ELECTRIC MOBILITY CANADA
ACCELERATING ELECTRIC TRANSPORTATION

MOBILITÉ ÉLECTRIQUE CANADA
ACCÉLÉRER L'ÉLECTRIFICATION DES TRANSPORTS

Powering Up

A national and sub-national outlook on electric vehicle adoption, barriers, and impacts to the grid

Provincial Report: ONTARIO

August 2025

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This report was prepared by Dunsky Energy + Climate Advisors, an independent firm focused on the clean energy transition and committed to quality, integrity and unbiased analysis and counsel. Our findings and recommendations are based on the best information available at the time the work was conducted as well as our experts' professional judgment.
Dunsky is proud to stand by our work.

This project was undertaken with the financial support of the Government of Canada.

Ce projet a été réalisé avec l'appui financier du gouvernement du Canada.

To support the mandate of Canada's Net-Zero Advisory Body related to research, this project was undertaken with the financial support of the Government of Canada. Funding was provided through the Environmental Damages Funds' Climate Action and Awareness Fund, administered by Environment and Climate Change Canada.

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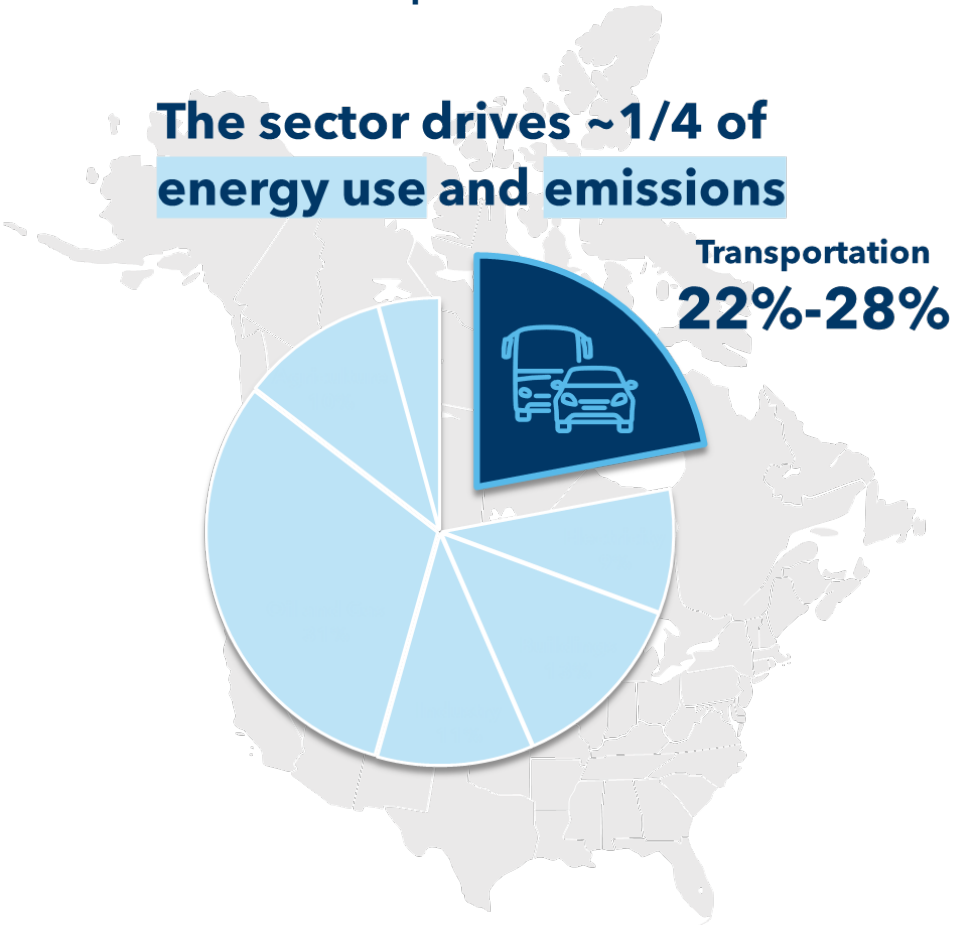
1. Background

1.1 Introduction

Powering Up: *A national and sub-national outlook on electric vehicle adoption, barriers, and impacts to the grid*, is a collaboration between Electric Mobility Canada and Dunsky Energy + Climate Advisors. Its goal is to provide robust data points for national and sub-national decision-making regarding the electrification of transportation. Light-duty vehicles (LDVs) were chosen as a focus because of their significant impact on total transportation greenhouse gas emissions (GHGs) in Canada.

Figure 1. Contribution of transportation to overall emissions in Canada



Addressing barriers to electric vehicle deployment is crucial to ensuring that Canada can meet its near-term climate targets (for 2030 and 2035) and maintain a realistic chance of achieving greater transportation decarbonization by 2050. By thoroughly examining key

barriers to Zero-emission Vehicle[1] (ZEV) adoption—including regionally tailored assessments of consumer affordability, customer economics, and electricity system impacts—our reports aim to identify policies and interventions that would enable the transition to electric mobility.

In this report, we outline the policy landscape and historical trajectory surrounding the adoption of light-duty ZEVs and provide a forecast of ZEV adoption under multiple scenarios between 2025 and 2040. We then analyze the implications of this adoption on electricity demand and how utilities, policymakers, and private actors can support a transition to ZEVs that is reliable, affordable, and predictable.

The key will be to transition to electric transportation in a way that is reliable, affordable and predictable

Primary benefits of ZEV adoption for Canadians:

- **Cleaner air** due to reduced emissions as the transportation energy source shifts from fossil fuel to electricity, which is becoming greener, and from reduced tailpipe emissions, improves air quality and helps to reduce the effects of climate change.
- **Improved affordability** due to savings on a total-cost-of-ownership basis – electricity is much cheaper than gasoline across Canada, offering operational savings from fuel as well as from maintenance, which has lower costs for ZEVs than for internal combustion engine vehicles (ICEVs).
- **Downward pressure on electricity rates** due to beneficial electrification, which creates opportunities for utilities to increase revenues, invest in infrastructure, and manage peaks and valleys in demand across their systems to reduce costs over time.

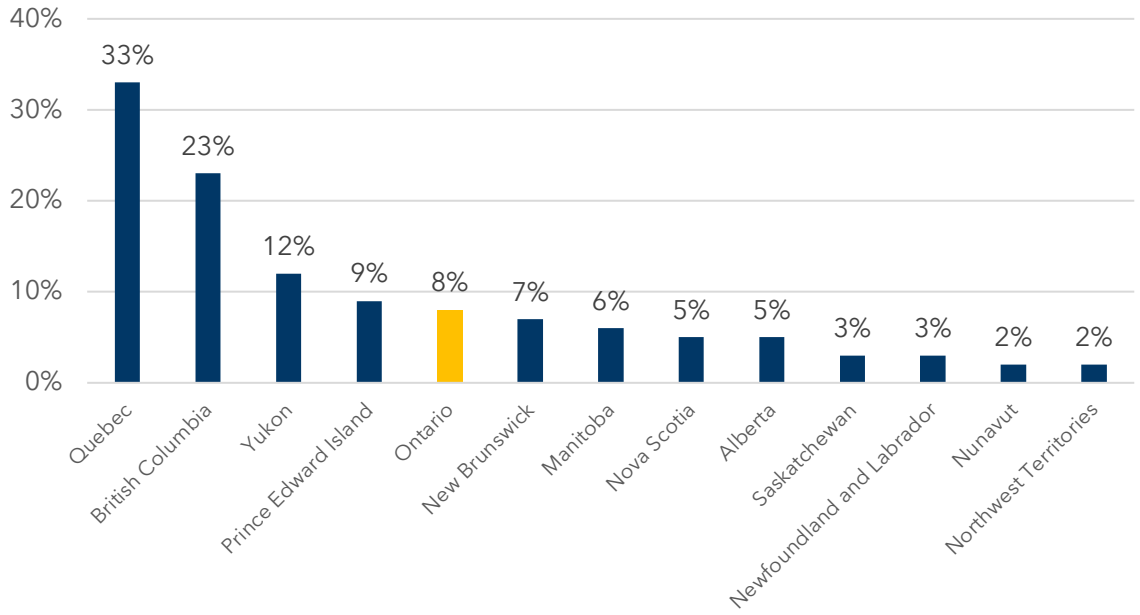
[1] Includes fully-electric or battery-electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs).

1.2 Historical ZEV Adoption

ZEV adoption in Ontario is among the top 5 in Canada, but lags behind other large provinces like Québec and British Columbia. According to S&P Global, while ZEV adoption represented 15.4% of new vehicle sales in 2024 across Canada, ZEV sales were only at 8% in Ontario, behind Yukon and Prince Edward Island.

Figure 2. 2024 ZEV share of new vehicle sales by province and territory[2]

ZEVs represented 8% of new vehicle sales in 2024.

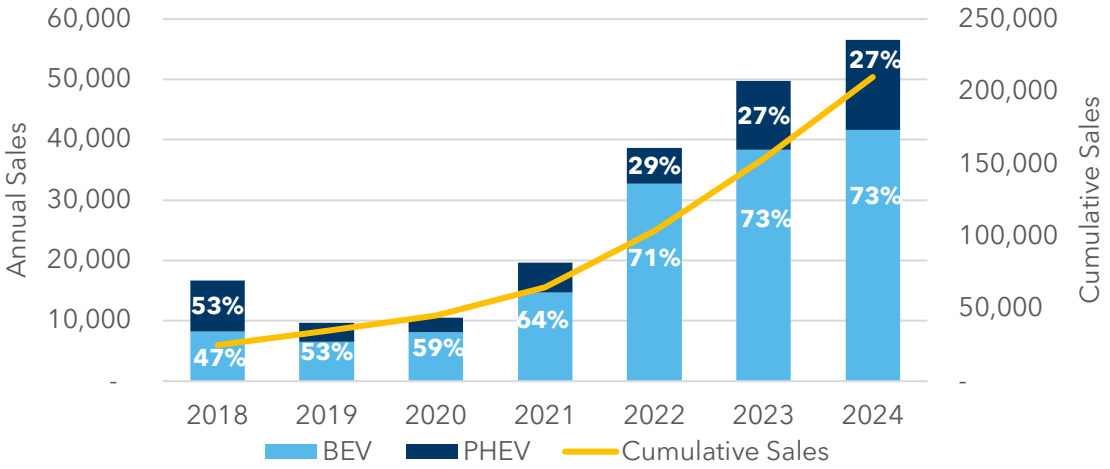


ZEV adoption in Ontario is among top 5 in Canada but lags other large provinces like British Columbia and Québec.

[2] S&P Global. Q4 2024. *Automotive Insights: Q4 2024 Canadian EV Information and Analysis.*

Figure 3. Historical ZEV sales, Ontario

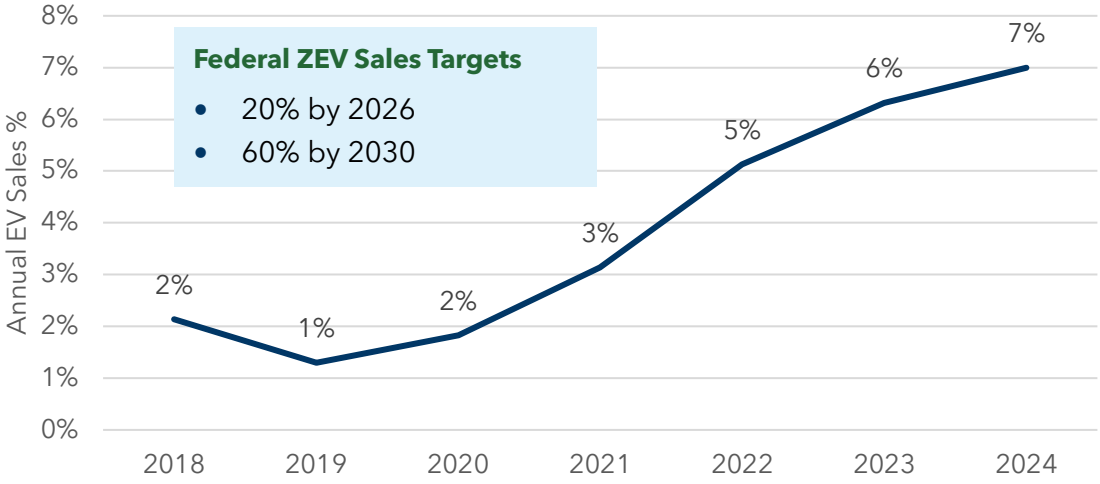
Over 210,000 ZEVs have been sold in the province as of 2024.[3]



In Ontario, ZEV adoption slowed in 2019 after the cancellation of the provincial ZEV rebate but had a significant jump in 2022 as sales recovered from the COVID-19 pandemic. PHEV sales as a share of overall ZEV sales were stronger in 2018 (53%), however, most of the increase in ZEV sales in 2022 was driven by BEVs (71%), which was potentially driven in large part by the launch of the Tesla Model 3.

Figure 4. Historical ZEV sales %, Ontario[4]

Since 2018, ZEV market share has grown year-over-year by an average of 32% each year.



