important than developing lower density homes
- 76% of respondents "totally agreed" Clarington should become a leader in environmental issues while striving to be the greenest community in Ontario
- a significant portion of respondents believed Clarington disagreed or remained neutral to the statement "Clarington is doing a good job at protecting the environment and promoting energy conservation"

The majority of people surveyed indicated they are willing to make changes necessary to mitigate GHG emissions and adapt to new environmental conditions.

More generally, the access to large rural areas, including farmland and conservation areas, means that people might be ready to hear how they can best protect these natural spaces. An environmentally conscious vehicle purchase might be one (though indirect) route to protecting the current natural spaces that take up large parts of the municipality.

These sentiments seemed to be echoed at the level of Clarington's municipal government, where there seems to be recent and broad support amongst newly elected councillors for EV initiatives and the CAO. Supported by the municipal government's corporation, two applications for federally-sponsored funding for EV infrastructure have been submitted to Natural Resources Canada. The first has been successful; the second is still being evaluated.

[28] Bailey, Miele, Axsen, "Is awareness of public charging associated with consumer interest in plug-in electric vehicles?" 2015.

Recommendations

The recommendations that follow are shaped by the data and observations outlined in Context section. The report offers the background and explanation for each recommendation.

Planning

Scope

Background

Successful EV plans have at least two identifiable qualities. They are comprehensive and responsive. In some communities, the temptation has been to focus on a single action – usually, publicly accessible charging infrastructure – to raise EV ownership. That has had some notable but limited effect. More successful plans are comprehensive, like the one in Guelph. With the highest rate of EV ownership (171% above the provincial average), Guelph has a comprehensive approach, one with a range of actions, including a modest investment in publicly-available charging infrastructure, a strong communications campaign (led by a local NGO), a working relationship with a dealership, and a series of building policies and recommendations, mostly for new parking lots and new residential homes. According to *Framework for Municipal Zero Emission Vehicle Deployment*, "There is no single action . . . that can accelerate the deployment of ZEVs in municipalities. Rather, accelerating the deployment of ZEVs in municipalities requires multiple concurrent and consecutive actions executed by the municipality and its diverse group of stakeholders."[29]

Successful plans are also responsive, acting on an understanding of the communities they serve. For example, the City of Edmonton's plan was developed after long stages of stakeholder engagement and market research. The City held broad and inclusive workshops (drawing on expertise of academics, EV owners, city staff, and business representatives) and carried out one-on-one interviews and surveys (estimated at more than 1,500), collecting key insights about that community's barriers to purchase and operate EVs in Edmonton. The understanding from those workshops and consultations led to the development of specific recommendations for that community.

Recommendation

1. Implement a comprehensive set of specific actions, which are responsive to an evidence-based understanding of the community.

Explanation

Whether the Municipality uses as its foundation this document or develops a complementary EV working plan, the resulting actions must be comprehensive (addressing supply-side challenges; developing building policies and programs; encouraging charging infrastructure at work, home, and in the community; and building awareness for various levels of understanding of EVs).

[29] *Framework for Municipal Zero Emission Vehicle Deployment*, 2019.

The actions in the EV plan must also be responsive to the municipality's current situation and grounded in an evidence-based understanding of the community, some of which are articulated above in the snapshot. In this case, the actions should account for Clarington's relative economic prosperity, its continued and future growth, the high number of single-family homes, the low supply of EVs, the interest in environmental sustainability, and the manageable commute distances.

Coordination / Political Support

Background
Any successful plan to increase the number of EVs in a community depends on political support. One way to show that support is to make sure that the EV working plan is connected to or even a consequence of longstanding climate change or transportation planning or community visions. By situating the EV working plan within long-range or consecutive planning processes, the Municipality can communicate the strength of its intentions and ensure that citizens take seriously the efforts to increase EVs (in the short term) and address climate change (in the long term).

The City of Edmonton's EV strategy, for instance, is the result of a strategic planning process that built on existing policies and stakeholder engagement. The policies that set the foundation for *Edmonton's Electric Vehicle Strategy* existed at the provincial and municipal levels. At the provincial level, the government set a target to phase-out coal and establish carbon pricing by 2030. At the municipal level, the council initially developed a long-range vision for the City, articulated in *The Way Ahead, 2009-2018*, which emphasized the values of sustainability and resiliency. That vision set the stage for the development and approval of a community energy plan six years later, titled *Energy Transition Strategy: Building a Climate Resilient Edmonton*, which was created to address and mitigate climate change through the reduction of GHG emissions, by increasing energy efficiency and promoting renewal energy systems. Because that plan identifies that transportation accounts for thirty percent of Edmonton's GHG emissions, council requested a specific EV strategy, which became *Edmonton's Electric Vehicle Strategy*.

