



The Strategic Counsel

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Executive Summary

CONSUMER ATTITUDES TOWARDS ELECTRIC VEHICLES

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I. Executive Summary



Executive Summary

A. Background

With a wide range of models and price points, buying an electric vehicle has never been easier. In 2017, there were over 30 battery-electric vehicles (BEVs) and plug-in hybrid electric (PHEV) models available in Canada¹. To date, 41,695 electric vehicles have been sold in Canada.²

Although recent sales data for electric vehicles (EVs) shows a record-setting total of 11,000 electric vehicles were sold in 2016—up 56% over 2015—electric vehicle sales overall remain a tale of three provinces: 95% of sales in 2016 were in British Columbia, Quebec and Ontario.

The Government of Canada is committed to developing a national strategy by 2018 to increase the number of zero-emission vehicles on Canadian roads. Advanced technology vehicles are the most energy-efficient and lowest emission choices available today and include plug-in hybrid electric vehicles (PHEVs), battery-electric vehicles (BEVs), and fuel-cell vehicles. PHEVs and BEVs use electricity from a battery that is charged using an external electricity source. There are two types of electric vehicles on the market—BEVs and PHEVs—and each has its benefits:

- BEVs produce no carbon dioxide or other emissions during operation;
- PHEVs are emissions-free only when operating in electric mode, but they may have a greater driving range

A multi-stakeholder Advanced Technology Vehicle awareness group is working with the Government of Canada to develop a Zero Emission Vehicle (ZEV) Strategy to encourage uptake of low carbon emission vehicles by Canadian consumers.

This research study explored consumer awareness and knowledge of PHEVs and BEVs, including familiarity with the technology, attitudes and perceptions as these relate to electric vehicles, to help inform the work of the ZEV Strategy Committee and future educational outreach activities.

B. Objectives

This research study has been designed to explore Canadian consumers' awareness, knowledge, and experience, as well as their attitudes towards and perceptions of electric vehicles. Specifically, the survey captures measures of:

- Knowledge and awareness of electric vehicles and supporting infrastructure (cost of ownership, cost to operate, battery life, warranty, summer/winter range);
- Attitudes towards and perceptions of electric vehicles;
- Perceived barriers and benefits to purchasing an electric vehicle;
- Where information about electric vehicles is sought or expected to be found;
- Purchase intentions such as vehicle style, size, price, budget, etc.;
- Likelihood to purchase an EV in the future; and
- Fact-based data such as the type of dwelling in which they reside and their average daily commute.

¹ Plug'n Drive, [EVs Available in Canada](#)

² FleetCarma, [Electric Vehicle Sales in Canada, Q3 2017](#)



Results of this research will inform recommendations made to the ZEV Strategy Committee and future educational outreach activities.

C. Methodology

The study was undertaken as a hybrid, quantitative-qualitative research program.

1. Quantitative Component

A survey was undertaken online, via a panel of Canadians, targeting n = 1500 completions among those who had purchased a new vehicle (i.e., not a resale vehicle) in the past two years or were planning to purchase a new vehicle within the next year. The survey was approximately 15 minutes in length. The quantitative research component aimed to assess levels of awareness of and interest in electric vehicles, including examining attitudes, perceptions, and motivators/barriers to purchase.

Sample Design

The survey was designed to target Canadians, via an online panel, aged 18 years and older who had purchased or plan to purchase a new vehicle (past purchase having taken place within the last two years; future purchase likely to occur within the next year).

The sample was designed to be proportionate across the regions. Beyond this, quotas were set for gender (an approximate 50/50 male/female split) and by age groups (proportionate to population) to ensure that the final sample is generally reflective of the Canadian population relative to these two demographic variables.

Beyond this, no additional hard or soft quotas were set. The respondent profile for income and education in terms of the final sample was permitted to fall out naturally and, as such, reflects the income and education characteristics for new car buyers in Canada rather than the general population as a whole.