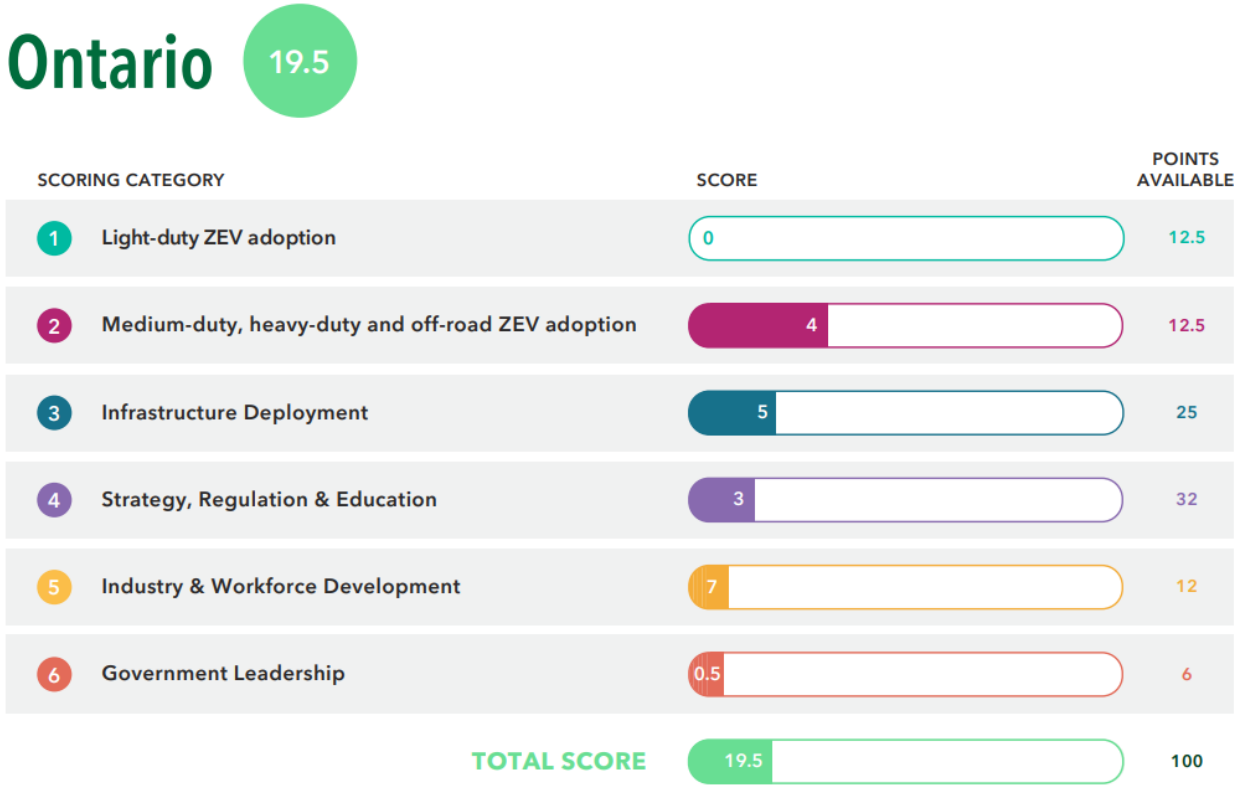
[3] Sources include Statistics Canada. *New motor vehicle registrations, quarterly, by geographic level*. Accessed January 2025 and Statistics Canada. *Vehicle registrations, by vehicle type and fuel type*. Accessed January 2025.

[4] Annual ZEV Sales percentage are calculated leveraging car and light truck new vehicle sales from Natural Resources Canada. *Comprehensive Energy Use Database: Transportation Sector.* Note that new vehicle sales are not available for 2023 and 2024 and forecasted new sales are leveraged for those years calculations. Varying methodologies or source for 2023 and 2024 light-duty new vehicle sales may result in different annual EV Sales percentages for those years.

1.3 Policy Landscape

In 2022, Dunsky developed a Provincial and Territorial Zero-Emission Vehicle Scorecard for Electric Mobility Canada. At the time, Ontario was leading the pack in terms of economic investment in the ZEV industry and was investing in workforce development in the automotive sector. However, it was among the lowest-scoring provinces (7th out of 13) with a score of 19.5 out of 100, falling into the “Getting Started" category. [5]

Figure 5. Ontario ZEV Scorecard, 2021-22[2]



In that scorecard, we also outlined a number of key opportunities for Ontario to improve its score and thereby encourage higher rates of ZEV adoption in coming years, as shown in the table below. Major progress or updates against these potential opportunities include increased deployment of public ZEV charging from municipalities, the provincial government, and supportive policy work from the Ontario Energy Board (OEB), as well as investment in training programs for electric vehicles in the automotive sector.

[5] Electric Mobility Canada. 2021-22. *Provincial and Territorial Zero-Emission Vehicle Scorecard.*

Table 1. Opportunities for ZEV policy and program improvement and updates since 2022, Ontario

Opportunities highlighted in ZEV Scorecard (2022)[6]	Major progress or updates in 2023-2024
Reinstating ZEV purchase incentives and investing in public education is important to ensure Ontarians are informed and can afford the ZEVs that will increasingly be manufactured in the province. Incentives could be funded through a feebate system, which would be revenue neutral.	N/A
Set provincial ZEV sales targets and work to incorporate these targets with the forthcoming federal ZEV standard. A provincial mandate would ensure supply and choice of ZEV models for consumers.	N/A
With goods movement comprising a significant part of southern Ontario's economy, Ontario has a unique opportunity to facilitate MHDV ZEV adoption.	N/A
Provincial investments would help the network develop at the pace needed to keep up with demand. Further, building on the implementation of favourable ZEV charging rates, the province and regulator should explore demand charge reform to improve the business case for ZEV charging.	• The Ontario government installed fast chargers at all 20 renovated ONRoute stations on the 400 and 401[7] and launched ZEV ChargeON to provide funding for public charging in small or Indigenous communities.[8] • The OEB shared a proposal for an ZEV Charger Discount Rate for public direct current fast chargers (DCFC)[9] and requirements for distributors to post capacity maps to support ZEV charging providers.[10] • Note that public charging reliability is an issue – 40% of Ontarians said public chargers are often out of service.[11]
Develop a public education program.	N/A
The province should ensure that a dedicated portion of its automotive workforce development funding is allocated to ZEV-specific training.	• Ontario invested $4.7 million in programs for training in skills for the automotive sector, including ZEVs.[12]
Set government ZEV fleet procurement targets.	N/A

[6] Electric Mobility Canada. 2021-22. *Provincial and Territorial Zero-Emission Vehicle Scorecard.*
[7] Government of Ontario. June 12, 2023. *News Release: Ontario Expands Electric Vehicle Charging Stations.*
[8] Government of Ontario. October 20, 2023. *News Release: Ontario Building More Electric Vehicle Charging Stations.*
[9] Ontario Energy Board. May 30, 2024. *OEB shares materials to support meeting on proposal for new delivery rate for public charging stations.*
[10] Ontario Energy Board. October 17, 2024. *Distribution System Capacity Information Map – Phase 1 Implementation (EB-2019-0207).*
[11] Pollution Probe. January 2024. *2023 Canadian Electric Vehicle Owner Charging Experience Survey.*
[12] Government of Ontario. May 30, 2023. *News Release: Ontario Building the Auto Manufacturing Workforce of the Future.*

Additional ZEV policy progress highlights in Ontario from 2023-2024 include:

- In October, after engagement with the DER Connections Review Working Group, the Ontario Energy Board (OEB) determined that **distributors will be expected to post system capacity maps** as part of a phased approach to provide customers with access to electricity distribution system capacity information.[13] These capacity maps would help **streamline the installation of charging infrastructure** by helping infrastructure developers assess the feasibility of installing chargers in a given location as early as possible.
  - In the first phase, distributors will be expected to post capacity information maps (with quarterly updates) on their websites by March 3, 2025.
  - In the second phase, distributors will be required to provide advanced and consistent capacity information maps. Phase 2 requirements will be finalized in early 2025.
- The OEB is consulting on potential regulatory changes under the Ontario Energy Board Act that would **change the cost responsibility rules for certain electricity system connection infrastructure** for high-growth areas where load growth materializing in the future is very likely.[14] This includes how costs are allocated to customers and how those costs are recovered by the utility companies that build the infrastructure.
  - The changes are intended to "reduce the cost to 'first mover' customers and enable more timely development of infrastructure to enhance system readiness for industrial and housing development and electrification".
  - This change **could benefit ZEV charging network providers and fleet customers** that need to undergo service upgrades to support their ZEV charging infrastructure, as they have to date, borne the costs associated with these system upgrades.

[13] Ontario Energy Board. *Case Number EB-2019-0207.* Accessed December 2024.
[14] Environmental Registry of Ontario. *Proposal to create a regulation under the Ontario Energy Board Act, 1998 to change cost responsibility rules for certain electricity system connection infrastructure for high-growth areas where load growth materializing in the future is very likely.* Accessed December 2024.

1.4 Vehicle and Housing Market Overview

After stagnating in 2020-2021 due to the COVID-19 pandemic, vehicle sales in Ontario have been on an upward trend, reaching over 9.6 million LDVs on the road by 2024. This market growth has implications not only for the potential total ZEV sales but also for the cumulative grid impact of an increasing number of electric vehicles.

Figure 6. Historical light-duty vehicle stock on the road, Ontario[15]

The vehicle market in Ontario is growing, reaching stock of over 9.6 million in 2024.

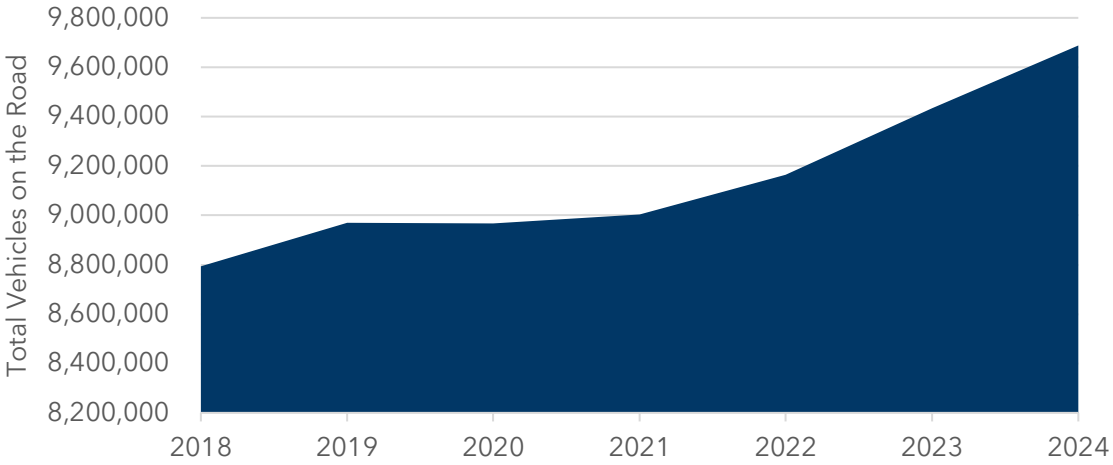
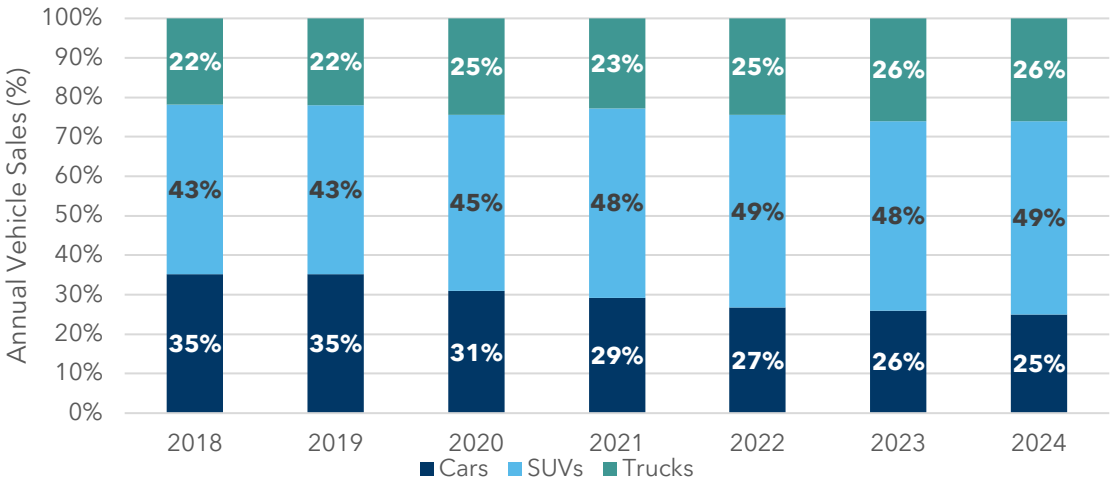


Figure 7. Historical light-duty vehicle segment mix, Ontario[16]

The current segment mix is 49% SUVs and 25% cars, the remaining 26% being light trucks.

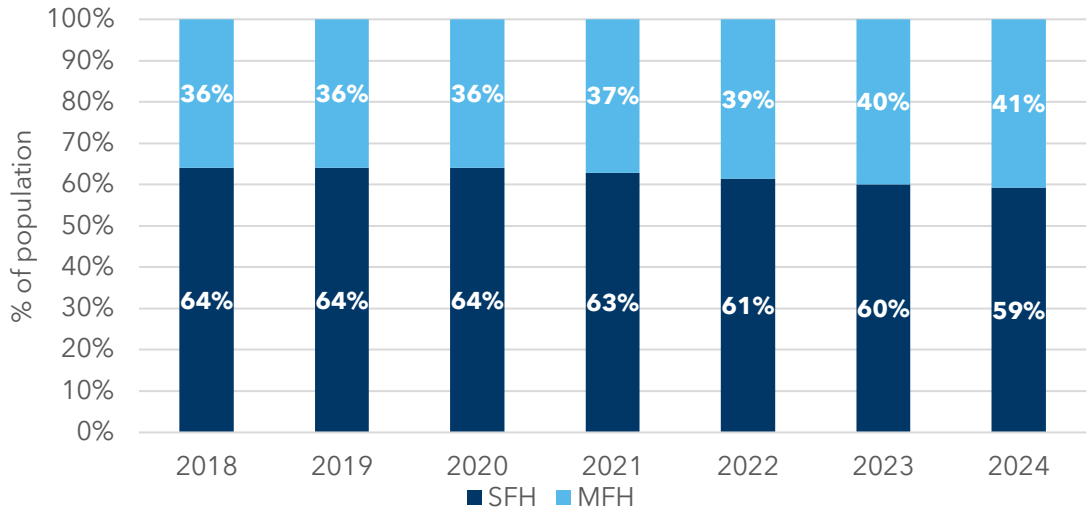


[15] Natural Resources Canada. *Comprehensive Energy Use Database: Transportation Sector, Ontario.* Accessed December 2024. Assume vehicle ownership remains constant and vehicles on the road align with population projections from Statistics Canada's M1 scenario. *Projected population, by projection scenario.* Accessed June 2024.
[16] Ibid.

Ontario's LDV market is trending towards larger vehicles (SUVs, Trucks) over time. It is essential to consider the vehicle segment mix when transitioning these vehicles to electric, as larger vehicles are heavier and tend to be less energy-efficient, requiring more charging energy for the same amount of driving. A trend towards larger vehicles, as seen in Ontario, will also result in increased energy needs for charging across all vehicles on the road as vehicle electrification progresses.

Figure 8. Historical percent of provincial population in single-family (SFH) versus multifamily homes (MFH), Ontario[17]

Most Ontarians live in SFH, with an increasing proportion living in MFH over time.