The City of Kingston provides another good example of the necessary political support. That support took a few forms. A suite of municipal documents – *Kingston's Climate Action Plan* and the *Corporate Climate Action Plan* – set the stage for the EV strategy. Moreover, the City had recently committed to a Smart City plan, with a goal to find "green solutions that serve Kingston's people." The council also expressed their enthusiasm for the EV strategy, by encouraging and funding a more ambitious plan.

Recommendation
2. Develop a plan that builds on existing municipal visions and policies.

Background
The Municipality of Clarington already has a series of initiatives, policies, and plans which signal its commitment to sustainability issues. Specifically, last year, the Municipality's CAO distributed a memo indicating interest in developing a community EV

plan. At the Regional level, the *Durham Community Climate Energy Plan* identifies transportation as a main contributor to GHG emissions and recommends the development of an "Electric Vehicle Joint Venture" that would promote the adoption of EVs across the region.

As the EV plan is developed for Clarington, it should reflect and build on these current statements, plans, and efforts to reflect their commitments, coordinate projects, and present a consistent message.

Relationships with Dealerships

Background
It's clear that there are very few EVs in Durham region. In some ways, that is a function of or even caused by the low demand. Companies which make and distribute EVs tend to direct their supply towards markets which are more likely to buy them. In our interviews we were told (anecdotally) that cars in Canada had been directed in large measure to Quebec and British Columbia, two provinces with provincial-government-led interventions. That tends to happen on a national level, with EVs heading to larger markets instead of, say, Canada.[30] In fact, one dealership even told us that it was unpredictable when more EVs would arrive because they go first to the States, the hotter, larger market.

Recommendation
3. Consult with dealerships to let them know the Municipality's plan to encourage EV ownership; work with them to identify partnership opportunities.

Explanation
The difficulty of finding an EV in Durham region and the relatively low EV ownership numbers in Clarington indicate that, currently, there are significant barriers which owners are unable or unwilling to overcome (at the moment) and a lot of opportunity to increase private EV ownership. One way, usually overlooked, is by increasing the supply of EVs, making them easier for potential customers to find and buy.

The Municipality of Clarington should work with car dealerships to help them understand the political commitment to EVs and help them be ready to meet, if not encourage, the public's interest. In an interview, Amy Burke, Senior Planner, made clear that the Municipality could not ask businesses to stock specific products; but there is some minor influence that is possible. The Municipality could make businesses aware of political support and potential consumer demand.

Indeed, there is precedent for doing making businesses aware of political support and potential consumer demand. For example, when the Region of Durham introduced the green bin program, representatives from the regional government met with local retailers to explain the standards for biodegradable bags; that way, the right bags would

[30] Clairman, "EV Rebates and Fleet Opportunities," 2019.

be on the shelves, and retailers and customers would experience less frustration with the program.

Moreover, this kind of relationship is partly responsible for or a product of the success in Guelph. A local dealership sees the value of providing all kinds of EVs, even ones sold by other manufacturers, to its customers, along with free charging on the premises. That dealership also supports local exhibitions of EVs by providing vehicles. It has, according to an interview with an NGO located in Guelph, been a key feature of the dealership's long-term success and the community's high interest in EVs.

As the Municipality builds this relationship with local dealerships, it could consider

- co-sponsoring or co-hosting EV exhibition events,
- agreeing to non-monetary or low-cost rewards for EV owners, and/or
- recognition and promotion programs for dealerships who provide EVs.

Building Policies and Programs

Background
A combination of supply-side and demand-side interventions are more likely (than a single-sided approach) to make a significant impact on the number of EVs in the community.[31] One key area affecting demand is charging. It is a major barrier for people considering an EV. Wary of the distance an EV can travel on a single charge and largely unaware of the actual distance they commute daily or even weekly, potential, even reluctant buyers tend to overestimate their need for charging outside of the home, even though that's where most charging (approximately 80%) eventually takes place. For that reason, it is common that municipalities influence demand for EVs by requiring or encouraging charging in single-family homes and multi-unit residential buildings. Some municipalities even encourage or oblige (through policy) new commercial or public builds (from lots to buildings) to include a specified number of chargers or charger-ready parking spaces.

In all cases, whether dealing with retro-fitted residences or new commercial, institutional, or residential builds (either through rezoning or development applications), there are different levels of requirements available to a municipality:

- requiring a percentage of spaces to have chargers (usually around 20%), and
- having all stalls roughed-in, ready for chargers (this option has varying degrees of readiness), and
- having all stalls completed with a level-2 charger.