Questionnaire Design and Pretesting

The survey was designed in close consultation with Natural Resources Canada (NRCan). It was pre-tested among a minimum of n = 30 panelists (15 in English and 15 in French) prior to running live in order to obtain feedback with respect to length, ease of completion, and comprehension. No changes were made following the pre-test.

2. Qualitative Component

A total of 30 one-on-one interviews were completed with electric vehicle owners. Interviews ranged in length from 40 to 45 minutes. All participants who completed an interview were offered a \$90 incentive.

Interview subjects were drawn from survey respondents who had identified themselves as owning or leasing a PHEV or EV in the survey and who then gave their consent to participate in a follow-up interview. Given the low incidence of electric vehicle ownership across Canada, survey completions did not generate a sufficient number of prospective interviews in order to complete the interviews in the required timeframe. As a result, electric vehicle owners were identified from another Canadian online panel provider. These individuals were subsequently screened to request their participation in an in-depth, one-on-one interview.



Profile of Interview Participants: Distribution by Region, Gender, and Age

The distribution of interviewees by region, gender, and age is shown below. To the extent possible, attempts were made to ensure reasonable regional coverage. Notwithstanding this, the majority of the interviews were completed with individuals residing in Ontario, Quebec and British Columbia, which mirrors the provinces with the highest sales of electric vehicles in Canada. Of the 30 interviews that were completed, the distribution by region is as follows: Quebec (12), Ontario (10), British Columbia (5), Manitoba (2), and Newfoundland (1). A total of 20 interviews were completed in English and 10 in French.

Distribution of Interviews by Region

| Province/Territory | City/Town in which Interviewee Resides | Number of Interviews Conducted | Total |
|--------------------|--|--------------------------------|-----------|
| Quebec | Greenfield Park | 1 | 12 |
| | Lévis | 1 | |
| | Longueuil | 1 | |
| | Montréal | 2 | |
| | Pierrefonds | 2 | |
| | Québec City | 1 | |
| | Ste-Julienne | 1 | |
| | Ste-Marcelline-de-Kildare | 1 | |
| | Terrebonne | 2 | |
| Ontario | Alexandria | 1 | 10 |
| | Ingersoll | 1 | |
| | Kitchener | 1 | |
| | London | 1 | |
| | Mississauga | 1 | |
| | Ottawa | 1 | |
| | Pickering | 1 | |
| | Toronto | 2 | |
| | Woodbridge | 1 | |
| British Columbia | Fort St. John | 1 | 5 |
| | Kelowna | 1 | |
| | Langley | 1 | |
| | Vancouver | 1 | |
| | Victoria | 1 | |
| Manitoba | Winnipeg | 2 | 2 |
| Newfoundland | St. John's | 1 | 1 |
| Total | | | 30 |

Most of those interviewed were men aged 35 and older.

Distribution by Gender and Age

| | 18–34 | 35–54 | 55+ | Total |
|--------------|----------|-----------|-----------|-----------|
| Men | 0 | 11 | 14 | 25 |
| Women | 1 | 2 | 2 | 5 |
| Total | 2 | 12 | 16 | 30 |



Make and Model of Electric Vehicle

The types of electric vehicles owned by those interviewed closely reflect the popularity of various makes and models according to the latest sales data. The largest share of electric vehicle owners interviewed drive a Chevrolet Volt/Bolt or a Nissan Leaf. As the chart below indicates, interviews were completed with a cross-section of those owning low- to mid-range electric vehicles (priced under \$50K) as well as those driving high-end luxury electric vehicles (priced over \$75K), such as the Tesla Model S/X and Cadillac CT6. The motivations and considerations of electric vehicle owners in terms of purchase decisions do vary to some extent according to vehicle type; these are noted as relevant in the detailed report which follows.