Most Ontarians (59% in 2024) live in single-family homes; however, this proportion has been on a downward trend over the last several years, and more Ontarians are living in multifamily buildings[18]. This trend has impacts on ZEV adoption because the barriers to home charging for those in single-family homes tend to be much lower than in multifamily homes – single-family home residents typically have more control over installing a charger where they park, and the costs of doing so are also typically much lower. Provinces and municipalities committed to supporting ZEV adoption must either enable home charging in multifamily buildings through supportive policies, such as ZEV-ready requirements, or provide equivalent charging access in public places, which is significantly more expensive.

[17] Based on population projections from Statistics Canada's M1 scenario (June 24, 2024. *Projected population, by projection scenario.*) and housing market data from the Canada Mortgage and Housing Corporation (June 25, 2023. *Housing market data.*).

[18] We use Statistics Canada definitions of housing types as follows: Multifamily buildings include "Apartments five stories and more", "Apartments 5 stories and less" and "Row houses", while single family homes include "Semi-detached", "Single detached", "Apartment or flat in a duplex" and "Other".

2. Methodology

To create a forecast of ZEV charging load in Ontario, we first leveraged results from our in-house **ZEV Adoption (EVA™) model** to produce a light-duty ZEV adoption forecast based on a market characterization that we produce for each jurisdiction.

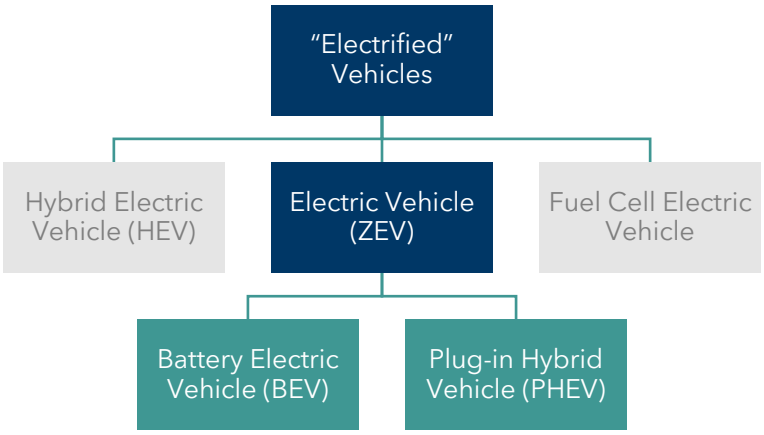
Figure 9. Overview of the EVA™ Model

Technical ▶	Economic ▶	Constraints ▶	Market
Assess the maximum theoretical potential for deployment	**Calculate unconstrained economic potential uptake**	**Account for jurisdiction-specific barriers and constraints, which vary by vehicle class, including:**	**Incorporate market dynamics and non-quantifiable market constraints**
• Market size and composition by vehicle class (e.g. cars, SUVs, pickups) • Forecasted availability of vehicle models in each class	• Forecasted incremental purchase cost of ZEVs over ICEVs • Total Cost of Ownership (TCO) based on operational and fuel costs	• Range anxiety or range requirements • Public charging coverage, capacity, and charging time • Home charging access	• Use of technology diffusion theory to determine rate of adoption • Market competition between vehicle powertrain types

Our ZEV analysis includes the following vehicle types:

- **Battery electric vehicles (BEV)** – "pure" electric vehicles that only have an electric powertrain and that must be plugged into an electric source to charge (e.g. Tesla Model 3, Volkswagen ID.4, Hyundai Kona Electric)
- **Plug-in hybrid electric vehicles (PHEV)** – vehicles that can plug in to charge and operate in electric mode for short distances (e.g. 30 to 80 km), but that also include a combustion powertrain for longer trips. (e.g. Mitsubishi Outlander PHEV, Toyota Prius Prime, Ford Escape PHEV)

Figure 10. Vehicle types in scope



The following vehicle types are **excluded** from the analysis:

- Hybrid electric vehicles that do not plug in are considered ICEVs.
- Fuel cell electric vehicles such as hydrogen vehicles where the market is assumed to be minimal in the timeframe of the study.

2.1 Scenario Analysis

The adoption rate of electric vehicles was assessed under three scenarios that vary policy and program interventions which can significantly impact ZEV adoption. These include the following key policy and program levers:

1. **Public Charging Access**: Existing infrastructure deployed to date has jumped-started the ZEV market, however significant investments are required to alleviate range anxiety.
2. **Home Charging Access**: With most ZEV charging expected to take place at home, lack of access to home charging for some segments of the population could limit their ability to adopt ZEVs.
3. **Vehicle Incentives**: Government rebates can help to bridge the gap to cost-parity with ICEVs in the short-term as the up-front purchase costs of ZEVs decline over time.
4. **Federal Zero Emission Vehicle (ZEV) Availability Standard**: Under the current ZEV Availability Standard, auto manufacturers and importers must meet a 100% ZEV sales target by 2035. Our scenario analysis varies whether the standard is present as well as its enforcement year to show its potential impact on ZEV adoption.
5. **Provincial ZEV Mandate**: While some provinces have implemented their own ZEV sales requirements, those that have not may potentially experience lower availability in the next few years as manufacturers and importers focus supply on regions with the highest demand or requirements for ZEV sales, even if there are targets at the federal level.

In addition to the modelled policy and program interventions, the forecasted ZEV adoption is also sensitive to uncertainties around key market and technology factors such as electricity rates, fuel prices, battery costs, total vehicle sales and ZEV model availability.

Our Low Growth scenario represents minimal efforts to support ZEV adoption, and in some cases the removal of existing supportive policies. The Moderate Growth scenario represents

some support to enable ZEV adoption and generally aligns with current commitments and policies, while the High Growth scenario represents a strong policy pathway to reach the Federal ZEV sales target. The specific parameters for each scenario are outlined in **Table 2**.

Table 2. Scenario assumptions for ZEV adoption

Parameter	Low Growth	Medium Growth	High Growth
Public Charging Infrastructure[19]	Limited 17,000 ports by 2030 95,000 ports by 2040	Moderate 34,000 ports by 2030 240,000 ports by 2040	Significant 68,000 ports by 2030 301,000 ports by 2040
Home Charging Access[20]	Limited Single-family homes are 94% ZEV-ready, 21% of multifamily homes are ZEV-ready by 2040	Moderate Single-family homes are 94% ZEV-ready, 41% of multifamily homes are ZEV-ready by 2040	Significant Single-family homes are 94% ZEV-ready, 62% of multifamily homes are ZEV-ready by 2040
Vehicle Incentives	Current incentives **Federal:** up to $5,000 (Ramped down + phased-out by 2025)	Current incentives, extended **Federal:** up to $5,000 (Ramped down + phased-out by 2030)	Expanded incentives **Federal:** up to $5,000 **Provincial:** up to $2,500 (Both ramped down + phased-out by 2035)
Federal ZEV Availability Standard	None	100% by 2040 Federal interim targets extended	100% by 2035 Aligned with Federal interim targets
Provincial ZEV Mandate	None	None	100% by 2035

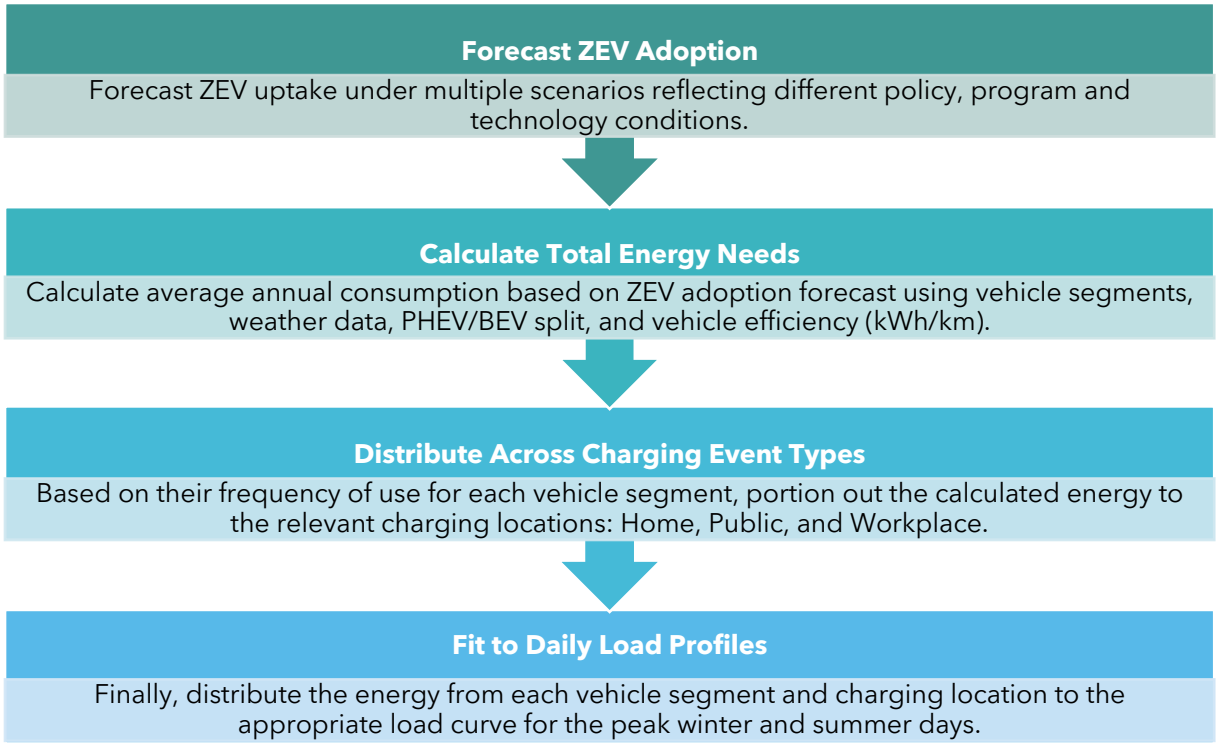
We refer to specific vehicle purchase incentive levels for simplicity, but what matters for our modelling is the ZEV price relative to an ICEV. The same impact can come from a $5,000 rebate, a $5,000 penalty on ICEVs, or a combination that is revenue neutral, like a "feebate" system. This approach would become important for the High Growth scenario to sustain ZEV incentives into the 2030s without high costs.

[19] Charging infrastructure inputs in the High Growth scenario are aligned with the estimated charging needs developed in the 2024 Dunsky report *Electric Vehicle Charging Infrastructure for Canada*. In the Medium and Low growth scenarios, charging inputs are lower to align with lower levels of adoption and to reflect reduced charging availability, which contributes to constrained ZEV adoption in these scenarios. Note that these inputs are not the result of a detailed charging needs assessment, but rather high-level estimates based on Dunsky's 2024 analysis, which reflects alternative adoption scenarios.
[20] Assumptions for Home Charging Access were based on the methodology used in the 2024 Dunsky report, *Electric Vehicle Charging Infrastructure for Canada*.

2.2 Electric Grid Load Impacts

This study follows a four-step process to assess the potential for and impacts of ZEVs on Ontario's electric grid from increased demand for electricity for ZEV charging. The ZEV adoption forecast from EVA™ is used to calculate the potential grid load (demand for electricity) impacts from realistic charging behaviours. Figure 11outlines each of these four steps for determining peak demand from ZEVs.

Figure 11. Process for modelling ZEV adoption and load impacts



To determine the impacts of ZEV adoption on the electrical grid, we used typical 24-hour diversified charging distribution profiles established from the literature[21] for each vehicle segment and charging location, and the Dunsky EVA™ model results, with regional adjustments for vehicle consumption in Ontario (i.e. temperature and proportions of vehicle types). The resulting load curves represent the average charging behaviour of different ZEV segments on the road during summer and winter peak days.[22]

Next, these curves are multiplied by the forecasted number of ZEVs on the road in each study year. The results of this load impact analysis produce the hypothetical daily load impact for

[21] The charging distribution profiles were developed by leveraging data sets from a range of government and utility-led pilot programs including the California Energy Commission (April 29, 2019. *California Investor-Owned Utility Electricity Load Shapes*); ISO New England (*2020 Transportation Electrification Forecast.*); and Rocky Mountain Institute. (2019. *DCFC Rate Design Study.*)
[22] Refers to the day with the highest electricity demand in a single hour, for a given year and season.

peak days. The curves consider the use of all charging event types – home, workplace, and public charging.

Charging event types refer to the location where charging is taking place, which will change the power level, time of day, and flexibility of the charging load. Each ZEV will receive a proportion of its total charging energy from different event types. For example, a personal vehicle is likely to charge at home most of the time, but it will occasionally charge at a public charger while the driver is shopping or at their workplace. This breakdown of charging event types will vary based on the vehicle's purpose. Our assumptions for charging event type proportions by vehicle segment and origin can be found in Table 3.

Table 3. Proportion of daily charging energy for each event type and vehicle segment

Charging Event Type	Personal	Commercial
Home/Depot[23]	80%	100%
Workplace	10%	N/A
Public	10%	N/A

[23] Refers to where most vehicles are parked overnight, "Home" for personal vehicles and "Depot" for commercial vehicles.

3. Results

Key results highlights that we cover in this section include:

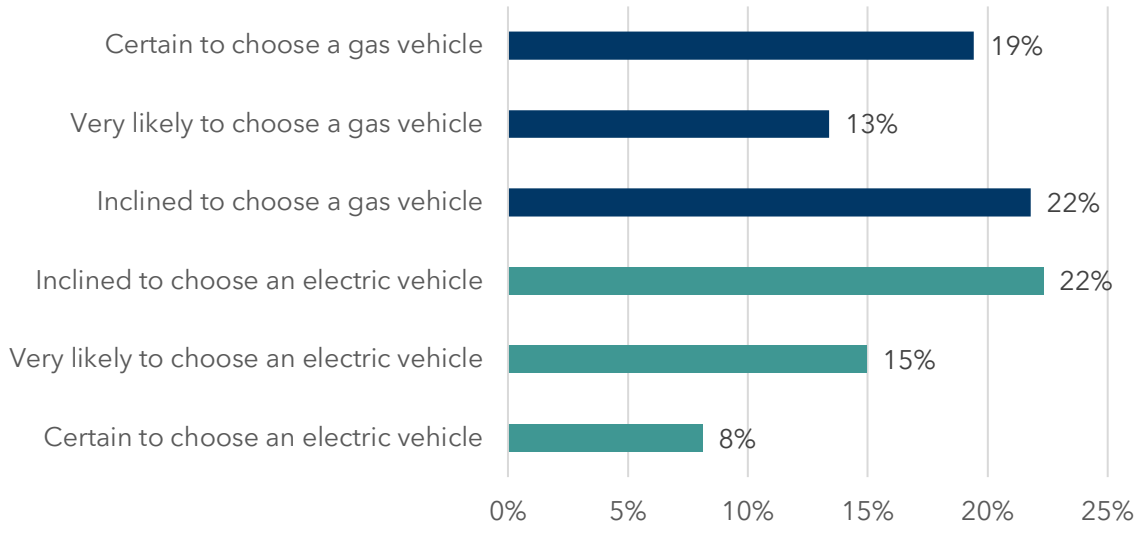
1. Over the long term, ZEV adoption in Ontario is forecasted to approach 100% of new sales, which would accumulate to 51% of total vehicles on the road by 2040, even in a low-growth scenario.
2. If effectively managed charging programs and technologies are employed, winter peak load from ZEV charging has the potential to be reduced by 3,600 MW (36%) in a medium growth scenario.
3. Without effective programs and policies in place over the next few years, Ontario will be on a slower path to electrification, resulting in lost benefits for Ontarians in both improved air quality and financial savings from reduced fuel and maintenance costs.

