

Recommendations for a national sales mandate for zero-emission light-duty vehicles

Pembina Institute comments and recommendations

Submitted to: Environment and Climate Change Canada | March 16, 2023

Regarding: Regulations amending Passenger Automobile and Light-Truck Greenhouse Gas Emission Regulations

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Recommendation summary

Recommendation	Outcome
1. Maintain proposed sales targets	Emissions from transportation sector will decline in line with national climate targets with minimal economic disruption
2. Extend credits for some PHEVs	Increased consumer uptake of low-emitting vehicles in places where there are few or no public chargers
3. Eliminate credits granted for building out charging Infrastructure	Fewer inefficiencies in the development of charging infrastructure
4. Require credit market transparency	All parties are held accountable for performance in meeting mandated targets

Context

The Pembina Institute is pleased to submit comments to Environment and Climate Change Canada to inform the proposed *Regulations Amending Passenger Automobile and Light-Truck Greenhouse Gas Emission Regulations*. Our recommendations draw upon key findings and insights from the Pembina Institute's research and is informed by multiple consultations with stakeholders.

The transition to zero-emission vehicles is essential to decarbonizing the transportation sector by 430 megatonnes, equivalent to reducing greenhouse gas (GHG) emissions by 40% below 2005 levels. We cannot achieve Canada's 2030 and 2050 emission reduction goals without the required level of carbon decline from the transportation sector.

The Pembina Institute supports the goals and overall design of the proposed zero-emission vehicle sales mandate. We urge the federal government to finalize its regulation in fall 2023 to give industry, businesses and investors the regulatory certainty needed to rapidly scale up the adoption and production of electric light-duty vehicles in Canada.

Discussion

Why Canada needs a zero-emission light-duty vehicle sales mandate

According to the most recent available data, the transportation sector accounted for nearly a quarter of Canada's total greenhouse gas (GHG) emissions, making transportation the second-largest source of overall emissions following oil and gas.¹ Emissions from passenger trucks, vans and SUVs more than doubled between 1990 and 2020.² While Canada has committed to 100% of new passenger auto sales being zero-emission vehicles (ZEVs) by 2035, with an interim target of 60% by 2030, current policies are not nearly strong enough to achieve these targets, nor Canada's national GHG emission reduction goals.³ Should Canada continue down its current path, the country is destined to fail in achieving its' climate commitments.

While purchase incentives have encouraged demand for ZEVs, insufficient supply in the domestic marketplace continues to be a major barrier to widespread uptake. As of March 2022, 82% of dealerships across Canada did not have a single ZEV in their inventory and 38% reported wait times of six months or longer to receive any vehicles.⁴ Canada needs strong supply-side policies to address the shortage in ZEV availability. Should Canada rely solely on existing policies, absent a sales mandate, ZEVs would constitute 38% of new vehicles sold in 2035 – well below what we need to achieve.⁵

At a global level, automakers are making investments in ZEVs and battery development. To date, automakers have prioritized the distribution of ZEVs in markets where policies require an accelerated effort to switch to electric vehicles. Canada has fallen behind on ZEV sales compared to other major markets. In 2021, Europe's EV market share rose to 17%, with some

¹ Environment and Climate Change Canada, *National Inventory Report 1990-2020: Greenhouse Gas Sources and Sinks in Canada, Part III* (2022), 11. <https://publications.gc.ca/site/eng/9.506002/publication.html>

² Environment and Climate Change Canada, *Canadian Environmental Sustainability Indicators: Greenhouse gas emissions* (2022), 10. <https://www.canada.ca/content/dam/eccc/documents/pdf/cesindicators/ghg-emissions/2022/ghg-emissions-en.pdf>

³ Jonn Axsen and Chandan Bhardwaj, *Policy Pathways to 100% Zero-Emission Vehicles by 2035 in Canada* (Équiterre and David Suzuki Foundation, 2022), 10. https://cms.equiterre.org/uploads/Rapport_zev_EN_final2.pdf

⁴ Dunsy Energy + Climate, *Zero Emission Vehicle Availability: Estimating Inventories in Canada: 2022 Update*, prepared for Transport Canada (2022), 18. <https://www.dunsy.com/wp-content/uploads/2023/01/Zero-Emission-Vehicle-Availability-2022-Update.pdf>

⁵ *Policy Pathways to 100% Zero-Emission Vehicles by 2035 in Canada*, 5.