Distribution by Make and Model of Electric Vehicles

| Make and Model | Number of Participants |
|----------------|------------------------|
| Chevrolet Volt | 9 |
| Nissan Leaf | 6 |
| Chevrolet Bolt | 3 |
| Audi A3 E-tron | 2 |
| Kia Soul | 2 |
| Cadillac CT6 | 2 |
| Ford C-Max | 1 |
| Ford Focus | 1 |
| Hyundai Ioniq | 1 |
| Smart Fortwo | 1 |
| Tesla Model X | 1 |
| Tesla Model S | 1 |

Half of those who participated in an interview drive a plug-in hybrid vehicle (PHEV) while the other half drive a fully battery electric vehicle (BEV). It is important to take this into consideration when reviewing the detailed findings that follow, as responses differ to some degree between these two groups of drivers, specifically around range anxiety.

Distribution by Type of Electric Vehicle

| | |
|--------------------------------|----|
| Plug in hybrid vehicle (PHEV) | 15 |
| Battery electric vehicle (BEV) | 15 |

While a few respondents were very early adopters, having purchased their electric vehicle 6 to 8 years ago (i.e., 2010–2012), the majority of owners made their purchase more recently, within the last 3 years (19 out of 30 purchased in 2015 or later).

The majority of respondents purchased their electric vehicle new. Very few electric vehicle owners mentioned that they purchased their vehicle used. Again, this is relevant to perceptions of the resale market for electric vehicles and is elaborated on later in this report.

3. Fieldwork

The online survey ran in field from February 5 to 13, 2018. One-on-one interviews were conducted from February 27 to March 16, 2018.



D. Note to the Reader

Throughout this report, we refer to the following terms:

PHEVs—Plug-in Hybrid Electric vehicles, which are partially electric vehicles

BEVs—Battery Electric vehicles, which are 100% electric

HEVs—Hybrid Electric vehicles, which are not plugged into the electric grid

In the survey, these terms were explained to respondents: both BEVs and PHEVs require charging by plugging into the electrical grid system, whereas HEVs charge while running and do not require plugging in.

In the report, we frequently use the term “electric vehicles” generically to encompass both plug-in hybrid electric and battery electric vehicles.

As this is not a survey of the general population, the reader will note that reference is made to “respondents” or to “consumers” rather than to the general population, the public or Canadians. Given that the survey targeted new vehicle buyers (those who have purchased a vehicle in the past 2 years and/or who plan to purchase within the next year), inferences from these results cannot be made to the broader Canadian population at large. Readers should keep in mind that these findings reflect the views of recent new car buyers across Canada only and/or those who have indicated they intend to purchase a new vehicle within the next 12 months.

E. Key Findings

The following provides a high-level overview of key findings from both the survey and the in-depth interviews with electric vehicle owners.

1. Key Findings from the Quantitative Survey

Purchase of and Interest in Electric Vehicles

- As expected, relatively few respondents (5%) currently own an electric vehicle—3% own a battery electric vehicle (BEV) and 2% own a plug-in hybrid electric vehicle (PHEV); of those who purchased a vehicle in the last two years, similar numbers (6%) purchased an electric vehicle—3% purchased a BEV and 3% purchased a PHEV. However, interest in electric vehicles appears to be reasonably strong:
 - Among those who indicated they will be purchasing a vehicle within the next year, 31% said they would be likely to purchase a PHEV and 27% said they would be likely to purchase a BEV.
 - One in ten (12%) non-electric vehicle owners say they are “very interested” in a PHEV or BEV and would *definitely consider one* when it comes time to purchase their next vehicle. Among current electric vehicle owners, over three-quarters (78%) are “very interested” in buying another.
 - Over half of non-electric vehicle owners are at least “somewhat interested,” with about one third expressing some caveats around the purchase price and their specific driving requirements.



Familiarity with Electric Vehicles

- Just over one third of respondents know someone who owns an electric vehicle (37%) or have driven/ridden in an electric vehicle (36%). Given low levels of ownership, this number may seem somewhat high but does align with interest.
- However, when it comes to the specifics of electric vehicles including how much they cost and how they operate, consumers clearly have some questions and concerns. Most of these centre on range (only 40% are “somewhat” or “very” familiar therewith), vehicle reliability (34%), operating costs (32%), battery life (30%), and charging equipment (30%). In each case, two in five (or fewer) respondents indicated they were either “somewhat” or “very” familiar with these aspects of PHEVs and BEVs.
- Consumers are accessing information about electric vehicles from a range of sources, but primarily from consumer reports (58%), vehicle dealers/salespeople (43%) and electric vehicle manufacturers (41%). The Government of Canada (20%) is seen as a key source for some, but not to the same extent as the others.