3.1 Results from Survey of Canadians

As part of the *Powering Up* project, Electric Mobility Canada conducted a survey of over 6,000 Canadians, with 999 respondents from Ontario. A portion of this survey aimed to confirm, update, or determine new assumptions that should be used in the EVA™ model to forecast ZEV adoption in Canada as accurately as possible. This section summarizes some of those key results.

Figure 12. When thinking about your next vehicle purchase, which will you choose? Ontario only

Over 2 in 5 Ontarians (45%) plan to buy a ZEV as their next vehicle. This preference is higher among Canadian urban residents (49%) and individuals aged 30-44 (51%).



Although Ontarians are willing to pay a premium for ZEVs over ICEVs (see Figure 13), the EVA™ model assumes that the comparatively higher upfront costs will pose a barrier to the majority of potential ZEV buyers until ZEV prices reach parity with ICEVs across most segments.

Figure 13. When considering the upfront cost of an electric vehicle vs a traditional gas vehicle, how much more do you consider acceptable today? Ontario only

67% of Ontarians would be willing to pay a premium for a ZEV versus an ICEV.

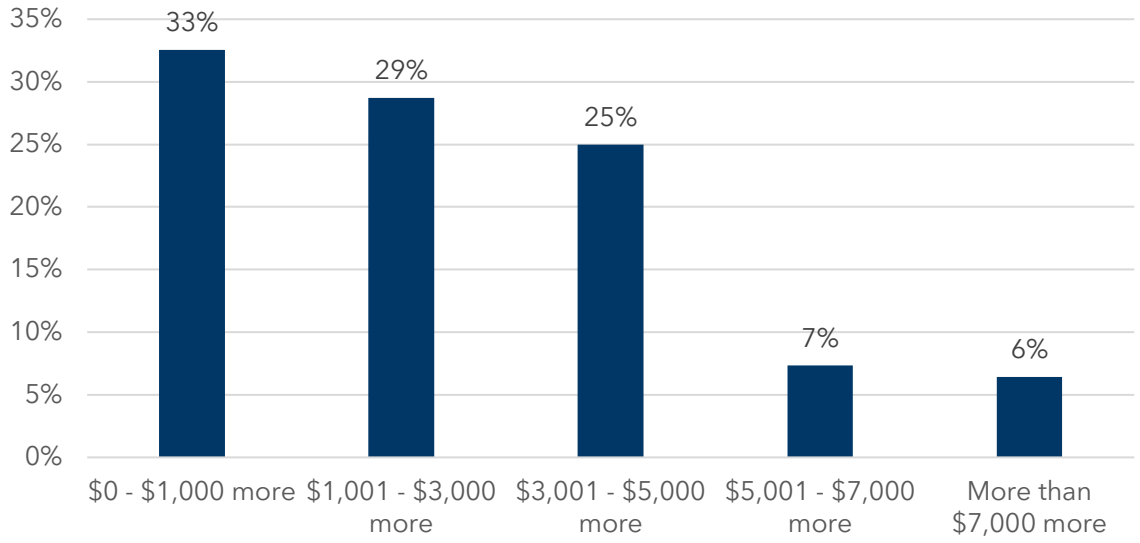


Figure 14. How many long distance (500 km or more) trips do you make in one year? Ontario only

Almost 50% of Ontarians take 1-2 long distance trips annually.

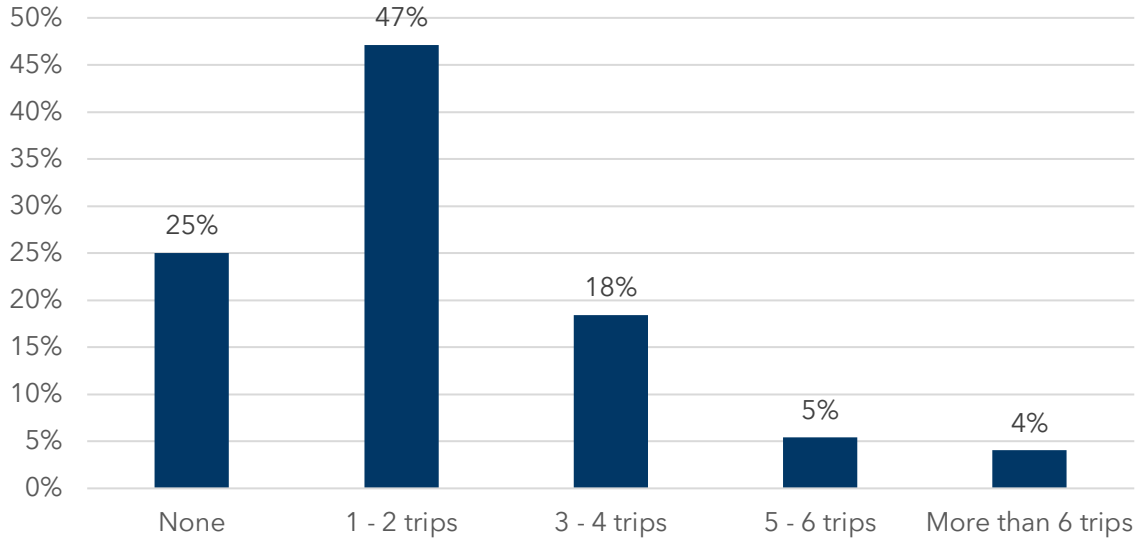
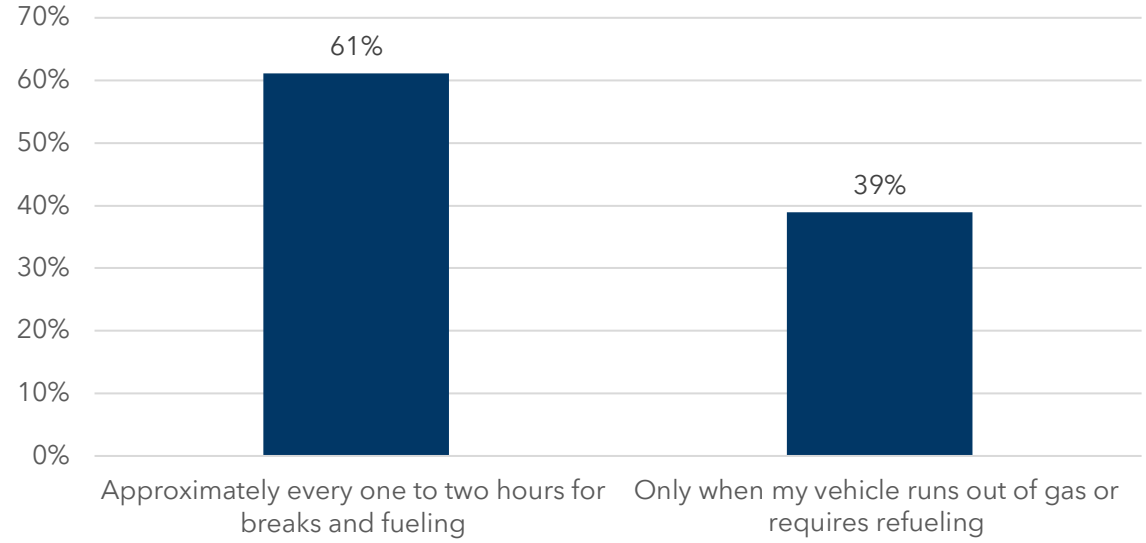


Figure 15. How frequently do you typically make stops during long-distance trips (500 km or more)? Ontario only

61% of Ontarians stop more frequently on long trips than they would need to refuel, indicating that ZEV range is not a major constraint or inconvenience on their ability to make long-distance trips so long as sufficient public charging is available.



Most Ontarians drive less than 30 km to get to work (60 km round trip), which means that not many people need to rely on top-up charging, or do not travel far enough daily for range to be a concern in daily driving.

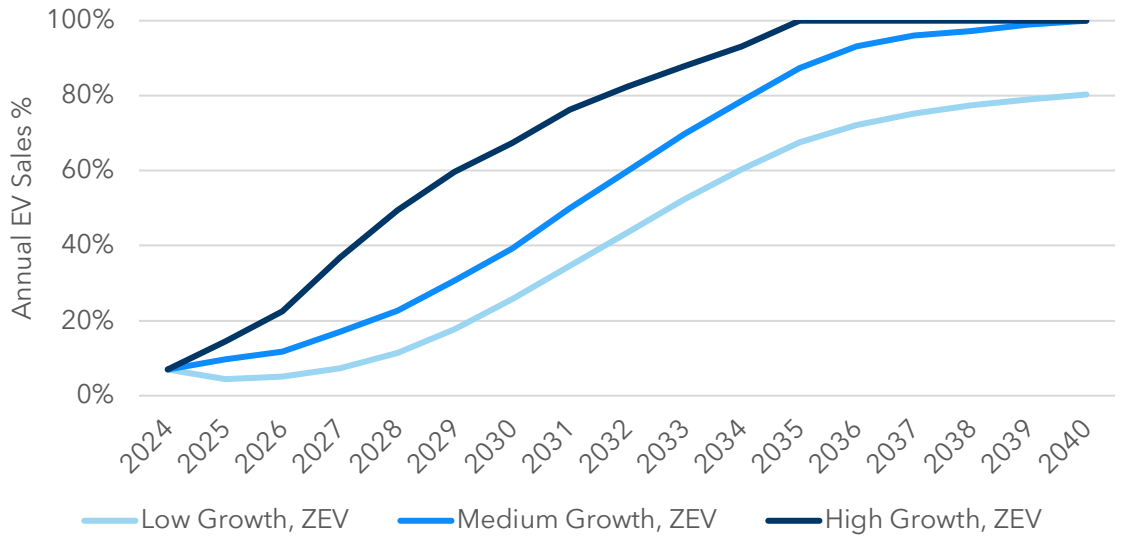
Despite improvements in battery size and access to public charging, there may still be perceived range barriers, also known as "range anxiety", which makes potential ZEV buyers hesitant to switch to electric, but could be improved either through education or exposure to ZEVs and charging as adoption increases.

This survey also included questions pertaining to Canadians' knowledge about ZEVs, which can be indicative of some common misconceptions that result in perceived barriers to adoption. For instance, the majority of Ontarians are unaware of the average range of new ZEVs, with only 26% knowing that it falls between 400 and 500 kilometres. Additionally, only 41% of Ontarians are aware of the federal government rebates for ZEVs. A sample of additional questions that were asked in this knowledge section is included in the Appendix, Additional Results from Survey of Canadians.

3.2 ZEV Adoption Results

Policies and programs that support ZEV adoption in Ontario will be significant drivers of growth over the next 10 years.

Figure 16. Annual ZEV sales % by scenario, Ontario



Changes in charging availability, purchase incentives, and a ZEV standard in the near term will determine how quickly Ontario arrives at a complete transition to electric vehicles. If these factors are in place, they will reduce key barriers to adoption, including having enough charge when needed, bringing ZEVs to price parity with ICEVs, and ensuring adequate local supply.

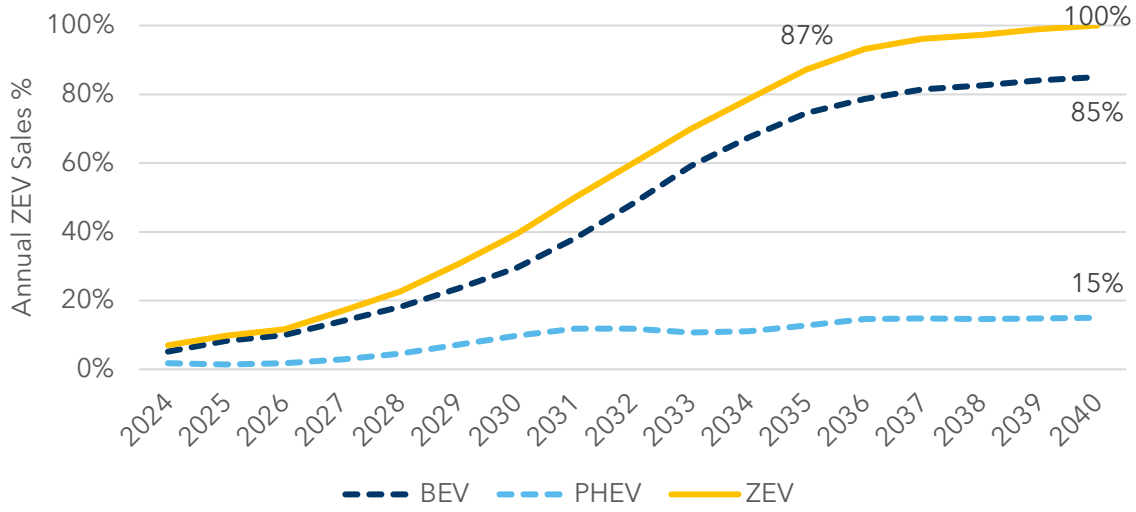
Policy makers have a critical opportunity in the next few years to put Canada on a strong path to vehicle electrification, enabling Canadians to reap the cost and environmental benefits over the following decades.

3.2.1 Medium Growth Scenario

Although the Medium scenario models a delayed federal ZEV standard enforcement date, ZEV adoption is still expected to reach 87% of new sales by the current target date of 2035.