European countries (Germany, Norway, Sweden) achieving market shares well above that.⁶ Similarly, ZEV sales made up nearly 19% of all new vehicles sold in California in 2022.⁷ In addition to California, 15 other states in the U.S. have adopted an LDV mandate.⁸ If Canada fails to do likewise, it is very possible that automakers will continue to prioritize markets where there is an evident commitment to a ZEV future. It also means that electric vehicles made in Canada will continue to be exported to other markets. Instead, through good policy such as the proposed ZEV sales mandate, Canada can ensure that investments in domestic ZEV production directly fund the manufacturing of ZEVs for Canadian consumers.

An increase in ZEV sales on an accelerated timeline will also yield significant health benefits. Replacing gas- and diesel-fuelled vehicles with electric ones will dramatically reduce emissions of criteria air contaminants, which are the main source of adverse health outcomes, including cardiovascular disease, lung cancer, chronic respiratory diseases, premature mortalities and increased hospitalizations. Bringing in an LDV sales mandate to boost the domestic supply of electric passenger vehicles will result in over \$90 billion in health cost savings, including the avoidance of 11,000 premature deaths.⁹

How to approach the transition to ZEVs

A ZEV sales mandate, instituting a quota for ZEVs sold in the Canadian market, is the single most effective policy tool for increasing the supply of EVs for Canadian consumers. This is not to say that the sales mandate alone can ensure the transition from internal combustion to zero-emitting passenger vehicles. To achieve this outcome, other policies and initiatives must occur in parallel, specifically: transitioning to a clean energy grid; extensive build-out of charging infrastructure; the implementation of the clean fuel regulations; and an industrial strategy that advances Canadian industry and workers by supporting domestic automobile manufacturing.

Clean electricity and fuels

In order to realize the maximum possible declines in emissions by transitioning to ZEVs, clean electricity should feed charging infrastructure; as well, during the transitional phase, fuel used in internal combustion vehicles should be subject to stringent emissions standards. Canada

⁶ International Energy Agency, *Global EV Outlook 2022* (2022), 16. <https://www.iea.org/reports/global-ev-outlook-2022>

⁷ Government of California, “California ZEV Sales Near 19% of All New Car Sales in 2022,” January 20, 2023. <https://www.gov.ca.gov/2023/01/20/california-zev-sales-near-19-of-all-new-car-sales-in-2022/>

⁸ Clean Energy Canada, *How Canada can design a truly effective zero-emission vehicle mandate* (2022), 7. <https://cleanenergycanada.org/wp-content/uploads/2022/08/ZEV-Standard-Best-Practices-EN.pdf>

⁹ The Atmospheric Fund, “Canada’s electric vehicle sales targets will reduce air pollution and crease at least \$90 billion in health benefits,” March 7, 2023. <https://taf.ca/canadas-electric-vehicle-sales-targets-will-reduce-air-pollution-and-provide-at-least-90-billion-in-health-benefits/>

must move forward with the policies to support a net-zero grid including the Clean Electricity Regulation, to ensure ZEVs are charged using clean electricity and that Canada’s electricity distribution system can support the increased demand for charging across all Canadian communities.

In addition, Canada will need to stay on track in its rollout of the clean fuel regulations and continue to strengthen regulations that reduce tailpipe emissions from internal combustion engine (ICE) vehicles. This should include a mandate that requires new ICE vehicles sold before 2035 be as efficient as possible.

Automakers have argued that Canada can meet its EV sales targets through the clean fuel emissions standard, instead of implementing a sales mandate. This, however, is not the case. As shown in Figure 1 below, the most expedient means of replacing fossil fuels with electricity in the vehicle sector is through instituting a ZEV sales mandate, which essentially eliminates tailpipe emissions from new vehicles.