Barriers and Motivators to Electric Vehicle Purchase

- Almost three-quarters of respondents agree that there are too few public charging stations (75%) and that these vehicles are too expensive (71%) to purchase.
 - In terms of driving range, many (74%) want assurance of a driving range of 250 km or more on a single full charge (39% want a 450 km driving range per full charge) even though most (73%) indicate they drive 249 km or less per week.
- Other barriers include worries about the cost involved in maintaining the vehicle, although opinions on this issue appear to be mixed or contradictory. On the one hand, the cost to operate is seen as a positive to owning a PHEV or BEV by almost four in five (79%) consumers. At the same time, significant proportions agree that these vehicles will significantly increase their monthly electricity bill (56%) and that repair and maintenance costs could be higher as compared to a gasoline car (47%).
- In general, it should be noted that fuel efficiency (95%) and maintenance costs (95%) rank high in terms of importance (very/somewhat) as a consideration in purchasing a vehicle.
- Proven reliability (99%) ranked highest in terms of importance as a consideration when purchasing a vehicle, not specifically an electric vehicle; two in five (42%) agree, either strongly (12%) or somewhat (30%), that plug-in or battery electric vehicle technology is too new to risk buying one.
- A driver analysis of key attitudes and perceptions related to new technologies—and to electric vehicles specifically—also underscored that greater familiarity with battery range, charging time, and vehicle performance are key motivators to raising electric vehicle purchase intent. Interestingly, and somewhat the reverse of findings reported above, one of the main motivators (or drivers of intent to purchase) is the advantage that buyers see to using electricity to power the vehicle rather than fuel. It may be the case that those consumers who express stronger, more definitive interest in the purchase of an electric vehicle have done more research and, therefore, have a better sense of the cost implications of switching from an internal combustion engine (ICE) to a vehicle that is exclusively powered by electricity. This is borne out in the qualitative one-on-one interviews with electric vehicle owners, which revealed that many had undertaken extensive research and cost/benefit analyses. As such, they had a clear picture of the advantages and cost savings associated with the switch to an electric vehicle.
- Finally, although the initial purchase price (39%) is seen as a slight (20%) or significant (18%) *disadvantage*, the subsidies do counter this to some extent—overall, just under two thirds of respondents (60%) viewed subsidies as at least a slight (29%) if not significant (31%) *advantage* to owning a PHEV or BEV.



2. Key Findings from the In-Depth Interviews with Electric Vehicle Owners

The early adopters of electric vehicles are real enthusiasts, motivated mainly by their interest in electric vehicle technology as well as by their desire to lower their impact on the environment and live more sustainably. Many have undertaken a very thorough cost-benefit analysis and say that, on top of having a positive environmental impact, they are reaping demonstrable yearly savings (which they expect to become more evident over the life of the vehicle), notwithstanding the generally higher price point for these vehicles.

For the most part, electric vehicle owners are satisfied with their purchase and were able to find the type of vehicle, in terms of size and features (including luxury details), that they were seeking. However, a specific downside that was mentioned related to the low inventory of electric vehicles in stock. While many purchased their vehicles and then had to wait weeks, if not months, to receive them, a number elected to purchase a vehicle other than the one they had originally intended to buy because it was available immediately at another dealer. At the same time, a certain degree of brand loyalty factors into the purchase decision as many electric vehicle owners are simply now rolling over their gasoline- or diesel-powered vehicle, purchased at the same dealership, to an electric vehicle (e.g., previous Chevrolet or Cadillac owners have purchased the EV version now available on the market).