Figure 17. Annual ZEV sales % by powertrain, medium growth, Ontario

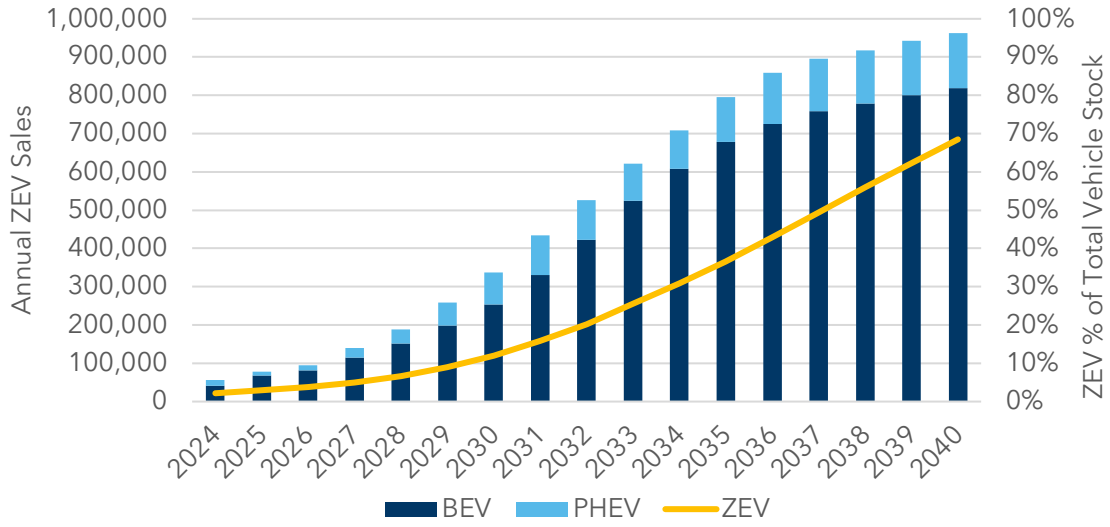
Ontario will experience significant growth in ZEV uptake, reaching 100% by 2040.



With the additional public and home charging access assumed in this scenario, which reduces barriers to BEV adoption, BEVs outcompete PHEVs due to their lower total cost of ownership.

Figure 18. Annual ZEV sales by powertrain and total ZEV stock, medium growth, Ontario

By 2040, over 8.5 million of the 12.5 million (69%) LDVs on the road are forecasted to be ZEVs.



3.2.2 High Growth Scenario

Under the High scenario, additional policy supports remove the primary barriers to ZEV adoption including public charging, home charging access, and upfront cost reductions.

Figure 19. Annual ZEV sales % by powertrain, high growth, Ontario

The ZEV proportion of annual sales increases rapidly towards the 100% ZEV standard in 2035, reaching 67% by 2030.

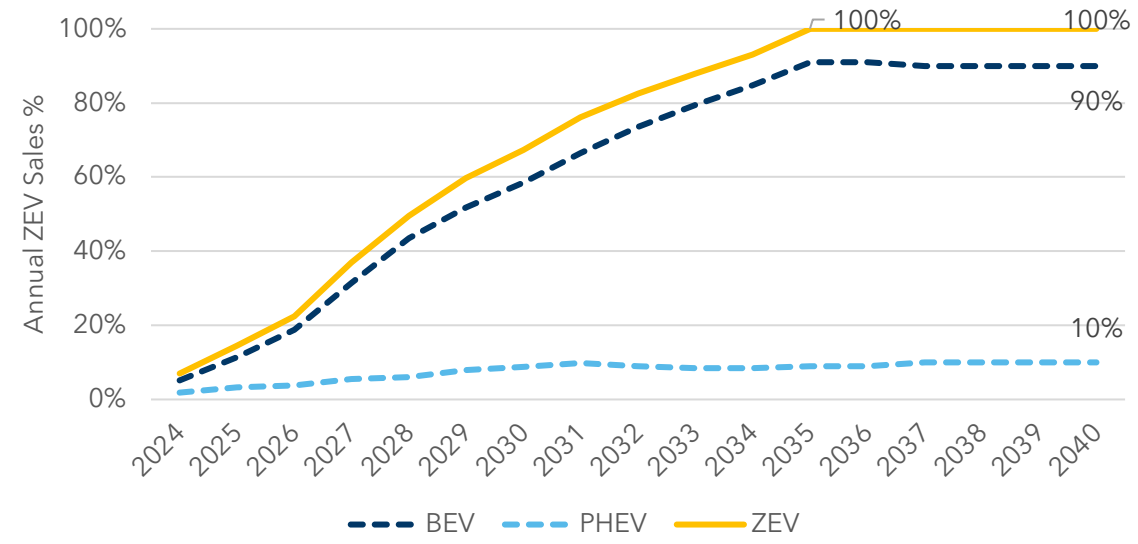
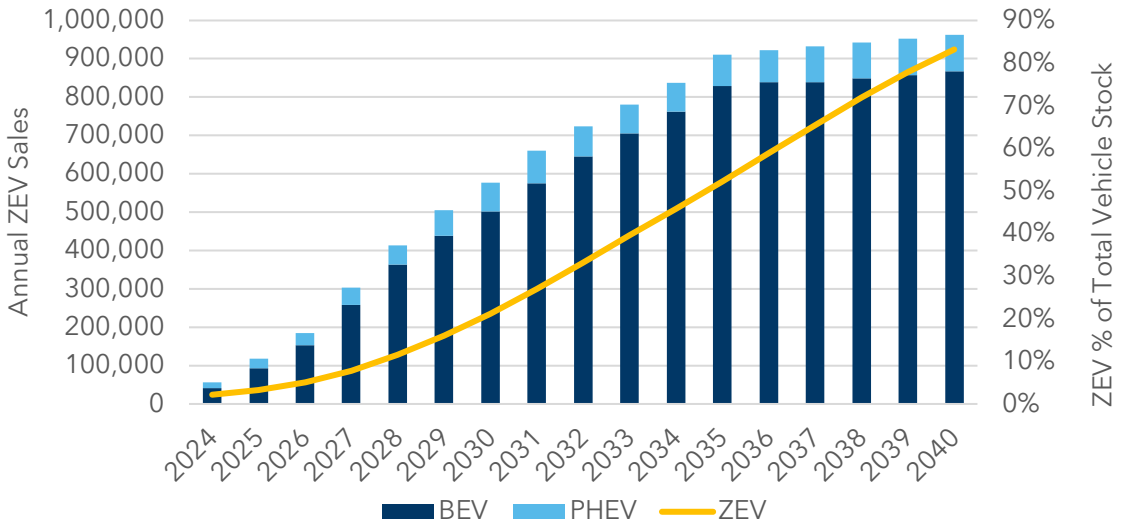


Figure 20. Annual ZEV sales by powertrain and total ZEV stock, high growth, Ontario

By 2040, over 10 million of the 12.5 million (83%) LDVs on the road are forecasted to be ZEVs.

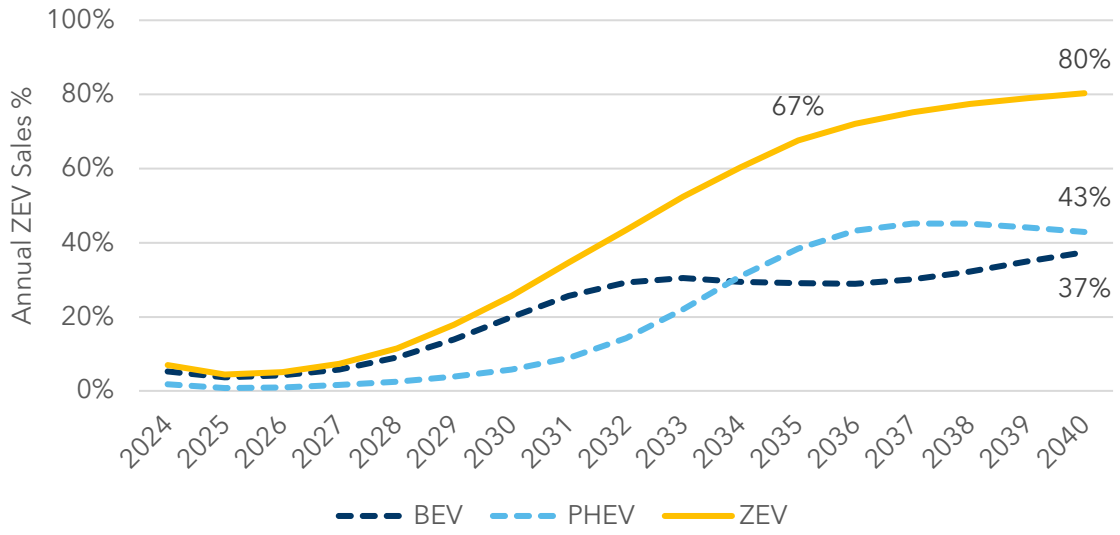


3.2.3 Low Growth Scenario

With few supportive policies in the Low scenario, ZEV adoption potential will be constrained.

Figure 21. Annual ZEV sales % by powertrain, low growth, Ontario

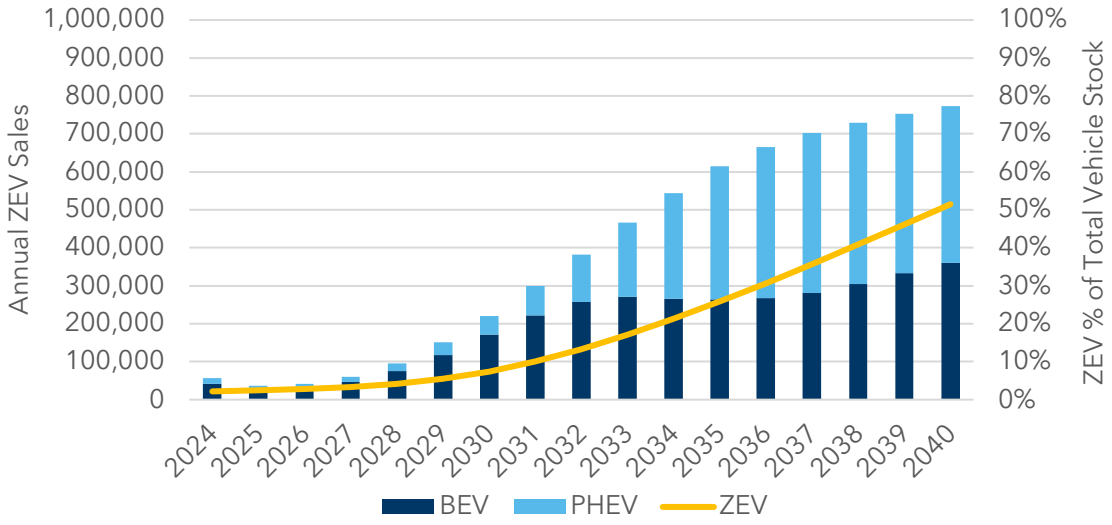
ZEV adoption is expected to fall short of the current federal 2035 ZEV target (100%), reaching only 67% of new sales by 2035 and 80% by 2040.



The market share shifts towards PHEVs by 2034 as public infrastructure deployment in this scenario is insufficient to meet the needs of BEV drivers. However, over the long term, the economics of BEVs are likely to continue improving and result in an increasing market share.

Figure 22. Annual ZEV sales by powertrain and total ZEV stock, low growth, Ontario

By 2040, over 6.4 million of the 12.5 million (51%) LDVs on the road are forecasted to be ZEVs.

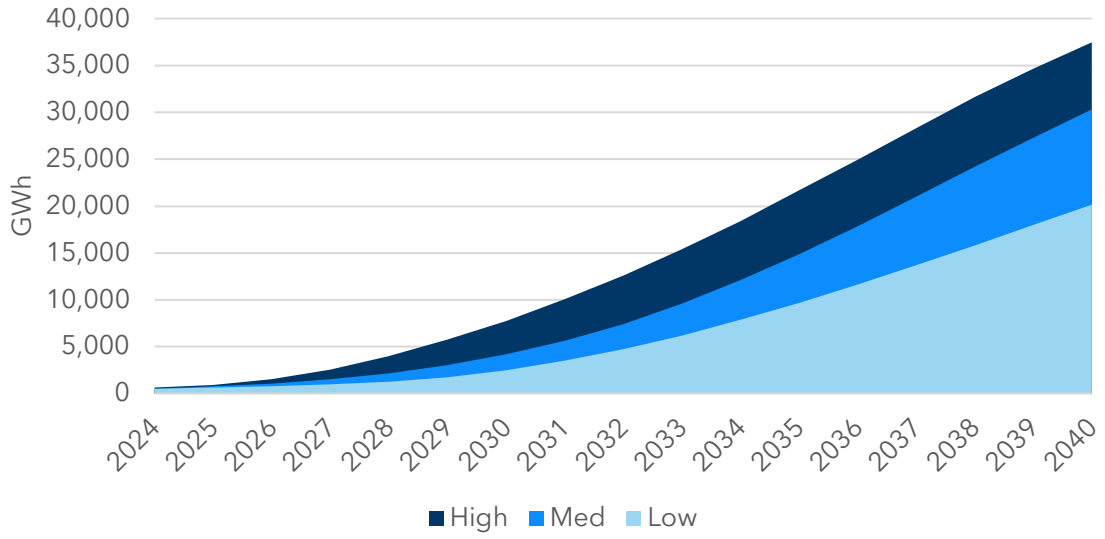


3.3 Electric Grid Load Impact Results

Total annual energy consumption from ZEVs will be higher in the Medium and High scenarios compared to the Low scenario, not only because there are more ZEVs overall, but also because there are more BEVs than PHEVs. Since PHEVs drive a proportion of their time on gas, whereas a BEV must always use electricity, a higher proportion of BEVs will result in higher energy consumption overall.

Figure 23. Annual energy impacts from ZEV charging, scenario comparison, Ontario

Total annual load impacts in Ontario could range from 20,000 to 37,000 GWh by 2040 under the Low and High Growth scenarios, respectively, mirroring the growth of cumulative ZEVs on the road.



Light-duty ZEVs will increase annual electricity consumption in Ontario by between 14% and 27% by 2040.[24]

[24] Based on our ZEV forecast (Figure 16) and the IESO's hourly demand report for 2024. See source: Independent Energy System Operator (IESO). January 22, 2025. *Hourly Demand Report.*

3.3.1 ZEV Charging Load Growth Over Time

Outdoor air temperatures on the coldest day can increase vehicle energy needs, thereby doubling peak grid impacts[25] compared to summer requirements, mainly due to cabin heating needs.[26]

Figure 24. Peak ZEV Charging Load, summer, Ontario

ZEVs will contribute between **3,600 and 6,700 MW** of peak load by 2040 in **summer**.