Whatever requirements are selected by a Municipality, they should be evaluated against a series of criteria. There is no perfect option which meets all criteria; but a Municipality needs to be aware of the potential advantages and drawbacks of its selection.

[31] Wolinetz and Axsen, "How Policy Can Build the Plug-In Electric Vehicle Market: Insights from the REspondent-based Preference And Constraints (REPAC) Model," 2017.

The criteria are:

- minimized upfront costs,
- minimized retrofit costs,
- ease for the municipality to approve and inspect,
- equitable for users, and
- maximized future choices, in case of a shift in technology or provider.

For a detailed examination of the different levels of requirement mapped on to these criteria, please see Appendix C. For a list of what some communities in Ontario and British Columbia have done, please see Appendix D.

Recommendations
4. Continue identifying building policies that would allow or encourage builders, especially those of new single-family homes, to incorporate EV-charger ready infrastructure.

5. Work with builders and their associations to identify partnership opportunities.

Explanation
Clarington is facing a period of tremendous growth, with a significant number of new residences. The Municipality should focus first on policies or programs that oblige or encourage at least roughed-in infrastructure, so that new owners have the potential to add EV chargers, with dedicated circuit and wiring outlets. This strategy minimizes retrofit costs, is simple to manage, equitable, and maximizes future choices.

These requirements should only be developed after consultation with builders and their associations. Consultation – which includes raising awareness on issues of cost, projected EV ownership growth, and rough-in requirements – is a key step in removing some of the barriers for EV purchase.

Charging Infrastructure

Timing
Background
Publicly accessible chargers are a frequent, even necessary, part of any municipal EV strategy. But the number of chargers installed and maintained by Canadian municipalities varies, as does the overall timing and approach to funding.

62% of Canadians say that they would be more likely to purchase an EV if more public charging was available. The perceived availability of public charging is a significant barrier to purchasing an EV, even though the majority of charging eventually takes place at home. That perception might explain why the federal government seems to be expanding its strategy from funding point-of-purchase rebates to funding the installation of charging infrastructure. When asked about the government's commitment to helping Canadians find an electric car or an alternative to fossil fuels, Jonathan Wilkinson, the

Minister of the Environment and Climate Change, said that “the bigger issue with electric cars is the lack of a full-fledged infrastructure.”

Some municipalities – especially large urban centres – have made infrastructure a major focus of their EV strategies. For example, the City of Montreal’s Transportation Electrification Strategy aims to “roll out a network of charging stations to support the desired gradual conversion of Montreal’s automobile stock” and intends to finish installing 1,000 charging stations this year. In Vancouver, its EV Ecosystem Strategy aims to increase charging infrastructure by developing charging hubs to support residents, commercial fleets, and EV taxis; increasing the visibility of its Level 2 chargers; and by testing curbside charging for commercial and residential properties without garages.

But in our research and interviews, smaller, mid-sized municipalities (with a mix of urban and rural centres) seemed to be cautious about investing in charging infrastructure on their own. For example, the City of Guelph has resisted initial heavy investments in charging infrastructure. Instead, the City opted for a few well-placed chargers to indicate support for EVs, and allowed a local NGO to raise awareness. Only after a prolonged period of building awareness has the City invested in more chargers, arranging for 20 stations to be installed across the city (in addition to 24 already at the University of Guelph) in major hotspots like performance arts centers, museums, hockey arenas, community centers, and parks.

The City of Kingston, which invested heavily in charging infrastructure by installing 48 chargers in just under 2 years, indicated that it might not make that same investment today, since private companies (Petro-Canada and Hydro One / Ontario Power Generation are examples) have announced major investments in charging networks. For its part, the City of Edmonton doesn’t want to carry the full cost of installing and maintaining charging stations, so it has looked for public-private partnerships.

Recommendation
6. Phase-in charging infrastructure.

Explanation
The Municipality of Clarington should provide publicly-accessible charging stations, but should phase them in. The reluctance of other municipalities of a similar size and a similar stage in the development of their EV strategies to make heavy and immediate investments in charging infrastructure is instructive. A careful approach – one that phases in chargers, sites them according to agreed-upon and well-tested criteria, and ensures that there is a comprehensive service plan – will ensure that the investments made by the Municipality have a significant and long-term impact on private EV ownership.

The Municipality has made some modest plans for chargers. It has already been awarded funding through the Natural Resources Canada Zero Emissions Vehicle Investment Program for 9 chargers; and has joined an application for an additional 18 chargers for use by the municipal fleet.