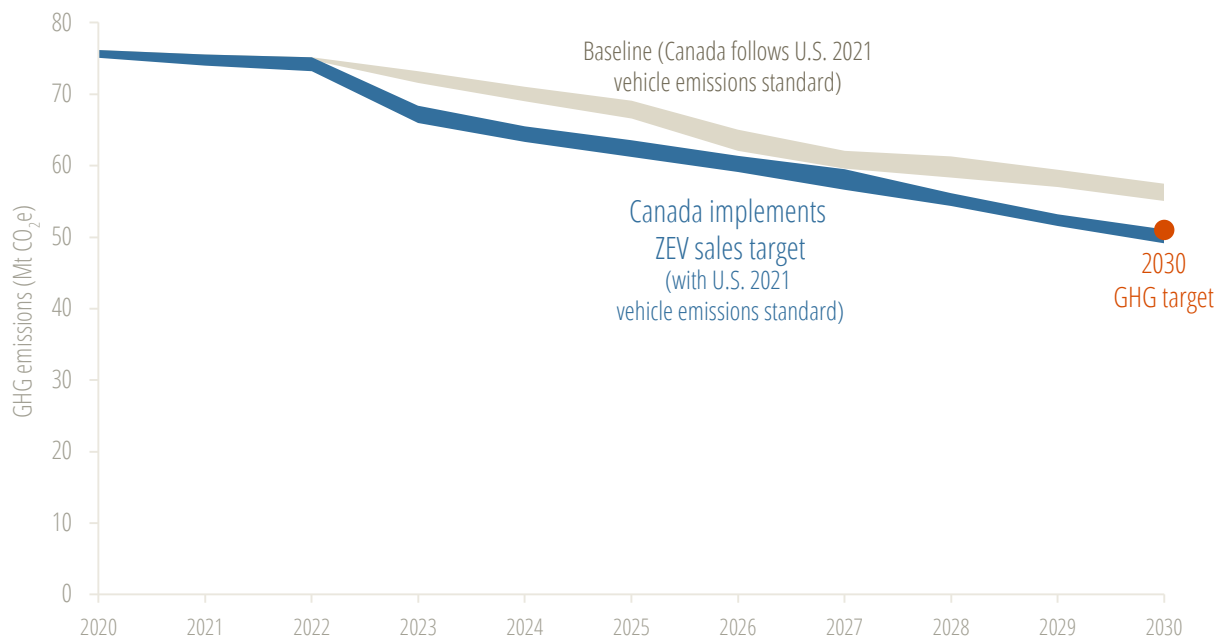


Figure 1. Total GHG emissions from light-duty vehicles under different policy scenarios

Equity and inclusion

Canadians living in remote, rural, and areas on the outskirts of urban centre are overwhelmingly car dependent. The regional under-supply of ZEVs, and the challenges of driving electric vehicles in northern and remote communities, potentially jeopardize a fair and equitable transition to ZEVs in Canada. Supporting under-resourced communities requires targeted, region-specific approaches such as additional purchase incentives, credit modification, and addressing unique infrastructure needs.

While the Pembina Institute does not oppose regional targets, credit pooling, or other tools to support regional allocation, we do not want to see the sales mandate delayed as a result. At the outset, the EV supply in some provinces may be less than desired. However, as sales targets approach 50% (the sales quota scheduled for 2029), automakers will need to closely consider supplying areas other than B.C., Quebec, and Ontario to meet their mandated targets. This will include supplying northern and remote communities, which face unique challenges in ZEV adoption. To further encourage the sales of ZEVs in these regions, policy tools such as additional purchase incentives or specific infrastructure supports may be the most effective.

Charging Infrastructure

Research has shown that readily available public charging infrastructure is key to developing new vehicle buyers' confidence in ZEVs.¹⁰ Of the 40% of Canadians living in multi-unit residential buildings (MURBs), most will rely on public chargers. Unsurprisingly, places where ZEV sales are highest (Norway, China, California) boast extensive public charging infrastructure. The uptake of ZEVs will be limited by the rate at which charging infrastructure is built. Equally important is that infrastructure is built in an efficient and equitable manner that reflects the needs of under-resourced communities.