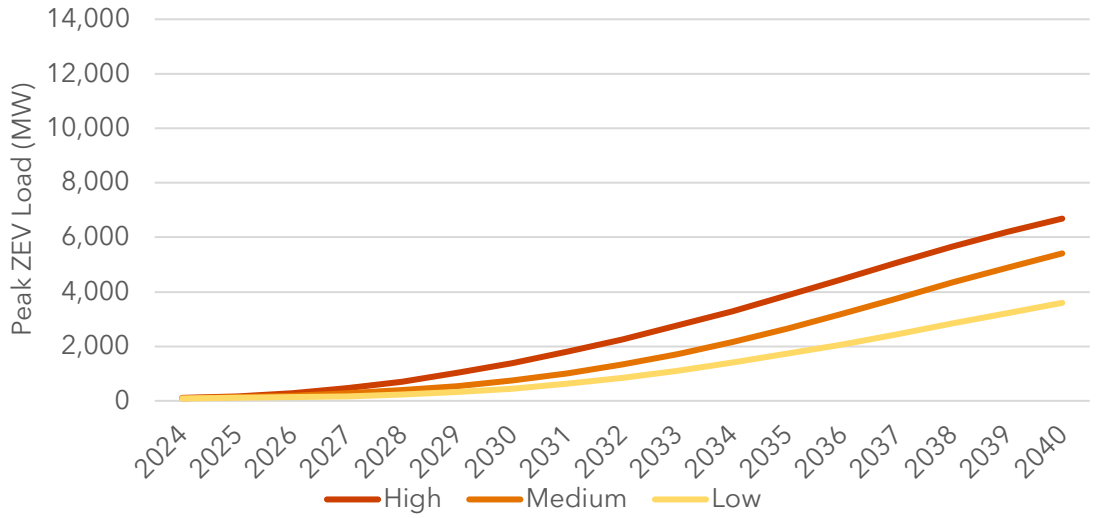
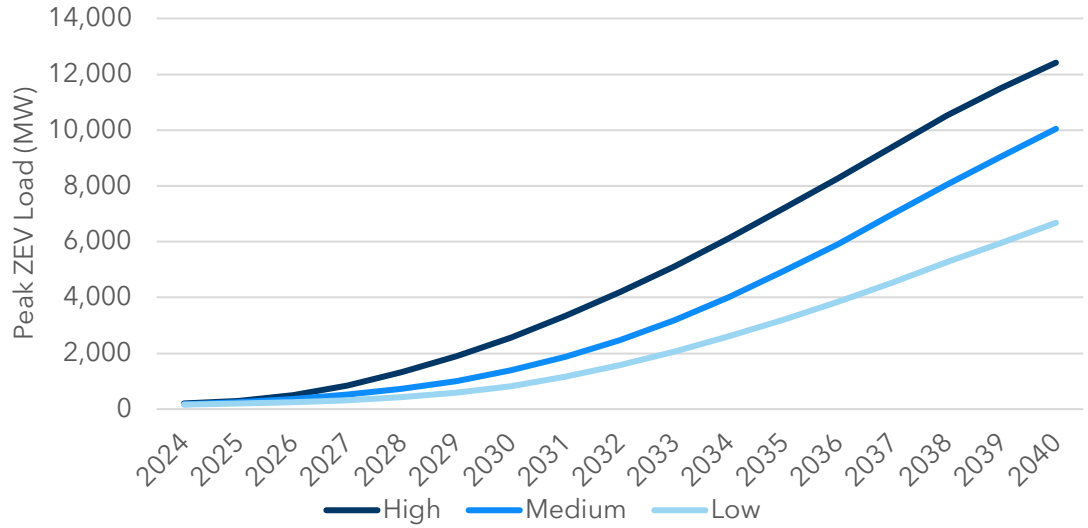


Figure 25. Peak ZEV Charging Load, winter, Ontario

ZEVs will contribute between **6,700 and 12,400 MW** of peak load by 2040 in **winter**.

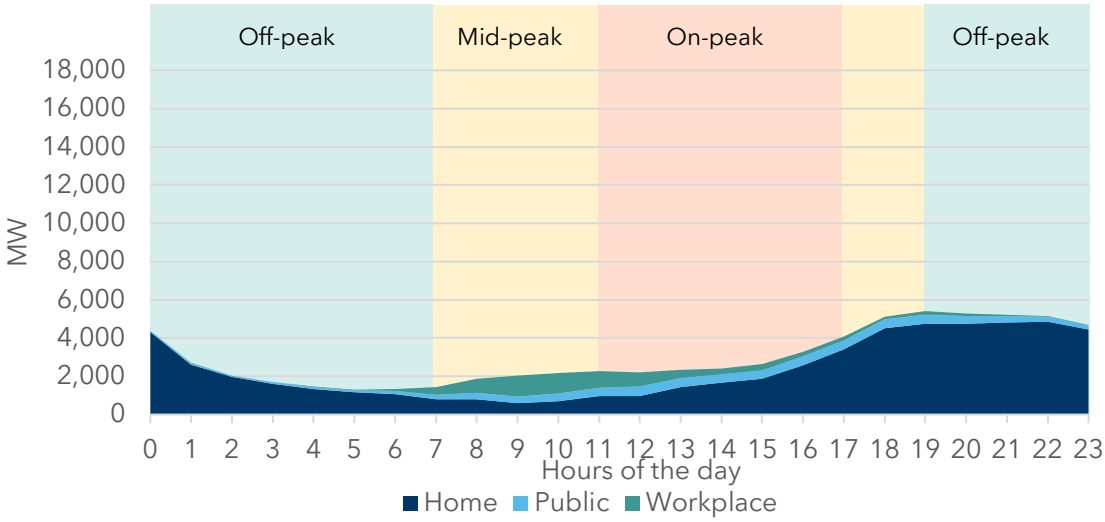


[25] Peak load refers to the hour with the highest electricity demand for a given year and season.
[26] Geotab. November 30, 2023. *To what degree does temperature impact EV range?*

3.3.2 Peak Day ZEV Load

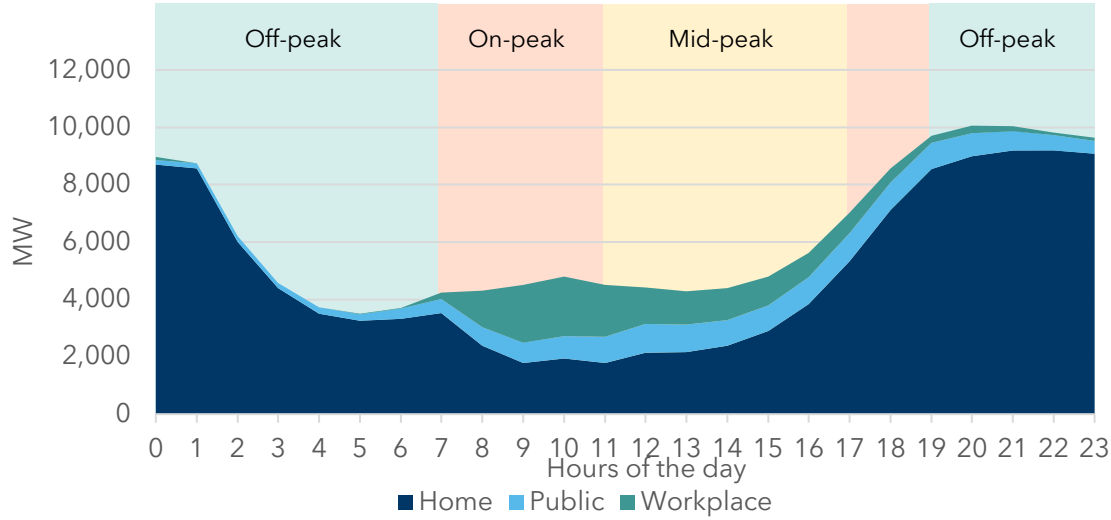
Most of the peak day[27] impact from ZEV charging will come from home charging, with the majority of this charging occurring in the evening and overnight.

Figure 26. Summer peak day ZEV load in 2040, medium growth, Ontario



Although the ZEV-peak typically occurs overnight, as a result, load impacts from ZEV charging are significant enough during Ontario's peak periods (annual peak is between 11 am - 5 pm in summer)[28] to be impactful on the electrical system if the charging load is unmanaged.

Figure 27. Winter peak day ZEV load in 2040, medium growth, Ontario

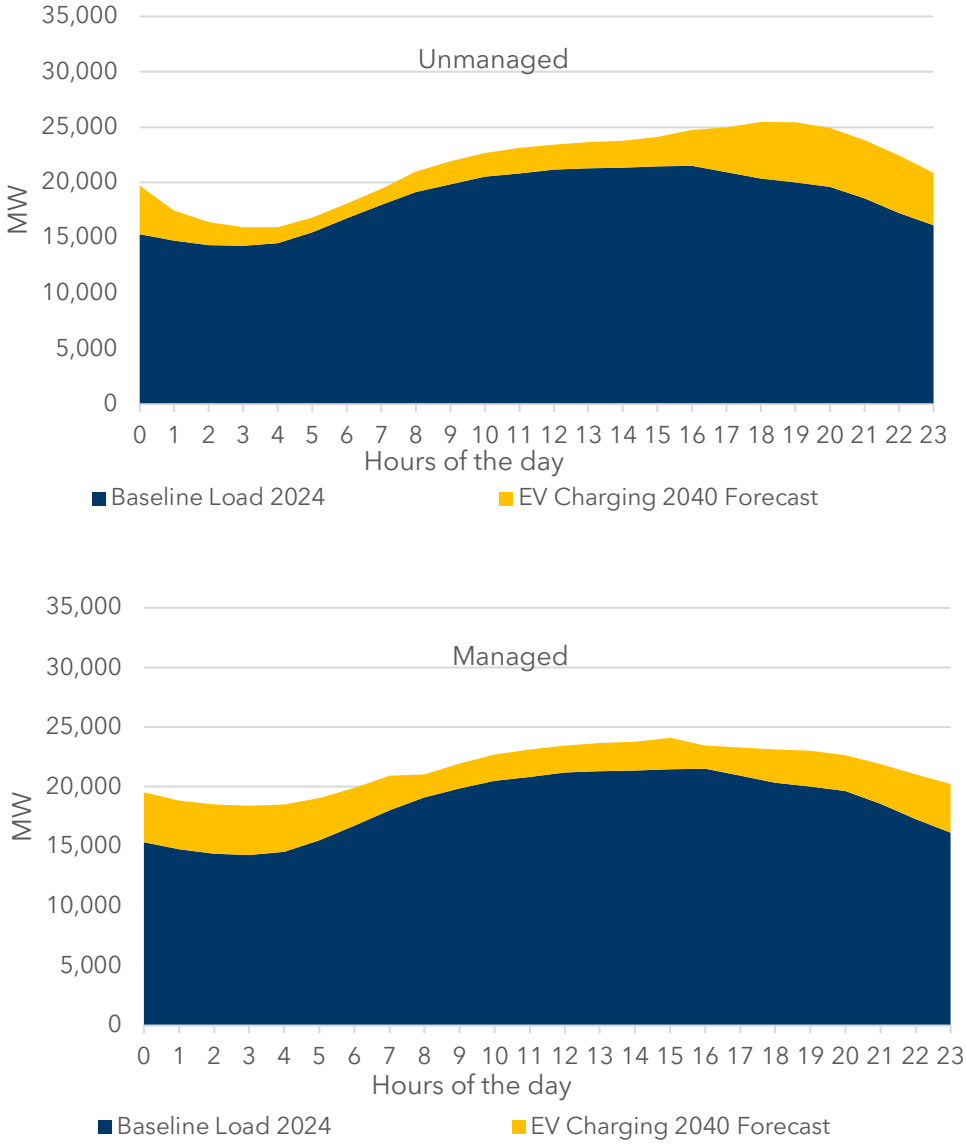


[27] Refers to the day with the highest electricity demand in a single hour, for a given year and season.
[28] Ontario Energy Board. *Electricity Rates.* Accessed January 2025.

3.3.3 Managed ZEV Charging Load

To understand the impact of ZEV charging on the total system peak, we layer the ZEV load on top of the existing grid demand.[29] This also allows us to see opportunities to shift ZEV load to periods when other loads are low. When applied to a typical peak day, light-duty ZEVs typically increase peak demand and push the peak hour to later in the evening.

Figure 28. Managed charging potential, summer peak day, medium growth, ON

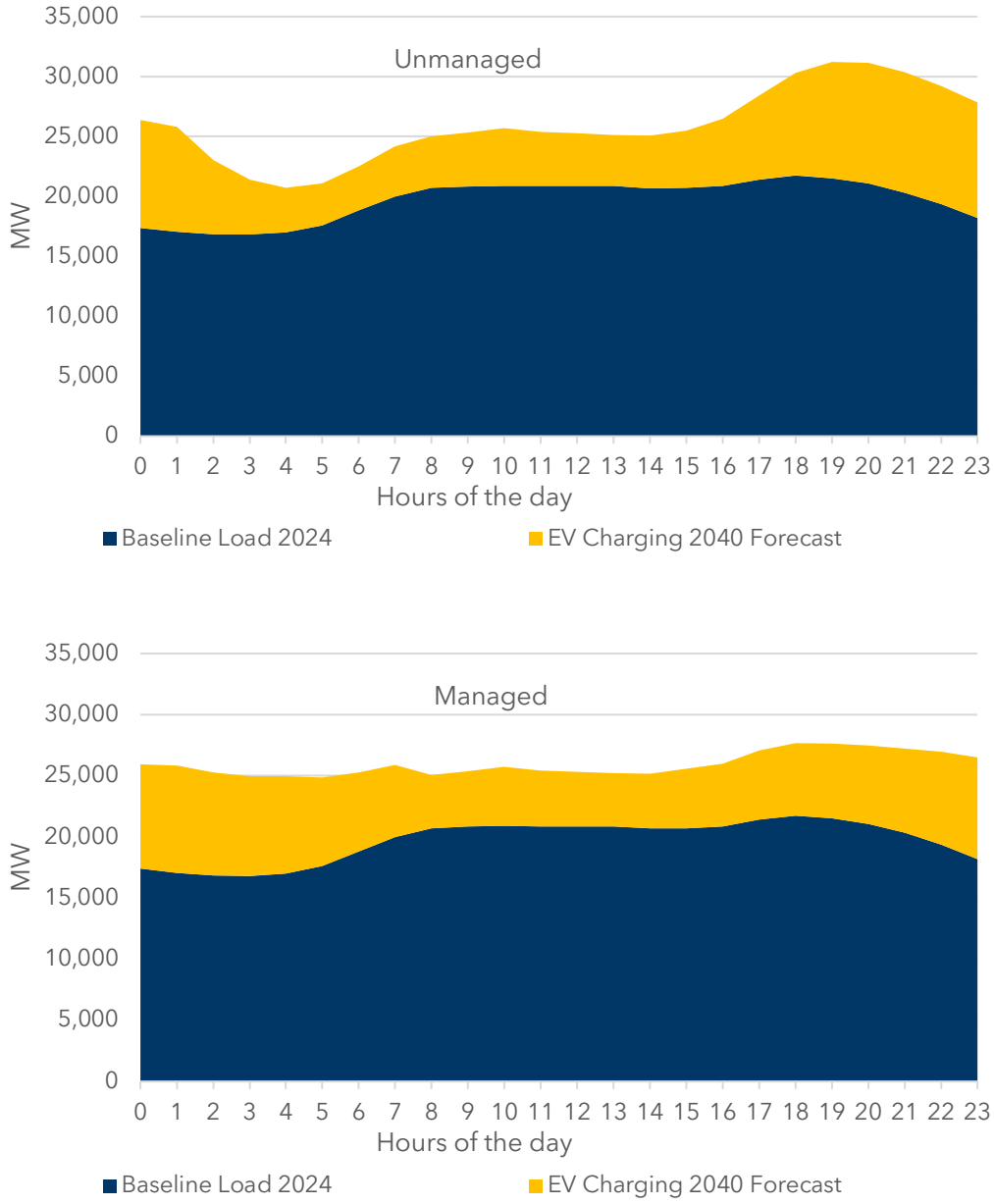


However, if this charging is effectively managed through a combination of Ontario's existing TOU rate plans and active load management, winter peak impacts could be reduced by 3,600

[29] Independent Energy System Operator (IESO). January 22, 2025. *Hourly Demand Report.*

MW (36%).[30] The IESO forecasts a shift from summer to dual peaking by 2030[31], in part driven by ZEVs. Since ZEV load impacts are more significant in winter, the potential for load shifting is higher.