This current plan for investment in chargers has the potential to signal to the community the Municipality's support for EVs, perhaps the primary function of government-sponsored, publicly-available chargers. Summing up that situation, an advocate for EVs that was interviewed by our research team has called publicly-accessible chargers marketing devices, signaling community (or political) support for EV ownership but not actually providing necessary charging.

Further investments should come only after the municipally-sponsored chargers prove to have high-demand or are useful in areas underserved by other private networks. Instead, more consideration should be put into public-private partnerships (to offset the costs of installing and maintaining chargers and to signal support for community-based sustainability efforts) and offsetting the cost of in-home chargers.

Supplier Relationship

Background

There are many different suppliers of EV charging stations; and every supplier offers a different range of options, some including EV equipment, installation, data management, and service and maintenance.

Recommendations

7. Decide on the nature of the relationship with the suppliers of EV charging stations.

8. Ensure there is a comprehensive service plan for all municipal charging stations.

Explanation

Before deciding on a supplier, the Municipality needs to decide the range of services it would like to provide and the services a supplier should provide. The decision about the supplier and its services will need to be made early, so that any aspect not covered by that relationship can be planned for by the Municipality. For example, if the Municipality is looking to only purchase equipment, it will need to develop a plan to install, manage data, and provide service and maintenance for the chargers.

Whichever supplier the Municipality chooses (with whichever service options), it needs to ensure a comprehensive service plan for all municipal charging stations. Data must be collected (on use and users); and service and maintenance plans are key. It is a common understanding, shared by charging network companies and experienced municipalities, that users must have a good experience when they use a publicly-accessible charger. Because there are already so many barriers to purchase an EV, chargers must be in a state of good repair, clean, and accessible. A broken, dirty charger, in a difficult to reach spot is almost worse (or more discouraging) than no charger at all.

Siting

Background

A phased-in approach is important, so that the Municipality doesn't over-invest in a charging network and so that it can locate initial and future chargers in strategic

locations. In our interviews, charging infrastructure companies and experienced Municipalities identified three common guiding principles, to be used separately or in combination: use, attraction, accessibility.

- use: if chargers are sited according to their potential use, then they are located in high-traffic areas, where there will likely be EV users, such as community centres or along highways.
- attraction: if chargers are sited according to their potential to attract users, then they are located in zones that would benefit from more traffic; following this siting guideline has the potential to lead to public-private partnerships.
- accessibility: if chargers are sited according to their accessibility, then they are located in places that are underserved by the charging networks installed by private companies.

The municipalities we surveyed emphasized different criteria when siting chargers. Guelph, for example, seemed to emphasize use, siting chargers at the local university, community centres, and downtown parking lots. The City of Kingston located chargers downtown, in the hopes of pulling people off the nearby highway, where chargers were already being installed by private companies. The City of Toronto's assessment-phase report seems to emphasize accessibility, seeing EV mobility as a social equity issue; it cites actions and plans in Seattle, Portland, and Vancouver that aim to help people in lower-income neighbourhoods have access to EV transportation and charging networks.

Recommendation
9. Decide on locations for charging stations, emphasizing first use and then accessibility.

The Municipality of Clarington should site its first chargers in locations with heavy traffic, where drivers are likely to park for longer-terms: community centre parking lots, soccer field parking lots, and popular retail zones. If placed in highly-visible locations, the chargers will signal the Municipality's interest in EVs. Subsequent chargers should be sited in locations that are underserved by private charging networks. While charging infrastructure companies suggest that it is possible, even likely, that chargers attract customers, the research is preliminary, tentative, or misleading.

Cost Recovery

Background
Any EV strategy, particularly one that involves municipally-provided and municipally-maintained chargers, requires financial investment, some of which can be offset by grants and user fees. While municipalities usually purchase Level-2 chargers, both the cost of the chargers and its recovery vary across communities. The cost itself is dependent on the supplier, the experience of the installer, the number of chargers purchased, the service package, and the grants available and obtained. Also, expanding the range of potential costs, some chargers must be installed by the provider or at least validated by the installer. Others must be installed by the municipality (an option which might save initial money, but the lack of experience may be costly).

The costs encountered by the City of Kingston give a representative impression. Supply, installation, and commission of each Level 2 charging station in Kingston was estimated to cost up to $15,000. It cost Kingston approximately $230,000 to install their two Level 3 chargers downtown, offset by a $100,000 grant from the federal government. Overall, the City estimated a $35,000 impact in electricity costs and a $25,000 impact for maintenance for all their stations.

Most municipalities initially offer free access to the chargers, since their main goal is to raise awareness and reduce range anxiety. Rather, costs start to be offset or recovered, once the charging stations begin to charge a fee, usually after about a year.