Industrial strategy

Canada must develop a comprehensive industrial strategy to ensure Canadians and Canadian manufacturing can realize the full economic benefits of the ZEV transition. The Canadian automotive manufacturing sector accounts for over 100,000 direct jobs; Canada's auto manufacturing GDP is approximately \$16 billion.¹¹

Yet there has been great turbulence in the auto industry. Over the past two decades, nearly 47,000 jobs have been lost and automotive sector GDP has declined more than 30%.¹² During the same period, automobile production dropped from more than 2.5 million vehicles (4.5% of the global marketplace share) to about 1.4 million (1.8% of global share), with a net loss of five vehicle assembly plants (some of which have been re-started in 2022, owing to a transition to EV manufacturing).¹³

¹⁰ Scott Hardman, Alan Jenn, Gil Tal, Jonn Axsen, George Beard, Nicolo Daina, Erik Figenbaum et al. "A review of consumer preferences of and interactions with electric vehicle charging infrastructure." *Transportation Research Part D: Transport and Environment* 62 (2018), 513.

¹¹ Cedric Smith, Saeed Kaddoura and Morrigan Simpson-Marran, *Taking Charge: How Ontario can create jobs and benefits in the electric vehicle economy* (Pembina Institute, 2021), 11. <https://www.pembina.org/reports/taking-charge.pdf>

¹² *Taking Charge: How Ontario can create jobs and benefits in the electric vehicle economy*, 11.

¹³ *Taking Charge: How Ontario can create jobs and benefits in the electric vehicle economy*, 13.

If Canada expands the light-duty electric vehicle market to 100% of total new light-duty vehicle sales by 2035, the potential direct, indirect and induced economic benefits associated with EV manufacturing and charger deployment are estimated to reach more than 50,000 jobs (saved or created) and over \$5 billion in gross domestic product by 2035.^{14,15}

To date, Canada's auto industry has failed to capitalize fully on this opportunity to produce EVs domestically. For example, of the total light-duty EVs sold in Canada in 2018, approximately 95% were produced elsewhere. Canada contributed only 0.4% of light duty EV production to the global marketplace in 2018 (Canada produces 1.5% of all vehicles globally).¹⁶ Thus, Canada must take steps to encourage more domestic EV manufacturing, beyond the recent investments (by the federal and Ontario governments) in Ford, GM, Honda and Stellantis plants in Ontario to help retool them for EV production.¹⁷

Recognizing the need to develop local EV supply chains, an increasing number of leading auto manufacturing countries are now taking steps to protect and grow their domestic automotive industries. The recently announced U.S. Inflation Reduction Act requires that to qualify for a \$7,500 tax credit, an electric vehicle and its battery must be assembled in North America.¹⁸ In response, Germany's car industry has called for a European industrial policy to counter the U.S. green subsidy regime in order to safeguard the competitiveness of European industry.¹⁹ Unifor, Canada's largest private-sector union, is urging the government to support domestic industries and establish "made-in-Canada guidance for government fleet vehicle purchasing," where the government prioritizes procurement of Canadian-made vehicles.²⁰

The Pembina Institute encourages the Canadian government to consider how the LDV sales mandate might be integrated into a comprehensive industrial strategy, including a potential credit modifier to reward vehicles produced in Canada.

¹⁴ *Taking Charge: How Ontario can create jobs and benefits in the electric vehicle economy*, 3.

¹⁵ Clean Energy Canada, *Canada's New Economic Engine: Modelling Canada's EV battery supply chain potential-and how best to seize it* (2022), 2. https://cleanenergycanada.org/wp-content/uploads/2022/09/CanadasNewEconomicEngine_Web.pdf

¹⁶ *Taking Charge: How Ontario can create jobs and benefits in the electric vehicle economy*, 15.

¹⁷ Rob Ferguson, "Ontario's auto industry getting \$500M boost from governments to build electric vehicles, pickups," *Toronto Star*, April 2, 2022.

