

Building a zero-emission goods-movement system

Opportunities to strengthen Canada's ZEV freight sector

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Building a zero-emission goods-movement system: Opportunities to strengthen Canada's ZEV freight sector

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About the Urban Delivery Solutions Initiative

Led by the Pembina Institute, the Urban Delivery Solutions Initiative is a national network of businesses, researchers and an environmental advocacy organization working to create an efficient and low-carbon urban freight system in Canadian cities. This report is a publication of the coalition.

Building a zero-emission goods-movement system

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Executive summary

As urbanization, economic activity, online shopping, and the demand for same-day and home deliveries increase, the number of delivery trucks and vans on the streets of Canada's cities is also growing. The COVID-19 pandemic is prompting more Canadians to buy online, which will only escalate truck traffic in urban areas. Now is the time to consider what the proliferation of delivery trucks is doing to the air that Canadians breathe, and the impact those vehicles are having on global warming.

The transportation sector represents a quarter of the country's greenhouse gas emissions. Emissions from the transportation sector are notoriously difficult to tackle because the carbon footprint of passenger and freight movement originates from millions of different sources of pollution — cars, SUVs, buses, trains, heavy-duty trucks, ships, and planes. Freight sources represent 42% of national transportation emissions, and, by 2030, freight emissions are expected to surpass passenger-vehicle emissions in Canada. To respond to impacts of climate change and to better manage transport-related GHG emissions, businesses with large fleet operations need to reduce their carbon footprint, and, ideally, transition to zero-emission vehicles.

But there are considerable gaps that must be filled to support an integrated clean transportation and energy system. Such a system is needed if Canada is to meet its climate goals. Canada has committed, under the Paris Agreement, to a reduction of greenhouse gas emissions by 30% below 2005 levels as of 2030. More recently, the federal government has pledged to achieve net-zero greenhouse gas emissions as of 2050.

This report evaluates the current policy landscape pertaining to zero-emission vehicles and identifies opportunities to cultivate and sustain a zero-emission goods-movement system in Canada. There is currently no national zero-emission vehicle policy and investment strategy for goods movement, from last-mile deliveries to the heavy-duty freight sector. In the absence of such a strategy, market transformation has been slow, even

for those companies that are eager to make the changes necessary for a clean economy.

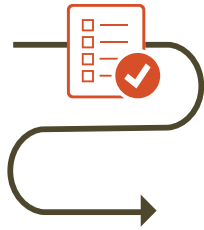
Zero-emission vehicles (ZEVs) are defined as vehicles that have the potential to produce zero tailpipe emissions. These include battery-electric vehicles, plug-in hybrid electric vehicles, and hydrogen fuel cell vehicles. This report focuses on the electrification of vehicles used in urban deliveries, especially over the short term, and examines a range of vehicle types deployed for that purpose (light-, medium- and heavy-duty vehicles).

Based on a review by the Pembina Institute of the policies implemented to promote the use of zero-emission delivery vehicles within six of the largest Canadian municipalities (Vancouver, Calgary, Edmonton, Toronto, Montreal, and Halifax) as well as the policies of their respective provincial governments and the federal government, it is clear that an integrated and comprehensive approach is required to support the shift to low-carbon urban delivery. Change would be accelerated by action from all levels of government, and commitment of industry, to establish long-term strategic plans and set targets, to provide incentives for vehicle procurement and associated capital infrastructure, and to cultivate skills required to develop and maintain these fleets.

The Technical Appendix offers an inventory of federal policies and programs, as well as those in effect at the provincial and municipal levels, that support ZEV adoption for goods-movement purposes in these six major Canadian cities.

Opportunities

The ZEV policy landscape can be divided into four categories: long-range strategic planning and regulations; incentives (financial and non-financial) for vehicle procurement and widespread deployment; charging infrastructure; and fleet-capacity development. Each of these categories require investments to support the development of an integrated zero-emission transportation system. With that in mind, this report identifies 10 opportunities to support the expansion of zero-emission vehicles for goods movement, and to help Canada achieve its 2030 and 2050 climate targets.



Strategic planning and regulations

Governments at all levels have the power and a role to play to propel the goods-movement industry toward practices that will lead to reduced emissions, cleaner air, and a sustainable environment. Long-range strategic planning and regulations can help ensure policies are consistent, effective, and co-ordinated and implemented in a manner that is accountable and transparent.