To decide on costs, municipalities tend to survey surrounding communities for the market price for charging; and set a price that recovers partial costs of the maintenance of the chargers.

Fees are usually a flat rate (per session) or based on time. For example, a hospital in Monterey, California charges $6.50 per session regardless of how long the user charges their car. However, it is more common in Canada to implement an hourly fee, usually ranging from $1.00 - $2.00 / hr. Currently in Canada, fees cannot be based on the kilowatts used per hour; that kind of fee is governed by federal policies, which are under review but have not yet changed.

Location	**Pricing Model**
Monterey, California	$6.50 / session
Vancouver	$2.00 / hour
Ottawa	$1.00 / hour
Quebec City (240 volt chargers)	$2.50 / session or $1.00 / hour
Richmond	$2.00 / hour for the first two hours; $5.00 for every hour after
London	$1.50 / hour (plus $1.50 / hour for parking, where applicable)

Recommendation
10. Phase-in a cost-recovery plan.

Explanation
The Municipality of Clarington should phase in a cost-recovery plan by initially offering free charging for a selected period of time to raise awareness and increase usage. After that, the Municipality should implement a fee of $1.00 -$2.00 / hour, which is the

standard for Level 2 chargers. Level 3 chargers could have a fee of $15.00 - $20.00 / hour, a market standard.

Since communities take different approaches to pricing, the eventual price should be set so that it recovers some if not all of the costs associated with the price of the charger, its installation, maintenance of the charger and its site (including snow removal), and data management.

Incentives for Purchase

Background
For some people, cost is a major barrier to purchasing an EV. However, in general, municipalities do not have access to the amount of money that it would take to offer meaningful rebates for purchasers of EVs.

Recommendation
11. Offer a low-cost reward and recognition program for people who purchase EVs.

Explanation
The Municipality of Clarington should offer a reward and recognition program for people who purchase EVs, less as a way to incentivize the purchase directly and more as a way to indicate the Municipality's support for the purchase of EVs.

There are a number of possible forms of reward and recognition for new EV owners:

- free or discounted charging on Municipal chargers for a year,
- discounted in-home charger and its installation,
- prioritized parking spaces within the municipality,
- rebates for municipal programs and attractions,
- personal congratulatory letter from the Mayor,
- box seats to an upcoming OHL game, and/or
- invitation to be an EV ambassador in the community.

Organizational Structure

Background
An EV plan is potentially challenging to manage because it draws on the resources of many different departments and because a municipality can lose interest as new priorities arise. To mitigate these difficulties, a municipality can choose a centralized or decentralized approach to managing the EV plan.

A centralized approach to coordinating an EV plan has one person overseeing its implementation. The benefit to this approach is that a single coordinator can manage the various responsibilities that cut across departments. They would be the go-to resource and leader of the plan – someone who can help avoid miscommunication and coordinate efforts, without distraction. A good example of this approach is the City of

Kingston's organizational structure. Kingston has a dedicated coordinator of the EV plan, who over oversees the development, implementation, and outcomes of the strategy, usually by coordinating, bringing together, and monitoring departments as they implement their own contributions to the EV strategy.

A decentralized approach has numerous people or departments in charge of the EV strategy. In this kind of approach, it's more likely that these departments are responsible for their own duties and objectives. The City of Toronto follows this decentralized model. Toronto has departments working together to reach one goal. They have a carefully laid out plan that outlines the expectations and guidance for each department on their own, and as a team.

Two factors that a municipality must consider when deciding on an organizational structure are the scope and stage of the working plan. The scope refers to the complexity of the objectives the municipality wants to implement. For example, Toronto is a larger city, and therefore has a more ambitious strategy. Kingston is a smaller city, so their plan focuses largely on the implementation and upkeep of charging infrastructure.

The second factor is the stage of the working plan, whether it is in its early stage of development and implementation or whether it has matured into a comprehensive, consistent, and reliable program. In its early stage, a centralized approach would be better, in large part because the EV strategy might need someone to champion its development, rally excitement, and coordinate all the aspects of a new program. In a later stage, an EV working plan might benefit from a more decentralized approach, allowing the various departments to carry out their responsibilities.

Recommendation
12. Because of the scope (small) and stage (early), opt for a centralized approach for developing and implementing the EV working plan.

Explanation
Because of the scope and stage of the working plan, the Municipality of Clarington should have one person providing leadership for the EV strategy. To avoid miscommunication and to encourage the implementation of the plan, one person should lead the development and implementation. This centralized model would provide various departments with one person they can rely on to direct and consult with about their role in the EV working plan.