¹⁸ Dan Mihalascu, "Inflation Reduction Act Disrupts EV Market, Says Kia Of America COO," *InsideEVs*, November 29, 2022. <https://insideevs.com/news/624061/inflation-reduction-act-disrupts-ev-market-says-kia-of-america-coo/>

¹⁹ Automotive News Europe, "Europe should copy U.S. EV subsidies, France says." <https://europe.autonews.com/automakers/europe-should-copy-us-electric-car-subsidies-france-says>

²⁰ Mehanaz Yakub, "Unifor calls for national auto policy after landmark vote to elect Lana Payne as first female president," *Electric Autonomy*, August 12, 2022. <https://electricautonomy.ca/2022/08/12/unifor-auto-policy-report-lana-payne/>

Detailed recommendations

Recommendation 1: Maintain (or increase) the proposed ZEV sales targets

The Pembina Institute supports the yearly targets outlined in the proposed ZEV sales regulation and recommends that those targets, especially the 2030 goal of 60% new passenger car sales being ZEVs and the 2035 goal of 100% new vehicle sales being ZEVs, are kept in the final regulations. We also note that increasing those targets to harmonize with other North American jurisdictions would benefit both consumers and suppliers. Conversely, diluting the targets would undermine the effectiveness of the regulation. The Pembina Institute's modelling shows that the proposed ZEV sales mandate, when added to existing policies that support EV production and uptake, ensures that the 2030 and 2035 sales targets can be met.

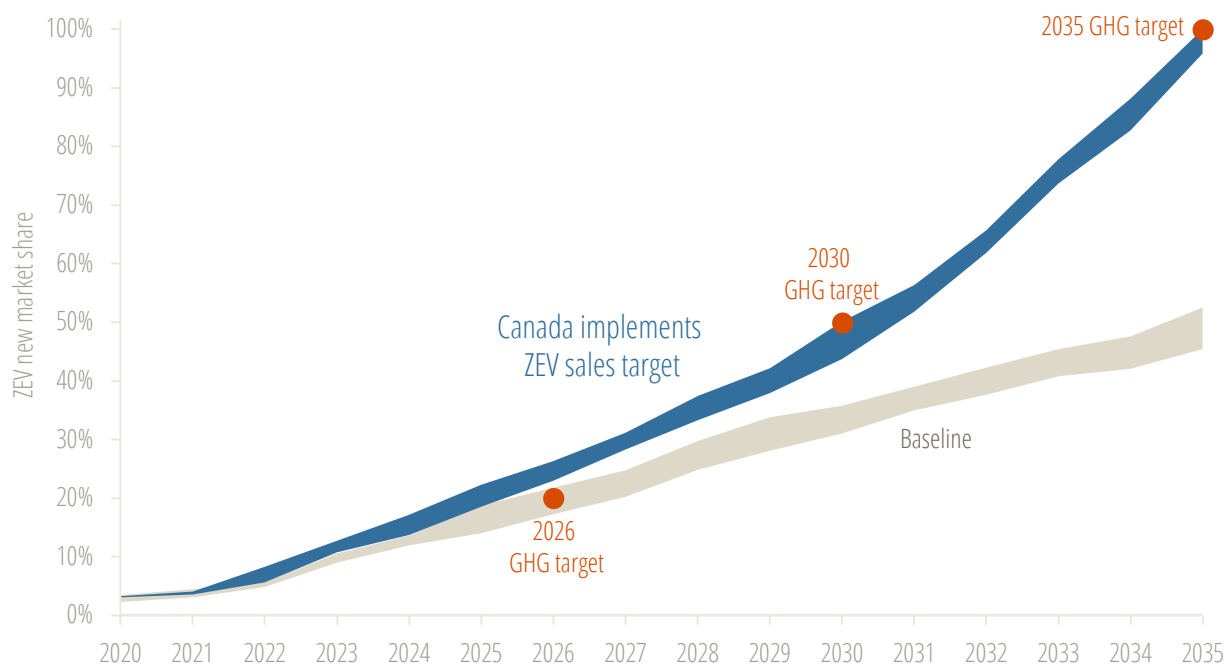


Figure 2. ZEV new market share under current policies (Baseline) and with the proposed ZEV sales target

We further recommend that the government review the sales targets in 2025/2026 to consider increasing the sales targets if the current supply chain constraints ease sooner than expected.