1

Co-ordinated ZEV strategies for commercial vehicles — along with associated long-term investment plans — promote uptake within goods-movement fleets. Sales mandates for medium- and heavy-duty vehicles are effective tools in speeding the transition to clean freight delivery.



Incentives for deployment

The “carrot” approach has proved effective in incentivizing the movement to clean transportation. Both financial incentives and non-financial actions are crucial to reduce barriers and accelerate the widespread deployment of electric vehicles.

2

If Canada set a target of 25,000 new zero-emission medium- and heavy-duty vehicles by 2025, a total investment of about \$5 billion would be required for vehicle procurement alone — a cost that could be shared across sectors. Currently, the federal government’s Incentives for Zero-Emission Vehicles program does not include medium- and heavy-duty commercial vehicles.

3

Increased transparency and certainty on the long-term renewal of government financial incentives would provide increased ability for the freight delivery industry to plan its transition to zero-emission vehicles over time.

4

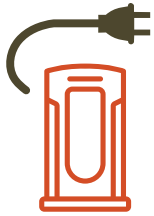
Expanding non-financial mechanisms, such as green licence plate programs, that give preferential treatment to zero-emission vehicles, to commercial vehicles, could encourage the transition to low-emission fleets.

5

Commercial fleet operators would be more likely to move to ZEV fleets if municipalities restricted the travel of high-polluting vehicles, over time, and set targets for emission reductions that align with Canada’s decarbonization goals.

6

Municipalities have the authority to implement curbside management tactics, which could incent commercial ZEV uptake.



Charging infrastructure

The operators of zero-emission fleets need to know their vehicles will be able to recharge at convenient times and locations. Continued investment can support the buildout of depot and private charging infrastructure, with public infrastructure programs designed to maximize applicability to goods-delivery fleets.

7

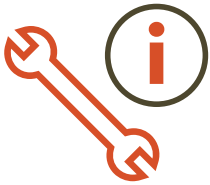
If Canada set a target of 25,000 new zero-emission medium- and heavy-duty vehicles by 2025, in addition to investments in vehicle procurement, an investment of about \$350 million in charging and refuelling infrastructure would be required.

8

At the provincial level, charging infrastructure incentive programs could become more useful if funding were expanded to directly target freight vehicles, with flexibility for private, single-use access, and to ensure coverage of higher-powered stations.

9

Buildout of publicly accessible charging and refuelling infrastructure along national highways or provincial or municipal roads could be done in co-ordination with relevant stakeholders in the goods-movement sector to keep their charging needs in mind.



Fleet capacity

A lack of readily available information continues to be a major barrier to ZEV deployment. Fleet operators need to be equipped with accessible, easily digestible resources to support effective decision-making, including information on total cost of ownership, vehicle procurement, infrastructure requirements, and GHG emission reductions. In addition, training needs to be provided for drivers and maintenance workers.

10

Investments in labour market programs to support good paying jobs and this new energy system are essential for the successful deployment and maintenance of zero-emission vehicles in commercial fleets, especially as the sector moves to scale up from pilot to mass adoption.

1. Introduction

The transportation sector represents over a quarter of Canada’s greenhouse gas (GHG) emissions, second only to the oil and gas sector.¹ While transportation emissions come from both passenger and goods-movement (freight) vehicles, historically the primary focus has been on mitigating emissions from passenger vehicles. However, reducing the environmental impact of freight activity is becoming increasingly important. As urbanization, economic activity, online shopping and the demand for same-day and home deliveries increase, the number of delivery trucks and vans on the streets of Canada’s cities is also growing. The COVID-19 pandemic is prompting more Canadians to buy online, which will only expand truck traffic in urban areas. Freight sources represent 42% of national transportation emissions,² and, by 2030, freight emissions are expected to surpass passenger-vehicle emissions in Canada.³ Canada has committed, under the Paris Agreement, to a reduction of greenhouse gas emissions by 30% below levels in 2005 as of 2030.⁴ More recently, the federal government has pledged to achieve net-zero greenhouse gas emissions as of 2050.⁵ Reducing freight emissions will be key to Canada achieving these goals.