Of course, a single person leading the plan should have a set of clear goals, roles, and responsibilities for each department. This would reduce the chance for miscommunication and prepare for a later, more decentralized organizational structure.

Communication

Background
Effective communication is essential for any environmental issue or initiative. Good policy is not enough. Even the most careful and well-intentioned policies can be derailed if not communicated effectively. According to environmental communications expert, Sylvia Rowley, clear and inspiring communications can "reframe the debate on climate change, shifting public perceptions so that people are more receptive to targeted campaigns and legislation . . . By improving their communication, politicians could build stronger support for policies and reduce the likelihood of a public backlash."[32] For a summary of six principles for effective communication about environmental issues, please see Appendix E.

Best Practices for Communicating to the Public About EVs
Along with the six general guiding principles for environmental communication, our research has found the seven best practices for communicating about EVs that should be included as part of a robust EV working plan. These best practices include: knowing your community culture, knowing your target audience, choosing an ambassador to propel EV adoption, developing an ongoing plan, consulting widely, and providing education and demonstration.

Know your community culture.
Understanding community culture is important for an effective EV communication plan. Research has found that people are more willing to accept policy change if it speaks to the values that they hold. Community culture is expressed in the biases, values, traditions, and beliefs that are held within the community. There are many socio-economic and geographic factors that affect how a community forms the basis of their culture, including age, income, education, and geographic location.

The best way to gain deeper insight into community culture and perception of EV initiatives is by holding events aimed at gathering feedback about EVs. By asking questions and actively listening to citizens, the local government can learn what aspects of EVs are most important to the community and what messages the community needs to hear to overcome common barriers to ownership.

Know your target audience.
The better you know your target audience, the better you'll be able to attract them with the right message, delivered in the right way, and at the right time. The more clearly you define your target audience, the better you can understand how and where to reach your best prospects. You can start with broad categories like millennials or new drivers, but you need to get much more detailed to achieve the best possible results. Your target audience should incorporate important demographic and behavioural characteristics from data compiled on the EV market in Clarington, as well as the typical EV buyer profile. The typical EV buyer

[32] Rowley, Introduction, 2010.

- is a homeowner
- is highly engaged with the environment and technology
- is educated with a graduate degree
- has a household income of $90,000 or more
- has access to at-home charging, with 75% Level 2 chargers[33]

By specifying its target audience, the Municipality of Clarington will be well-equipped to develop an EV education program and target-audience statements. Some initial target audiences are early adopters, those who are aware and interested, and skeptics.

Use ambassadors to propel EV adoption.
The purpose of an EV ambassador is to play a key role in accelerating the adoption of EVs. Volunteers from within the community and with first-hand knowledge of EVs, ambassadors share their experience and expertise with potential buyers in order to promote a positive image of ownership. EV ambassadors can offer consultations to prospective owners, provide their vehicles for display or demo rides, and answer technical and non-technical questions about EVs. In this way, EV ambassadors are an important way to influence prospective buyers and possibly normalize EV ownership.

Build a plan that is continuous.
It is important that EV communication is continuous. There is often a temptation to offer a sporadic communication plan that is focused on a single event such as a car show or new charging infrastructure.

It is crucial to have an ongoing plan that follows two phases; initial education and continued progress. Within the first 6 months to a year the focus should be on initial education about EVs to ensure the community is knowledgeable. Later, there should be focus on the progress that has been made and a celebration of that success.

Consult widely.
When communicating an EV strategy, it's important to communicate with a variety of stakeholders – not only the eager and early adopters. Speaking with and listening to people who are more reluctant as well as businesses and various stakeholders (including dealerships, business associations, and environmental groups) will help the municipality understand the range of barriers to ownership and the unique opportunities within the municipality to create a communal approach.

Provide education.
According to the City of Edmonton, education is one of the best ways to dispel the myths surrounding EVs and help people overcome the barriers to purchase. For example, when the City of Edmonton found that people were wondering about EV performance in winter conditions, the City turned to its social media platforms, the website, and social events to educate the community.

Ensure opportunities for EV demonstration.

[33] Axsen et al., "Electrifying Vehicles: Insights from the Canadian Plug-in Electric Vehicle Study," 2015.

President and CEO of *Plug 'N Drive* says, "Butts in seats sell EVs" – and for good reason. Recent evidence-based research (including our own interviews) shows that the best way to sell EVs is to put people in them. It helps to familiarize, even normalize, EV ownership for consumers who don't know anything about them or who misunderstand key features of EVs.