Recommendation #2: Extend credits for some PHEVs

The Pembina Institute recommends that support for plug-in hybrid electric vehicles (PHEVs), especially mid- and longer-range PHEVs, be maintained in the final regulations. We also recommend offering partial credits (.75) until 2030 for PHEVs with range between 50 km and 79 km and full credit for PHEVs with range over 80 km. While we agree that credits earned, partial or full, for PHEV sales will need to be phased out over time, we strongly recommend that the

cut-off date for earning credits be extended by two years from the end date currently listed in the draft regulations (see Table 1 below). Additionally, residual partial credits for PHEVs should continue past the end date that has been proposed and be phased out more gradually over time.

Table 1. PHEV recommendations

PHEVs by range	Current credit and phaseout	Recommended credit and phaseout
>80 km	1	1
50-79 km	0.75 until 2028	1 until 2030
16-49 km	0.15 until 2026	0.5 until 2028

Numerous surveys have shown that more than 60% of new vehicle buyers in Canada prefer PHEVs over battery electric vehicles (BEVs) because of the flexibility of dual power sources (gasoline and electric).²¹ For now, PHEVs are a viable option as consumers become accustomed to a new powertrain and make the switch to fully electric.

PHEVs are also key for consumers without access to chargers. Forty per cent of Canadians live in MURBs without access to private chargers.²² MURB ZEV owners will rely on public chargers, and it may take a few years to reach a stage where most MURBs offer ready access to charging infrastructure. As an example, B.C. forecasts that most households will have access to EV charging through a mix of workplace, on-street, and other forms of public charging only by 2030.²³ Other provinces will most likely lag B.C. in charger installation. PHEVs are a suitable transitioning technology, allowing for the continuation of ZEV adoption without being impeded by the slow rate of charger installation.

Relatedly, PHEVs provide advantages to those living in remote communities. Lack of public chargers, low population density, and uncertainty of EV performance in extreme weather conditions suggest that it will be particularly difficult to electrify road transport in remote communities in the near term. Here too, PHEVs can offer a substitute to BEVs, as PHEVs have no range constraints, and work as well as ICE vehicles in cold weather.

Maintaining or increasing support for PHEVs will have little impact on the effectiveness of the regulation in terms of GHG reductions. In Figure 1 above, the blue shaded area (showing existing policies with a ZEV mandate) represents the uncertainty/variation in GHG impacts.

²¹ Zoe Long, and Jonn Axsen, "Who will use new mobility technologies? Exploring demand for shared, electric, and automated vehicles in three Canadian metropolitan regions." *Energy Research & Social Science* 88 (2022), 102506.

²² Statistics Canada, "Dwellings in Canada," May 3 2017. <https://www12.statcan.gc.ca/census-recensement/2016/as-sa/98-200-x/2016005/98-200-x2016005-eng.cfm>

²³ Plug In BC, "Electric Vehicle Policies," <https://pluginbc.ca/policy/>

The primary sources of uncertainty are battery costs changing over time, changes in consumer preferences, and changes in driving patterns. Minor contributions to variations include possible alterations to the ZEV mandate regulations, such as banking of credits, allowance (or disallowance) of infrastructure credits, and allowance (or disallowance) of PHEV credits. Individually, such variations in the policy regulations result in a less than 2% to 3% impact on GHG emissions. Other factors, such as the degree to which the cost of batteries will decline and how quickly or changes in consumer behaviour, will have a much greater impact on outcomes. Policy features are presented in greater detail in Bhardwaj et al (2022).²⁴

Recommendation #3: Eliminate infrastructure credits

The Pembina Institute recommends eliminating the proposed credit allocated for ZEV-related activities. True, sufficient infrastructure is essential for the widespread adoption of ZEVs. But a sales mandate can motivate private investment in infrastructure through establishing confidence and a compelling business case for investing in a growing market. At the same time, a sales mandate is not the best regulatory mechanism to advance the rollout of a well-connected, efficient and reliable network to support current and future ZEV owners across Canada.