Zero-emission vehicles are vehicles that have the potential to produce zero tailpipe emissions. These include battery-electric vehicles, plug-in hybrid electric vehicles, and hydrogen fuel cell vehicles.⁶ To date, Canada’s limited stock of zero-emission medium- and heavy-duty vehicles consists almost entirely of passenger buses.⁷ Expanding the use

¹ Government of Canada, “Greenhouse gas emissions by economic sector, Canada, 1990 to 2018”, spreadsheet, May 2020, <https://www.canada.ca/content/dam/eccc/documents/csv/cesindicators/ghg-emissions/2020/GHG-emissions-sector-en.csv>

² Environment and Climate Change Canada, *National Inventory Report 1990-2018: Greenhouse Gas Sources and Sinks in Canada Part 3* (2020), 11.

³ Environment and Climate Change Canada, *Canada’s Fourth Biennial Report on Climate Change*, 122. https://unfccc.int/sites/default/files/resource/br4_final_en.pdf

⁴ Government of Canada, “Progress towards Canada’s greenhouse gas emissions reduction target.” <https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/progress-towards-canada-greenhouse-gas-emissions-reduction-target.html>

⁵ Jonathan Arnold and Nancy Olewiler, “Getting to zero: Canada plans to hit net-zero emissions by 2050. What’s next?,” *Canadian Institute for Climate Choices*, January 21, 2020. <https://climatechoices.ca/getting-to-zero-canada-plans-to-hit-net-zero-emissions-by-2050-whats-next/>

⁶ Transport Canada, “Zero-emission vehicles.” <https://www.tc.gc.ca/en/services/road/innovative-technologies/zero-emission-vehicles.html>

⁷ EV-Volumes.com, “EV Data Center.” <http://www.ev-volumes.com/datacenter/>

of ZEVs in goods movement is an avenue to decarbonize the freight sector. Given the current technology, that transition should start with finding near-term solutions that provide incentives for ZEV adoption in short-haul, last-mile, urban delivery. Lessons learned can then help inform efforts to electrify vehicles in the regional and longer-haul sector.

Cultivating and sustaining a growing ZEV market will require substantive and sustained investment. Both public and private investments that are designed with climate and economic resilience in mind represent an extraordinary opportunity to create a prosperous, resilient future. Over time, the benefits of the ZEV transition — in the form of savings on fuel and maintenance costs, savings on vehicle prices (after ZEVs and internal combustion engine vehicles reach parity), and GHG emission reductions — can outweigh costs, including procurement incentives and infrastructure, by a factor as high as 11.⁸

It is predicted that ZEV technological readiness in the freight sector will occur in waves. As ZEV technologies are accepted in their early market applications, the technology can be transferred to additional market applications. For instance, the success of zero-emission transit buses has served as a launch point for shuttle and school buses, delivery vehicles, drayage trucks (which move bulk and containers to and from ports and other locations⁹), and regional trucks.¹⁰ Indeed, many businesses have already started to explore, procure, test, and set targets for integrating ZEVs into their commercial fleets.

Leading jurisdictions with a burgeoning ZEV transition for commercial vehicles have a balanced mix of supportive public policies and regulations with climate and air pollution in mind, infrastructure investments, incentives for fleet conversion, and demonstration pilots. Given the interest and commitment from businesses, and the growing number of commercial ZEVs available today and anticipated in the near term, these are the types of components needed for a transition in Canada.

⁸ Analysis of the United States and Germany by the International Council on Clean Transportation indicates that, between 2020 and 2050, cumulative ZEV transition benefits can outweigh costs by a factor of between 5 and 11. *Source:* Peter Slowik, Dale Hall, Nic Lutsey, Michael Nicholas and Sandra Wappelhorst, *Funding the Transition to All Zero-Emission Vehicles* (International Council on Clean Transportation, 2019), i-ii. https://theicct.org/sites/default/files/publications/Funding_transition_ZEV_20191014.pdf

⁹ California Air Resources Board, “Drayage Trucks at Seaports & Railyards.” <https://ww2.arb.ca.gov/our-work/programs/drayage-trucks-seaports-railyards>

¹⁰ California Air Resources Board, *Proposed Fiscal Year 2019-20 Funding Plan for Clean Transportation Incentives Appendix D: Heavy-Duty Investment Strategy* (2019), D-21-22. <https://ww2.arb.ca.gov/sites/default/files/2019-09/fy1920fundingplan-appd.pdf>

It is important that policies and programs are consistent and predictable, and stable over the long term, to provide effective market signals that induce investments in ZEV adoption and infrastructure. In Canada, businesses and organizations with fleets, no matter the size, stand to gain substantially from a more consistent approach, particularly those that have multi-province and/or national operations. There are opportunities to strengthen the planning efforts and level of infrastructure to accommodate zero-emission commercial vehicles across Canada, particularly in regions with weak policy and market conditions.