Events in Guelph are good examples of how to raise awareness about EVs. In Guelph, the NGO eMERGE holds a unique annual car show as a strategy to normalize EV ownership. When conceptualizing this strategy, eMERGE aimed to capture the interest of as many Guelphites as possible in order to encourage the adoption of EVs in the community – but their choice of venues and their event organization soon became a way to raise awareness within a community already familiar with a culture of sustainability. Key features of eMERGE events are:

- selecting an impactful date and time for the event, usually planning it alongside other major events happening in the community (from OHL games to car shows to church gatherings),
- if possible, attending the event a week in advance to advertise their presence,
- arranging for ambassadors to talk (in practical, non-technical ways) about their EVs, and
- getting the support of municipal councillors and local dealerships, who attend the shows, even showing off their own EVs.

The Municipality of Clarington could have these kind of events, and work with local dealerships to ensure EVs are available and on their lots for demonstration.

Recommendation
13. Develop a comprehensive and long-lasting communications plan that follows these principles and best practices, and addresses different populations, each with its own familiarity with EVs.

Explanation
There are different levels of familiarity with EVs in the community. Each level needs a message that is catered to them so they can feel good about their current or future EV purchase and, possibly, encourage others to also purchase an EV. Please see Appendix F for a detailed communications plan, outlining source, message, and objective of a campaign for three populations: people who are influencers, people who are aware and interested, and people who are unaware or even skeptical about EVs.

Appendix A: Interviews and Workshops

Our research team had interviews with representatives from the following:

- ChargePoint
- City of Edmonton
- City of Guelph
- City of Kingston
- eMERGE
- FloNetwork
- Ontario Power Generation

We attended the following workshops:

- Accelerating EV Adoption: A Local Government Approach
- Driving the Future
- Electric Vehicle Strategy Workshop

Appendix B: Glossary

Types of EVs

HEV: a hybrid electric vehicle (HEV) combines an internal combustion engine (which requires gas for fuel) with a battery-electric propulsion system; regenerative braking restores the battery, which usually has shorter range than almost all battery-electric vehicles; the combustion engine takes over once the battery is depleted

BEV: a battery electric vehicle (BEV) runs exclusively on battery, and must be plugged in to recharge

Types of Chargers

Level 1: a standard electric outlet, 120 volts, usually 8-30 hours to fully recharge a BEV; usually used as a back-up or occasionally at home

Level 2: usually a separate and dedicated charger, 240 volts, 4-10 hours to fully recharge a BEV; installed for $1000-$5000; common for at home charging and most publicly-available chargers

Level 3: DC (480 volts, direct current) quick charger; usually 30 minutes to charge a BEV; usually found along highways

Appendix C: Required Charging Infrastructure: Criteria, Drawbacks, and Benefits

The varying levels of required charging infrastructure have drawbacks and benefits. The following chart maps those levels on to criteria for deciding on those requirements.

	Minimized upfront costs	Minimized retrofit costs	Easy for the Municipality to approve and inspect	Equitable for users	Maximized future choices
Requiring a percentage of spaces to have chargers	yes	no	somewhat	no	no
Having all stalls roughed-in	somewhat	somewhat	somewhat	somewhat	yes
Having all stalls complete with level-2 charger	no	somewhat	yes	yes	somewhat

Adapted from *Residential Electric Charging: A Guide for Local Governments*, 2018

Appendix D: Examples of Requirements for New Residential Developments

Here are some examples of requirements for new residential developments, in Ontario and British Columbia:

- The City of Kitchener requires a minimum of 20% of parking spaces in multi-unit residential buildings (MURBs) to have rough-ins for charging stations; for parking lots in non-residential buildings, 15% of the spaces must have rough-ins and 5% of the parking spaces must be allocated as EV parking spaces

- In North Vancouver, new one- and two-unit residential buildings must have outlets capable of providing Level 2 charging; new multi-unit residential buildings must provide energized outlets capable of providing Level 2 charging

- In Richmond, in newly constructed commercial and institutional buildings, 20% of parking stalls must have an EV charger; 25% of additional parking spaces must be roughed in for future installation of EV chargers

- In Vancouver and Montreal, builders and property managers are provided with guidelines for the installation of EV infrastructure

- In Portland, when the City undertakes major public works projects, charging stations are incorporated into streetscape planning

- In Burnaby, for every new dwelling unit, every required parking space (excluding visitor and secondary suite) must be provided with energized outlet, Level 2

- In Coquitlam, in every new apartment, townhouse, and street-oriented village home there must be one energized outlet (for Level 2 charger) per dwelling unit provided

- In North Vancouver, for newly-built single-family homes, there much be capacity for Level 2 chargers in 100% of parking spaces; for newly-built multi-family homes, 20% of parking spaces must be supplied by 40A 240V circuit (in preparation for a Level 2 charger) and there must be capacity in electrical room for 100% of parking spaces

- In Squamish, in newly-built multi-family homes, 30% of off-street parking stalls in shared parking areas must have access to Level 2 charging receptacles[34]

[34] The majority of this information is adapted from *Residential Electric Vehicle Charging: A Guide for Local Governments*, 2018.