Figure 29. Managed charging potential, winter peak day, medium growth, ON



[30] This analysis assumes that 10% of ZEVs are unmanaged, with 10% being optimized for TOU and 80% participating in a utility managed charging program. We used the medium growth scenario results.
[31] Independent Energy System Operator (IESO). March 28, 2024. *2024 Annual Planning Outlook.*

4. Key Takeaways

1

Over the long term, ZEV adoption in Ontario is forecasted to approach 100% of new sales, which would accumulate to 51% of total vehicles on the road by 2040, even in a low-growth scenario. The impact of policies and programs, as well as the deployment of charging infrastructure, has the potential to increase the rate of adoption significantly in earlier years.

2

If effectively managed charging programs and technologies are employed, winter peak load from ZEV charging has the potential to be reduced by 3,600 MW (36%) in a medium growth scenario.

- While the actual load shift will depend on the techniques and technologies employed, as well as the incentives provided for ZEV drivers to participate, these results highlight the opportunity to avoid costly grid upgrades by leveraging the inherent flexibility of ZEV charging loads.
- By 2040, transportation electrification could be such an important driver of load that utilities may need to employ additional strategies in addition to shifting charging to overnight. These may include encouraging daytime charging at workplaces alongside increases in generation capacity.

3

Without effective programs and policies in place over the next few years, Ontario will be on a slower path to electrification, resulting in lost benefits for Ontarians in both improved air quality and financial savings from reduced fuel and maintenance costs.

The **most impactful tools** that local actors have to support the adoption of electric vehicles are **increasing charging access, increasing the local supply of ZEVs, and reducing vehicle purchase costs.** Critical actions to address these barriers include:

- Supportive ZEV-ready policies, standards, and programs to increase home charging availability, and deployment of sufficient public charging to supplement home charging
- Requiring and encouraging a sufficient supply of ZEVs at local dealerships
- Financial support for ZEV purchases as prices approach parity with ICEVs

Appendix

Key Inputs & Assumptions

Table 4. Federal and Provincial ZEV Incentives, Ontario[32]

Scenario	Powertrain	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Lo	PHEV	$3,750	$2,475	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lo	BEV	$5,000	$3,300	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Med	PHEV	$3,750	$3,750	$3,750	$3,000	$2,625	$2,000	$1,313	$656	-	-	-	-	-	-	-	-	-
Med	BEV	$5,000	$5,000	$5,000	$4,000	$3,500	$3,000	$1,750	$875	-	-	-	-	-	-	-	-	-
Hi	PHEV	$3,750	$5,625	$5,625	$5,625	$5,625	$5,625	$5,625	$5,625	$4,500	$2,700	$1,350	$675	-	-	-	-	-
Hi	BEV	$5,000	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	$6,000	$4,800	$2,880	$1,440	$720	-	-	-	-	-

[32] Based on a combination of professional judgement and currently available incentives and target phase-out dates from the Government of Canada: *Incentives for Zero-Emission Vehicles (iZEV).* Accessed December 2024.

Table 5. Fuel Costs, Ontario[33]

Variable	Units	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Electricity rate[34]	$/kWh	0.14	0.14	0.14	0.14	0.15	0.15	0.15	0.15	0.15	0.16	0.16	0.16	0.16	0.17	0.17	0.17	0.17
Gas rate[35]	$/L	1.60	1.62	1.63	1.65	1.67	1.68	1.70	1.72	1.73	1.75	1.77	1.79	1.81	1.82	1.84	1.86	1.88

[33] We assume an annual growth rate of 1% and no carbon tax.
[34] Dunsky's projected electricity rates by province in real dollars. These are blended $/kWh rates including energy, transmission, distribution and associated fees, but excluding taxes. Includes both residential and smaller commercial electricity rates.
[35] Statistics Canada. December 17, 2024. *Monthly average retail prices for gasoline and fuel oil, by geography.*

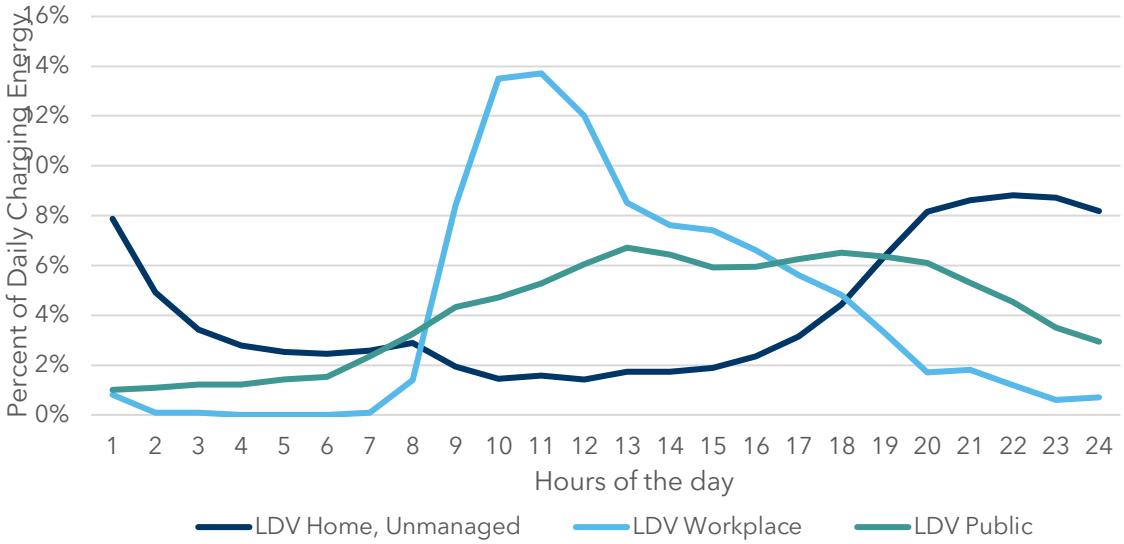
Table 6. Light-duty vehicle stock and sales, millions of vehicles, Ontario[36]

Variable	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
LDV sales	0.81	0.81	0.82	0.82	0.84	0.85	0.86	0.87	0.88	0.89	0.90	0.91	0.92	0.93	0.94	0.95	0.96
LDV Stock	9.69	9.94	10.19	10.42	10.60	10.74	10.86	10.95	11.05	11.19	11.51	11.79	11.96	12.11	12.24	12.38	12.52

[36] Natural Resources Canada. *Comprehensive Energy Use Database: Transportation Sector, Ontario.* Accessed December 2024. Assume vehicle ownership remains constant and vehicles on the road align with population projections from Statistics Canada's M1 scenario. *Projected population, by projection scenario.* Accessed June 2024.

The unmanaged diversified charging distribution profiles were developed by leveraging data sets from a range of government and utility-led pilot programs including: California Energy Commission 2019 California Investor-Owned Utility Electricity Load Shapes; ISO New England 2020 Transportation Electrification Forecast; Rocky Mountain Institute 2019 Direct Current Fast Chargers (DCFC) Rate Design Study.

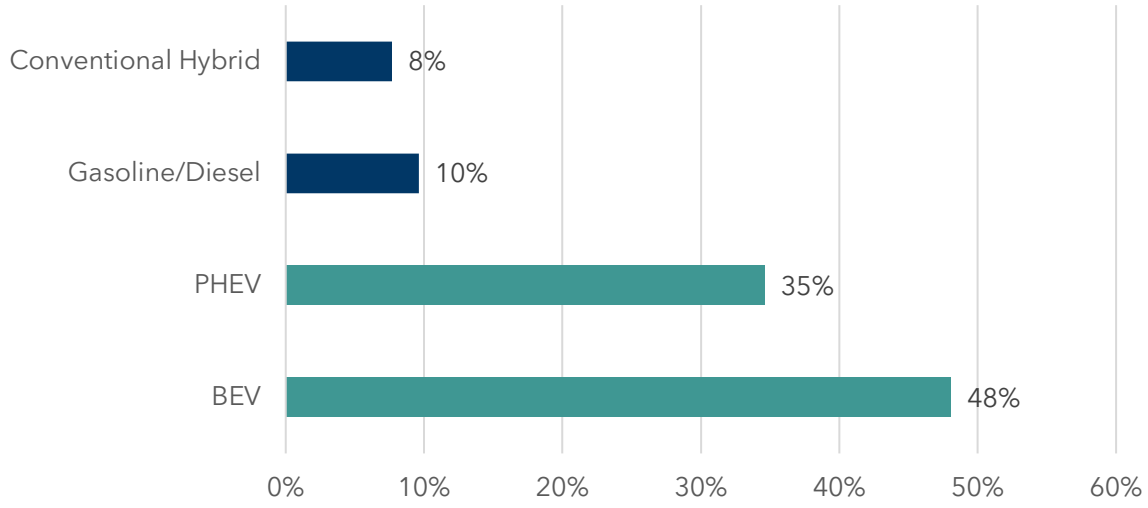
Figure 30. Diversified charging distribution profiles



The curves in the figure above represent the proportion of daily charging energy that the average vehicle would charge in each hour of the day. We calculate average daily energy needs per ZEV based on the average driving distance for vehicles in Ontario and use this in combination with the charging distribution profiles to determine how much charging energy is used every hour for our load impacts analysis.

Additional Results from Survey of Canadians

Figure 31. What type of vehicle do you intend to purchase or lease next? Ontario only (Posed only to current ZEV owners)



After being presented with a series of knowledge testing questions about electric vehicles and their correct answers, survey respondents were asked again to select the type of vehicle they would buy next. The responses to Figure 32 should be compared to Figure 12 to assess the potential impact of increased awareness of ZEV benefits on purchasing decisions.

Figure 32. Taking into consideration the information provided to you, when thinking about your next vehicle purchase, which will you choose? Ontario only

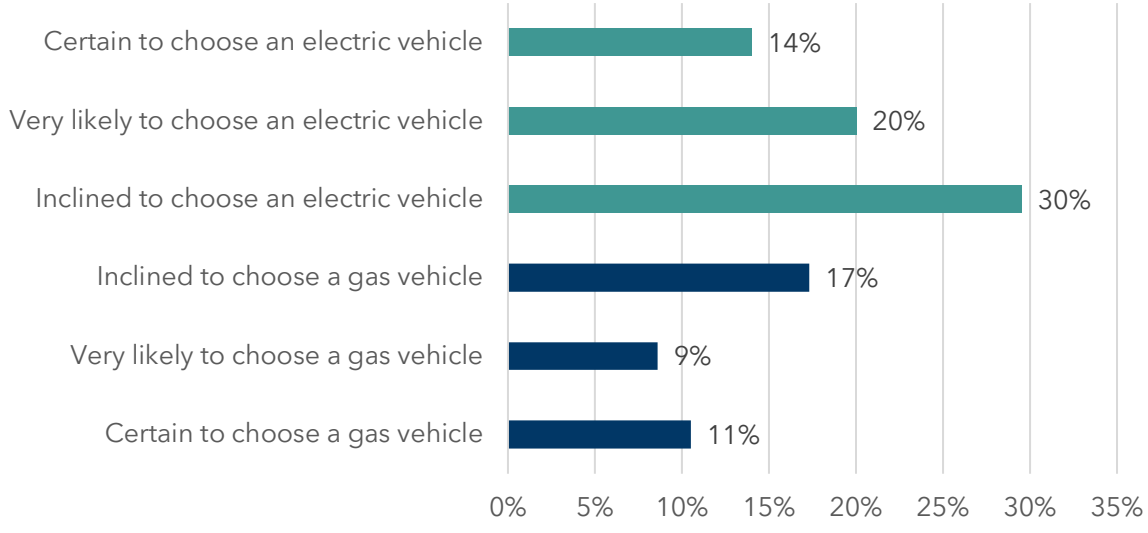


Figure 33. How influential were government incentives in your decision to purchase/lease an ZEV/PHEV? Ontario only (Posed only to current ZEV owners)