Types of freight vehicles

Light-duty freight vehicles: These may include vehicles intended for goods movement, such as step vans and utility vans, or vehicles intended for passenger movement that have been adapted for goods movement. Toronto-based courier company The Drop Distribution, for example, makes deliveries with a standard Nissan Leaf electric vehicle.¹¹ Amazon’s Amazon Flex program allows members to use their personal vehicles — including SUVs and mid-sized sedans — to deliver Amazon packages.¹²

Medium-duty freight vehicles: These include goods-movement vehicles in intermediate weight ranges, including city delivery vehicles, large walk-in vehicles, and single-axle vans.¹³

Heavy-duty freight vehicles: These include goods-movement vehicles in upper weight ranges, including medium semi-tractors, heavy semi-tractors, and refrigerated vans.¹⁴

While most ZEV policies in Canada are currently directed at light-duty vehicles, attention must also be paid to policies that support the proliferation of zero-emission medium- and heavy-duty vehicles. Only then can real progress be made in lowering emissions in the freight sector.

¹¹ The Drop Distribution, “Our Fleet.” <http://www.usethedrop.com/our-fleet>

¹² Amazon Flex, “What is Amazon Flex?” <https://flex.amazon.com/>

¹³ Alternative Fuels Data Center, “Types of Vehicles by Weight Class.” <https://afdc.energy.gov/data/10381>

¹⁴ “Types of Vehicles by Weight Class.”

2. Building a supportive ZEV policy landscape

There are several barriers to ZEV adoption, including high upfront capital costs, infrastructure availability (e.g. charging stations), insufficient consumer awareness,¹⁵ and the reality that commercial fleet vehicles may have up to a 20-year lifespan¹⁶, and it takes time for fleet operators to retire and replace their fleets. A supportive policy landscape is necessary to help businesses with commercial fleets to overcome these obstacles.

Table 1 outlines four categories into which the ZEV policy landscape can be divided: strategic planning and regulations; incentives for deployment; charging infrastructure; and fleet capacity. Each of these play an important role in ZEV adoption; none are sufficient on their own, and it is important for governments to work in tandem with one another. For example, policies that provide financial incentives for ZEV procurement help offset the high capital cost of ZEVs, but do not address the need for charging infrastructure buildout, nor address challenges of connectivity and potential upgrades to the electricity grid. Ultimately, a suite of policies and programs (i.e. a ZEV ecosystem) that helps overcome the different barriers to ZEV adoption is needed. While the transition towards a cleaner electricity grid and vehicle-grid integration is important in the decarbonization conversation, the scope of this report does not examine these issues.




¹⁵ Ben Sharpe, Nic Lutsey, Cedric Smith and Carolyn Kim, *Power Play: Canada's Role in the Electric Vehicle Transition* (International Council on Clean Transportation, 2020), 14.

<https://www.pembina.org/reports/canada-power-play-zev-04012020.pdf>

¹⁶ FleetOwner.com, "IHS: Both fleet age and truck demand on the rise," November 7, 2014.

<https://www.fleetowner.com/truck-stats/ihs-both-fleet-age-and-truck-demand-rise>

Table 1. Four categories of the ZEV policy landscape

 <h3>Strategic planning and regulations</h3> <ul style="list-style-type: none"> • Policies such as zero-emission vehicle strategic plans, climate-change related strategies, voluntary zero-emission vehicle sales targets, and long-term investment plans • Regulations such as mandates for zero-emission vehicle sales 	 <h3>Incentives for deployment</h3> <ul style="list-style-type: none"> • Financial incentives including rebates and tax incentives • Non-financial incentives such as privileged high-occupancy vehicle lane access
 <h3>Charging infrastructure</h3> <ul style="list-style-type: none"> • Infrastructure projects funded partially or wholly by the public sector • Incentives for implementing charging infrastructure on private property • Requirements that buildings be ready to add electric vehicle infrastructure 	 <h3>Fleet capacity</h3> <ul style="list-style-type: none"> • Zero-emission vehicle awareness and education • Skills training on zero-emission vehicles in commercial fleets