Some degree of range anxiety exists among BEV owners in particular, although they seem to have adapted through better trip planning and awareness of the locations of charging stations and timing required for charging. Ultimately, this is not a huge barrier for current owners, although they do see charging infrastructure as a significant barrier suppressing broader uptake of electric vehicles in the future. Additionally, many electric vehicle owners indicated some disappointment with the battery technology in that the redirection of significant power in cold, winter conditions to heat their vehicles results in a significant reduction in driving range.

Electric vehicle owners have undertaken fairly extensive research, having closely followed the development of the technology over the last decade or more. Many have a background in or at least a high comfort level with the technology and the technical side of vehicle manufacturing. As such, they are generally at ease adapting to the slightly different driving experience electric vehicles offer and, in fact, are effusive about the overall performance of these vehicles (with the exception of winter driving as noted above). They draw principally from online, unbiased sources of information, relying heavily on consumer reports, auto magazines, blogs, podcasts, and advocacy and user groups.

With respect to federal government initiatives and activities to promote higher uptake of electric vehicles, multiple suggestions were put forward by current electric vehicle owners. Improving the charging infrastructure is at the top of their list. Other recommendations included additional incentives beyond those offered by some provinces to purchase electric vehicles and/or disincentives to purchasing gasoline- or diesel-powered vehicles (i.e., gas tax, tax on these types of vehicles). More education and awareness-raising on the economic benefits of electric vehicles (rather than just the environmental effects) combined with opportunities to test-drive were also underscored.



F. Conclusions and Recommendations

Although there is interest in electric vehicles, it could be described as “soft.” It is clear that purchase price, charging infrastructure, range anxiety, and to some extent the hesitancy to be among the first to adopt a new technology are holding back some consumers from making the leap to an electric vehicle. Getting information out to consumers about incentives (where available), operating costs, battery function, life, and range is required to both entice and reassure potential buyers.

Interestingly, vehicle dealerships and salespeople are seen as key information sources, although electric vehicle owners interviewed as part of this study were disappointed in dealers’ lack of overall knowledge of electric vehicles and/or their interest in making a sale to a highly interested buyer.

Opportunities to acquaint prospective buyers with the electric vehicle features and the overall driving experience will likely have a positive impact. Interested buyers need more opportunities to test drive electric vehicles and/or to take part in demonstrations (e.g., the Electric Vehicle Discovery Centre in Toronto, Ontario) in order to be able to discover both the economic and environmental benefits of electric transportation and get answers to their questions from electric vehicle experts, specialists and owners.

Electric vehicle owners themselves are potential ambassadors—they could be quite persuasive in touting the benefits of a quieter drive in addition to the very practical cost savings in terms of operation and maintenance. Although recommendations from friends and family are not identified as a top information source, they are at least somewhat important as a factor or consideration in the vehicle purchase decision.

Currently, electric vehicles remain somewhat of a curiosity. Many non-electric vehicle owners have questions principally around driving range and charging. While it is difficult to accurately forecast the sales trajectory for electric vehicles in the coming years, this research suggests that reaching a critical mass or wider diffusion of this technology could occur quite rapidly with more models coming on the market each year, assuming a number of the other key barriers are addressed. As electric vehicles become more common on Canadian roads and highways and consumers begin to see more widespread charging infrastructure, non-electric vehicle owners will come to see these types of vehicles as mainstream.

The Government of Canada is viewed as having a key role to play in promoting this technology, specifically by:

- Raising awareness of the benefits of electric vehicles and promoting trials;
- Providing consumers with more information on the specifics (i.e., cost/benefits) to make a stronger economic, as opposed to just environmental, argument for electric vehicles;
- Countering some of the current myths, misperceptions, and misinformation about electric vehicles around issues such as range, performance, etc.;
- Offering additional incentives, above and beyond what some provinces are currently offering (alternatively, some suggested that taxing ICE vehicles would act as a disincentive to purchase); and
- Informing current and prospective EV owners of the existing charging infrastructure across Canada.



MORE INFORMATION

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Signed:

Donna Nixon, Partner