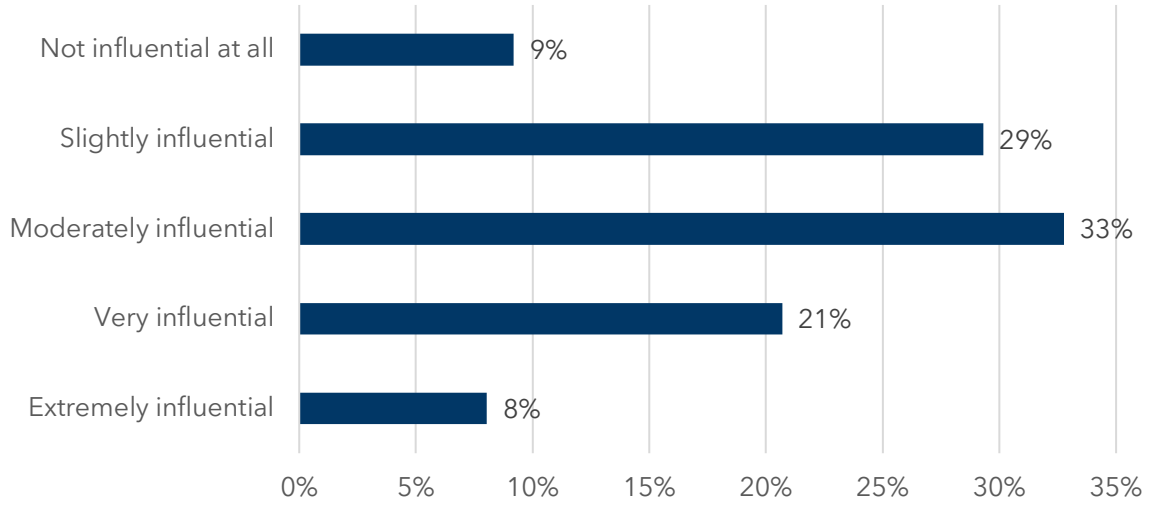


Figure 34. When you are selecting your next vehicle, do you expect you will buy/lease a fully electric vehicle (BEV) or a plug-in hybrid electric vehicle (PHEV)? Ontario only (Posed only to those who said they would buy an ZEV)

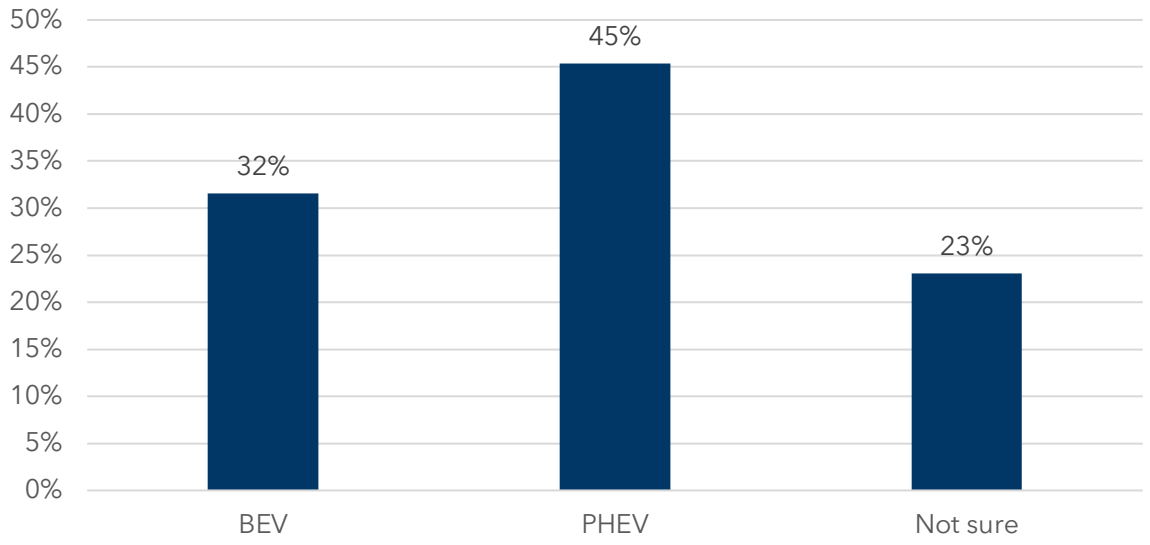


Figure 35. Are you aware of the federal government rebate of up to $5,000 for purchasing an electric vehicle? Ontario only

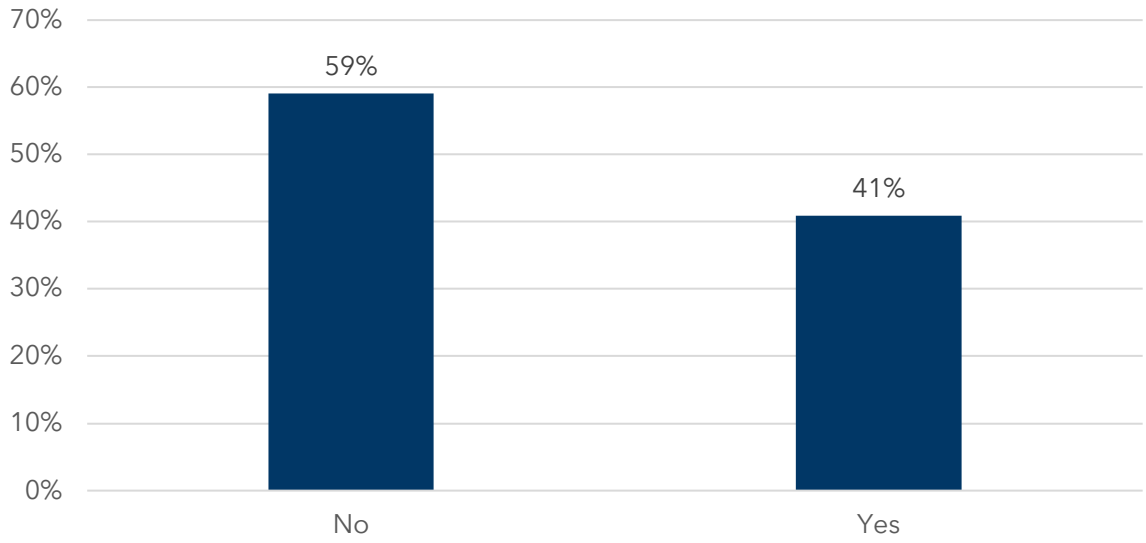


Figure 36. Are you aware that you may be eligible for a federal tax deduction specifically for the purchase of an electric vehicle if you are self-employed or own a company? Ontario only

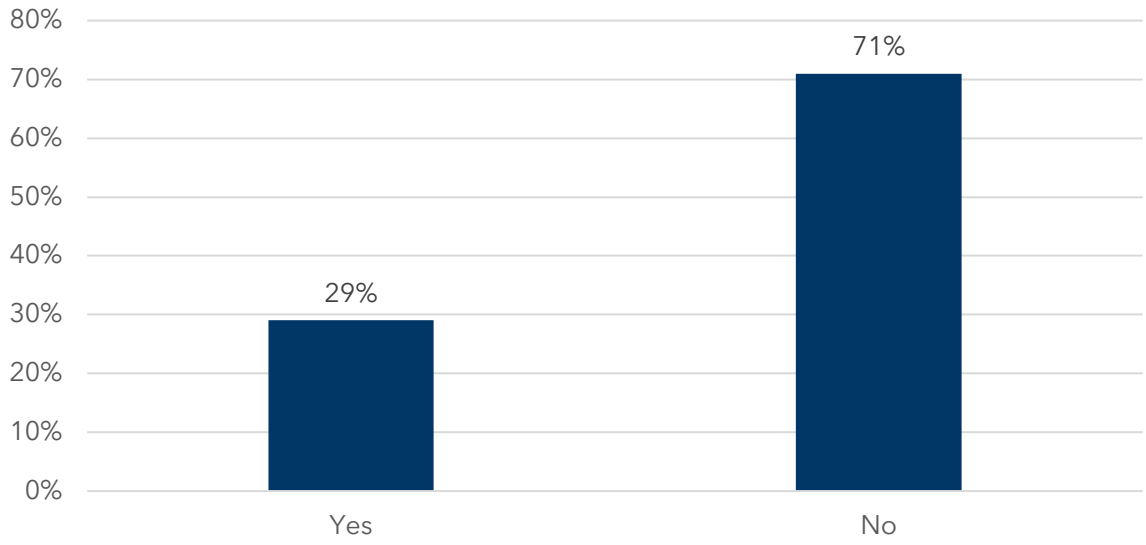


Figure 37. Are you familiar with other incentives available to ZEVs (e g , ferries, dedicated lanes on highways, dedicated parking spots closer to the entrance, etc.)? Ontario only

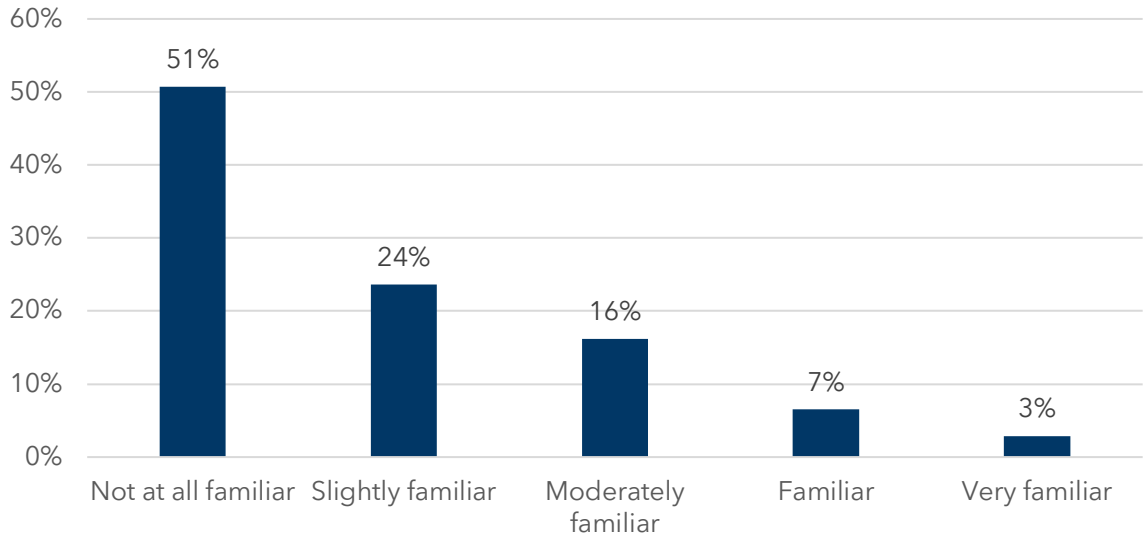


Figure 38. What is the average price of a new light duty vehicle (car, SUV, pickup truck) in Canada? Ontario only

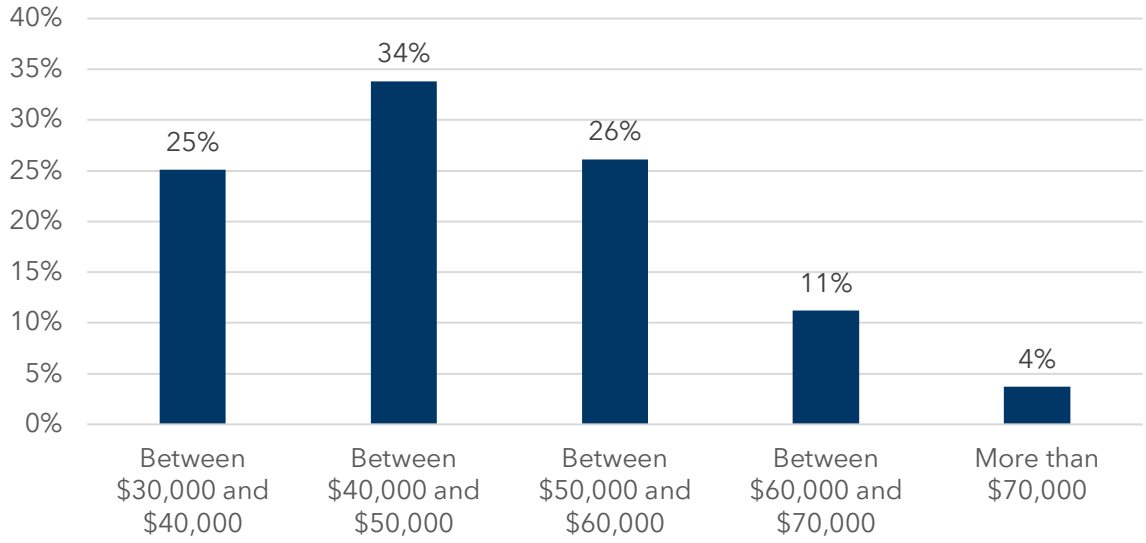
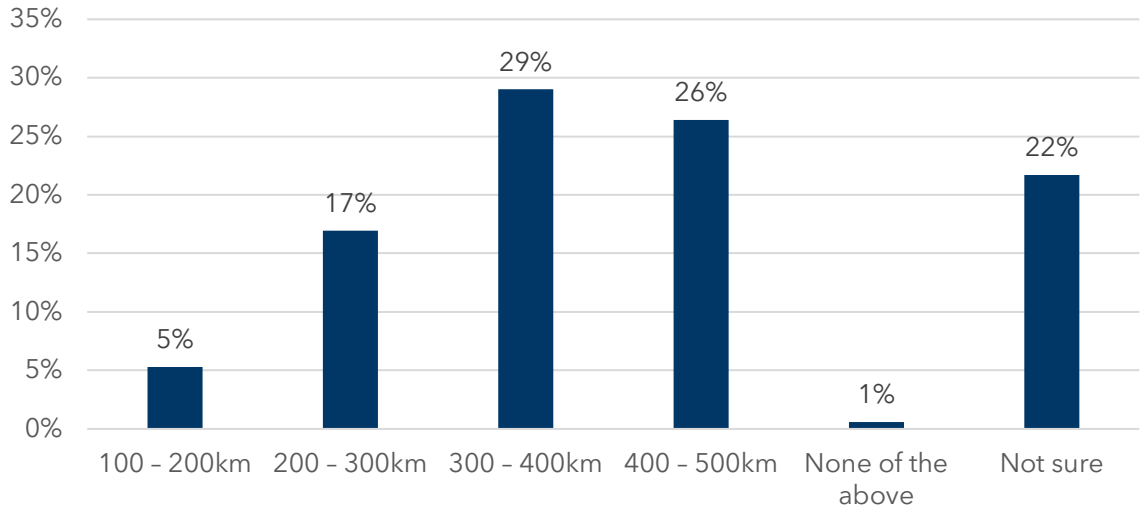


Figure 39. What is the average range of most new electric vehicles? Ontario only



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With deep expertise across the Buildings, Mobility, Industry and Energy sectors, we support our clients in two ways: through rigorous **Analysis** (of technical, economic and market opportunities) and by designing or assessing **Strategies** (plans, programs and policies) to achieve success.

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