In addition to a strong policy landscape, building up commercial ZEV deployment in Canada will require active involvement and partnership from a wide variety of stakeholders. Governments at all levels play an important role in establishing a supportive ZEV ecosystem through policies, infrastructure programs, financial and non-financial incentives, and other mechanisms. ZEV sales targets and mandates, for example, are policy levers that are in the domain of federal and provincial governments, while curbside management strategies are more of a municipal matter. Co-ordination across jurisdictions and sectors will be critical in developing the support required to accelerate commercial ZEV deployment.

It is important to recognize the critical roles played by other actors, including automakers (e.g. in ZEV manufacturing), utilities (e.g. in EV charging infrastructure installation and connectivity and upgrades to the grid), and other non-governmental organizations such as non-profits, academia, or research institutes (e.g. in education and awareness campaigns, and research into best practices for commercial ZEV deployment).

3. Policy analysis

3.1 Strategic planning and regulations

Several jurisdictions across Canada have already adopted strategies to increase ZEV uptake in order to act on climate change and reduce greenhouse gas emissions.

In Quebec, for example, the 2015–2020 Plan d’action en électrification des transports includes measures to promote electric transportation, develop the industry, and create a favorable environment.¹⁷ Quebec’s recently announced 2030 Plan for a Green Economy similarly has a priority on electrification and is intended to support targets of 37.5% GHG emission reductions below 1990 levels as of 2030 and 1.5 million electric vehicles on the road by 2030.^{18,19,20} Similarly, the City of Toronto’s 2020 Electric Vehicle Strategy, closely tied to its TransformTO climate strategy, assists the strategy’s goal of transportation using 100% zero-carbon energy sources by 2050.²¹

For the most part, electric vehicle (EV) strategies in Canada are targeted toward light-duty passenger vehicles; they only intermittently reference goods movement and medium- and heavy-duty vehicles.²² This is a reasonable starting point given that many electrification policies will benefit all vehicle types and that light-duty vehicles pose

¹⁷ Arthur Billette, “Transportation Electrification in Quebec: Overcoming barriers to cleaner cars,” presented at Sustainable Pathways for Canada’s Onroad Transportation Sector, Ottawa, June 12, 2019, 4,8. Available at

https://theicct.org/sites/default/files/Arthur%20Billette_Pre%CC%81sentation_E%CC%81lectr_anglais_ICC_T_Ottawa_12-06-2019.pdf

¹⁸ Quebec Ministère de l’Environnement et de la Lutte contre les changements climatiques, “Press release: Quebec Government Launches its 2030 Plan for a Green Economy,” media release, November 16, 2020.

http://www.environnement.gouv.qc.ca/infuseur/communiqu_e_en.asp?no=4427

¹⁹ Government of Quebec, *2030 Plan for a Green Economy: Electrification and Climate Change Policy Framework – Summary* (2020), 3, 4, 7. <https://cdn-contenu.quebec.ca/cdn-contenu/adm/min/environnement/publications-adm/plan-economie-verte/plan-summary.pdf?1605531461>

²⁰ The plan also noted a desire for a prohibition on gasoline-powered vehicles by 2035. *Source: 2030 Plan for a Green Economy: Electrification and Climate Change Policy Framework - Summary, 7.*

²¹ City of Toronto, “Electric Vehicles.” <https://www.toronto.ca/services-payments/water-environment/environmentally-friendly-city-initiatives/reports-plans-policies-research/electric-vehicles/>

²² The City of Calgary’s EV strategy, for example, included a commitment to advance Calgary-specific research into GHG reduction and energy efficiency in goods movement. *Source: City of Calgary, Calgary’s Electric and Low-Emissions Vehicle Strategy* (2019), 23.