Appendix E: Principles for Effective Environmental Communication

In the field of environmental communications, there are six principles for effective communication for environmental issues.

Tell a Story
Stories help people make sense of complicated issues, and are sometimes more persuasive than facts and figures.

Be Optimistic
According to focus-group research performed by Futerra, people are more likely to act if they are given an optimistic vision of an achievable future; it gives them a common goal to work towards.[35]

Connect With People's Values
Based on research in cognitive psychology and policy development, people are more willing to accept policy change if it confirms or speaks to their values. Therefore, communication has a greater and longer-lasting effect if it speaks directly to the values that the community holds.

Be Clear and Consistent
People are inundated with a variety of competing messages and are frequently confused about a government's position. Repeated, purposeful, and straightforward communication helps people to understand a complex issue and show them how to intervene.

Be Selective When Using Metaphors and Images
Language carries with it implicit and explicit metaphors, which convey a range of assumptions affecting how people see environmental issues. Both metaphors and images in communication help to simplify issues that might seem distant or overwhelming to audiences.

Choose an Appropriate Method of Communication
There are a lot of ways to get a message to an intended audience, but communicators should be selective in the most appropriate method, depending on that method's reach and familiarity to the audience.

[35] Townsend, 2010.

Appendix F: Communications Plan

The following plan outlines the source, message, and objective of a communications campaign for three distinct populations: people who are influencers, aware and interested, and skeptical.

Influencers

These are the very first buyers of EVs and are a relatively small, specialized group of enthusiasts. Research shows that such buyers are different than the larger passenger vehicle market, with influencers having higher income and education levels, more significant pro-technology and pro-environmental values, and greater willingness to explore and experiment.

Source	Message	Objective
personal letters	these letters thank and congratulate EV influencers and encourage them to come to events to share their passion about their EVs with others	to show appreciation for EV influencers through personalization to help influencers see themselves as leaders within the community
local events	influencers act as ambassadors here; they are invited to park in a prominent parking space, and allow people to look at their vehicle and answer any questions, drawing on their experience and expertise; the ambassadors make the purchase of EVs look achievable, even normal	to help the influencers feel like they are leaders within the community to encourage others to buy an EV
consultation	at regular meetings, the Municipality consults with dedicated EV owners to hear about their experience of owning EVs in Clarington	to build a stronger community of influencers to allow the Municipality to form a stronger relationship with influencers to ensure that perspectives of real owners can be

Source	Message	Objective
		shared when decisions are being made

Aware and Interested

This is an important segment of the population that generally has characteristics more in-line with mainstream values and interests. EVs must be adopted by this market in order to ultimately become a widely accepted option.

Source	Message	Objective
EV demonstrations, where people who are aware and interested meet ambassadors and take EVs for a test drive	EVs meet the prospective buyers functional needs (when it comes to cost and distance) the technology is advanced, but not alienating EVs help mitigate the effects of climate change	to address common barriers to purchase and make a purchase more likely to normalize EV ownership
EV event promotion	print and digital campaign which presents a friendly opportunity for people to become more aware of EVs	to ensure the community is aware of the event to show residents that the Municipality supports EV ownership to show dealerships that EVs are a priority to the Municipality
EV infrastructure print and digital campaign	a print and digital campaign, including appealing signage, showing where infrastructure is, how to use it, and what proper etiquette is	to remove or reduce range anxiety to help people feel more comfortable when thinking about owning an EV (i.e., it's not a strange social world, governed by unwritten rules)

Totally Unaware / Skeptical

This group is not presently interested in buying an EV. It is possible that households in this segment may eventually become buyers, but substantial changes will likely be required in terms of policy, costs, technology, or cultural norms.

Source	Message	Objective
car show display	EVs exist and are worth considering during the next purchase the Municipality is keen to support EV owners the Municipality wants to hear concerns about EVs	to allow this population to articulate concerns to answer questions and possibly reduce barriers to show how normal or accessible an EV is
social media campaign	providing information on the municipal website about the benefits of EVs, upcoming initiatives, and information regarding where to purchase will provide additional incentive for the community to support Clarington's focus on sustainability	to educate the community about why EV initiatives are important to address (even reduce) common barriers to purchase to ensure support for those who wish to get more information to provide visibility for investments in sustainability

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