Lessons learned from major ZEV markets demonstrate that strategic infrastructure deployment requires planning, financing, and collaboration. Markets leading in ZEV infrastructure development have pursued investment in increasing the number of charging and refuelling stations in conjunction with establishing protocols to enhance the standardization, interoperability, reliability and locational coverage of infrastructure.²⁵

Integrating the provision of infrastructure within a sales mandate has not been proven to be an effective mechanism in other markets and risks an ad hoc approach where infrastructure is concentrated in certain areas and there is a lack of standardization across stations. Such an approach could jeopardize long-term ZEV uptake, as consumer adoption has been shown to be heavily influenced by the location of infrastructure and by user experiences encountering variability between charging stations on charging speed, safety, and payment systems.^{26,27}

²⁴ Chandan Bhardwaj, Jonn Axsen, and David McCollum, “How to design a zero-emissions vehicle mandate? Simulating impacts on sales, GHG emissions and cost-effectiveness using the AUtomaker-Consumer model (AUM),” *Transport Policy* 117 (2022), 152-168. <https://www.sciencedirect.com/science/article/abs/pii/S0967070X21003656>

²⁵ *Global EV Outlook 2022*, 80.

²⁶ Pollution Probe, *Assessment of Consumer Electric Vehicle Charging Experience in Canada* (2022). <https://www.pollutionprobe.org/wp-content/uploads/2022/06/Pollution-Probe-.Consumer-EV-charging-Experience.pdf>

²⁷ J.D. Power, “Growing Electric Vehicle Market Threatens to Short-Circuit Public Charging Experience, J.D. Power Finds,” August 17, 2022. <https://www.jdpower.com/business/press-releases/2022-us-electric-vehicle-experience-evx-public-charging-study>

As currently proposed, credits generated would be based on the amount of money spent, rather than the number of charging and refuelling stations built. This mechanism does little to address the real infrastructure needs of ZEV owners in Canada — i.e., the need for less expensive, Level 1 and/or 2 chargers installed in homes and MURBs. While public charging stations are important, there is the potential for automakers to prioritize investments in high-cost, direct current fast charging (DCFC) public charging stations and/or inflate the costs of installation to generate more credits.

In sum, the development of infrastructure should be understood as a distinct challenge, requiring a comprehensive investment strategy. In addition, other innovative financial tools can be explored to shift the cost burden of infrastructure deployment from the public sector to private investors.²⁸

Recommendation #4: Require credit market transparency

The Pembina Institute supports trading credits between automakers but recommends that the market be transparent with yearly reporting of credit trading activity. Credit market transparency is critical to ensuring public accountability. The California ZEV mandate is a good example of transparency in the credit market that Canada can follow. The California Air Resources Board (CARB) makes available annual ZEV credit balances data that illustrates the status of each manufacturer's compliance with CARB's ZEV Regulation.²⁹

Conclusion

The proposed LDV sales mandate is essential to meeting Canada's emissions targets. We urge the federal government to finalize the regulations including the four recommendations outlined above in the next six months to ensure that regulated parties have sufficient certainty to begin planning for the 2026 implementation of the mandate. Our recommendations underscore the stringency and transparency necessary to achieve Canada's targets while providing the flexibility for consumers to choose PHEVs as an interim solution and without undermining a comprehensive and efficient rollout of charging infrastructure.

While an LDV sales mandate is a key policy tool, it is not sufficient on its own to ensure the transition to ZEVs is successful. Canada must meet this challenge with a comprehensive suite of policies and spending. This must include maintaining and strengthening the clean fuel

²⁸ Victor A. Rojas and Jake Hiller, *Financing the Transition: Unlocking Capital to Electrify Truck and Bus Fleets* (Environmental Defense Fund, M.J. Bradley & Associates and Vivid Economics, 2020), 13. https://www.edf.org/sites/default/files/documents/EDF_Financing_The_Transition.pdf

²⁹ California Air Resources Board, "Zero-Emission Vehicle Credit Balances", <https://ww2.arb.ca.gov/our-work/programs/advanced-clean-cars-program/zev-program/zero-emission-vehicle-credit-balances>

regulations and emissions standards for ICE vehicles on the road today and sold before 2035, and a national charging infrastructure plan with clear targets. Canada must also develop an industrial strategy that leverages the massive global investment needed to achieve a transition that will benefit the Canadian economy and labour force. Finally, Canada must consider how all Canadians can access these benefits in an equitable manner. While the challenges cannot be overstated, so too are the opportunities to grow a clean energy economy that will serve future generations in the most sustainable means possible.