<https://www.calgary.ca/Transportation/TP/Documents/strategy/Electric%20Vehicle%20Strategy/Electric-Vehicle-Strategy-Report.pdf>

fewer obstacles to electrification than medium- and heavy-duty vehicles. Nevertheless, given the fact that freight activity is rising in Canada's largest cities and heavy-duty freight trucks contribute more than one-third of Canada's transportation-sector emissions²³, strategies could include commitments toward electrification and decarbonization of all goods-movement vehicles.

Long-term plans and strategies that support the adoption of electric-vehicles and which align with climate action can send positive market signals for the automotive sectors, support research and development for zero-emission technologies, attract/spur private investments, and increase the likelihood that resources devoted to electrification are used as effectively as possible. ZEV sales targets and mandates are influential policy levers that could be at the centre of federal- and provincial-led long-term EV strategies and investment plans.

Opportunity #1

Co-ordinated ZEV strategies for commercial vehicles — along with associated long-term investment plans — promote uptake within goods-movement fleets. Sales mandates for medium- and heavy-duty vehicles are effective tools in speeding the transition to clean freight delivery.

ZEV sales mandates (binding) and targets (non-binding) are policy tools to signal a strong commitment to electrification.

The federal government has established a target that stipulates ZEVs should account for 100% of the light-duty vehicle sales market by 2040. At the provincial level, British Columbia and Quebec both have light-duty ZEV sales mandates. Sales mandates and targets for vehicles can be beneficial to consumers as they are demonstrated to increase the available supply of ZEV models.²⁴ In the three years after the adoption of Quebec's ZEV Act in 2016, for example, the percentage of models available in California that are

²³ Government of Canada, "Transportation sector greenhouse gas emissions, Canada, 1990 to 2018", spreadsheet, May 2020, <https://www.canada.ca/content/dam/eccc/documents/csv/cesindicators/ghg-emissions/2020/GHG-emissions-transportation-en.csv>

²⁴ John Axsen, Suzanne Goldberg and Michael Wolinetz, *Accelerating the Transition to Electric Mobility in Canada: The case for a zero-emission vehicle mandate* (Equiterre, 2017), 10, 53-54. https://www.equiterre.org/sites/fichiers/repac_en.pdf

also available in Quebec increased from 66% to 92%.²⁵ Canada could benefit from a mandated ZEV sales target in the medium term, one that encompasses light-, medium-, and heavy-duty freight vehicles. Provinces without existing sales targets or mandates could consider aligning with targets like British Columbia and Quebec.

ZEV sales mandates and targets for medium- and heavy-duty vehicles could be segmented according to suitability for electrification. California’s recently adopted²⁶ Advanced Clean Truck Regulation, for example, which seeks to accelerate electrification among medium- and heavy-duty vehicles, sets different sales percentage requirements for Class 2b–3 trucks, Class 4–8 straight trucks, and tractor trucks, as outlined in Table 2, below.²⁷

Table 2. Segmentation in California’s Advanced Clean Truck Regulation

Segment	Required Percentage of California Sales (2035)
Class 2b–3 trucks	55%
Class 4–8 straight trucks	75%
Tractor trucks	40%

Source: California Air Resources Board²⁸

ZEV plans and strategies

Based on a review of existing ZEV strategies in Canada, common elements that drive successful implementation and help to achieve desired outcomes include:

²⁵ Environnement et Lutte contre les changements climatiques, *Zero Emission Vehicle (ZEV) Standard: Report on the Results of the First Compliance Period* (2020), 7.

www.environnement.gouv.qc.ca/changementsclimatiques/vze/bilan-norme-vze-periode-1-en.pdf

²⁶ NRDC, “California Makes History with Clean Trucks Rule.” <https://www.nrdc.org/experts/patricio-portillo/california-makes-history-clean-trucks-rule>

²⁷ Segment analysis by the California Air Resources Board found that 70%+ of Class 4-7 vehicles are currently suited for electrification, in contrast with only 30% of Class 8 and Classes 2b-3 vehicles. Source: State of California Air Resources Board, *Public Hearing to Consider the Proposed Advanced Clean Trucks Regulation: Staff Report: Initial Statement of Reasons* (2019), I-17.

<https://ww3.arb.ca.gov/regact/2019/act2019/isor.pdf>

²⁸ California Air Resources Board, “Advanced Clean Trucks Fact Sheet.”

<https://ww2.arb.ca.gov/resources/fact-sheets/advanced-clean-trucks-fact-sheet>

- Accountability measures, including short- and medium-term actions to meet strategic goals with articulated targets for greenhouse gas emission reductions over time.
- Performance indicators to evaluate progress and impact of actions, and regular follow-up reports.
- Clear alignment and linkages with long-range land use and transportation plans, including goods-movement and freight strategies, and climate and clean energy plans.²⁹
- Clear alignment and linkages with a pan-Canadian zero-emission vehicle strategic framework. Identify opportunities to work with other jurisdictions to achieve desired goals.
- Governance structures that identify government units and individuals responsible for strategy co-ordination and/or implementation of strategy actions.³⁰ In general, it is important to ensure co-operation among relevant government departments that manage issues relating to the environment and energy, land use, and transportation, and finance.
- A capital investment plan that identifies source of revenue and identifies the level of investment required in the short, medium, and long term.

Strategies that are linked to long-term investment plans are more likely to successfully achieve intended strategic goals and targets. Major investments are needed to promote ZEV procurement, build out charging and refuelling infrastructure, support demonstration projects that test zero-emission goods-movement vehicles and support domestic zero-emission vehicle supply chains. In addition, planning and budgeting for data collection efforts and the maintenance of high-quality data through forums such as Statistics Canada and the Transportation Data and Information Hub are needed to ensure investments are allocated as effectively as possible.^{31,32} Long-term investment

²⁹ The City of Vancouver's Climate Emergency Response report, for example, recommended the creation of an urban freight and fleets strategy, which would include language on the transition to zero-emission light-, medium- and heavy-duty vehicles. *Source:* City of Vancouver, *Report – Climate Emergency Response* (2019), 34. <https://council.vancouver.ca/20190424/documents/cfsc1.pdf>

³⁰ Verificateur general de la Ville de Montreal, *2018 Annual Report: 4.3. Transportation Electrification Strategy* (2019), 131, 140. http://www.bvgmtl.ca/wp-content/uploads/2019/06/AR2018_En_Section4_3-1.pdf

³¹ Government of Canada, "Transportation Data and Information Hub." <https://www144.statcan.gc.ca/tdih-cdit/index-eng.htm>

³² Clean transportation data should include detailed information across Canadian urban centers in all provinces related to areas including vehicle kilometres traveled and greenhouse gases emitted for goods-movement fleets.

plans can also be useful in co-ordinating the complexities of multiple funding programs and related policies that exist at the federal, provincial and municipal levels.

The California Air Resources Board, for example, has a Heavy-Duty Investment Strategy that includes recommendations for investments over three years.³³ The total funding recommended per year ranges from \$465 million to \$875 million to support different phases of ZEV technology readiness — including early-stage demonstrations, pilot projects, and commercial-ready phases.

While the scope of this paper does not cover zero-emission supply chains,³⁴ the development of a robust Canadian ZEV manufacturing sector is an important driver to promote uptake of commercial ZEVs through increasing the model supply, variety and parts in Canada. And, of course, economic and employment benefits will flow from electrification. There is already government-led support for these types of initiatives. At the federal level, the ZEV manufacturing sector can benefit from the Strategic Innovation Fund, which has leveraged total investments of \$44 billion and has five funding streams.³⁵ Provincial-level examples include British Columbia’s Go Electric Advanced Research and Commercialization Program, which funds activities including R&D and commercialization.³⁶ To ensure adequate supply of commercial ZEVs and economic benefits from electrification, ZEV strategies and investment plans could also include funding for supportive industrial policy. In North America, for example, electric-vehicle assembly and battery-production plants have been supported by supply-side instruments including loans, property tax credits and other tax incentives, job-training support, and grants.³⁷ Continued support for R&D, commercialization and the attraction of foreign investment can also help foster innovation in the ZEV sector so that vehicle models are suitable to the interests of fleets operating in Canada.

Long-range strategic planning requires an all-hands-on-deck approach and intra- and inter-governmental co-ordination. To promote a stronger national policy framework and ensure cost-effective and impactful programs, there are opportunities for the

³³ *Proposed Fiscal Year 2019-20 Funding Plan, Appendix D, D-84.*

³⁴ *Power Play: Canada’s role in the electric vehicle transition* offers an in-depth examination of the Canadian zero-emission vehicle manufacturing sector.

³⁵ Innovation, Science and Economic Development Canada, “Strategic Innovation Fund.” <https://www.ic.gc.ca/eic/site/125.nsf/eng/home>

³⁶ Government of British Columbia, “BC ZEV Sector Development.” <https://www2.gov.bc.ca/gov/content/industry/electricity-alternative-energy/transportation-energies/clean-transportation-policies-programs/clean-energy-vehicle-program/zev-sector-development>

³⁷ *Power Play: Canada’s role in the electric vehicle transition*, 30, 32.

federal government to co-ordinate its efforts across departments, including Natural Resources Canada, Environment and Climate Change Canada, Innovation, Science and Economic Development Canada, Transport Canada, Finance Canada, Employment and Social Development Canada, and other agencies such as the Federation of Canadian Municipalities and the Canada Infrastructure Bank. Looking forward, the Canada Infrastructure Bank can play a leadership role in driving investments and financing for an integrated ZEV system that is suitable for freight- and goods-movement purposes. A formalized national forum can be the main driver and mechanism to develop a national ZEV policy and investment strategy and provide a “one-window” platform for program delivery and engagement with stakeholders.

3.2 Incentives for deployment

Financial incentives

Financial incentives are crucial in reducing one of the main barriers to electric vehicle adoption — high upfront purchase prices.³⁸ As shown in Table 3, the initial purchase price of a zero-emission truck can be significantly above that of conventional diesel options across a wide range of vehicle classes and use-cases. Financial incentives can help close this gap.

While barriers beyond upfront cost limit uptake of zero-emission vehicles, several data points illustrate the importance of financial incentives in stimulating demand. For example:

- In 2017, it was estimated that current ZEV financial incentives in Canada could increase the ZEV domestic new market share by 1.5 to 5 percentage points in 2040; however, stronger financial incentives³⁹ could increase the new market share by an estimated 15 to 20 percentage points. Financial incentive policies were viewed as the most effective demand-focused policy in encouraging ZEV uptake.⁴⁰

³⁸ Transport Canada, “Zero-emission vehicles.”

³⁹ Stronger policy was defined as point-of-sale incentives of \$6,000 per vehicle sale offered between 2018 and 2038. *Source:* Noel Melton, John Axsen, Suzanne Goldberg, Barbar Moawed and Michael Wolinetz, *Canada’s ZEV Policy Handbook* (Sustainable Transportation Action Research Team, 2017), 29. https://sfustart.files.wordpress.com/2017/12/zev-policy-handbook_web.pdf

⁴⁰ *Canada’s ZEV Policy Handbook*, 29, 58-59.

- The Province of British Columbia has estimated that its programs for ZEVs have resulted in more than 22,000 new ZEVs on the road as of September 2019.⁴¹

Table 3. Initial purchase price estimates for trucks

	Diesel	Electric	Hydrogen
Class 2b	\$36,500	\$99,500	
Class 3	\$51,500	\$132,500	
Class 4/5 Short-Haul	\$63,500	\$132,500	
Class 4/5 Long-Haul	\$63,500	\$199,000	
Class 6/7 Short-Haul	\$83,500	\$221,500	
Class 6/7 Long-Haul	\$83,500	\$331,500	
Class 8 Short-Haul	\$146,000	\$331,500	\$531,000
Class 8 Long-Haul	\$212,000	\$497,500	\$637,000

Data source: ICF^{42,43}

Existing financial incentive programs in Canada include the federal Incentives for Zero-Emission Vehicles program, federal tax write-offs for zero-emission vehicles, Quebec's Roulet-vert program, and British Columbia's Go Electric Incentive Program. A number of programs specifically incent the uptake of electric medium- and heavy-duty vehicles. The federal government's tax write-off, for example, extends to medium- and heavy-duty vehicles.⁴⁴ British Columbia's Go Electric commercial vehicle program supports the

⁴¹ These programs include vehicle point-of-sale incentives, electric vehicle charging and refuelling infrastructure, support for fleet ZEV adoption, and investment in areas including research, economic development and training. In addition to ZEVs on the road, B.C. has listed outcomes including charging/refuelling infrastructure installation and funding for technician training. *Source:* Government of British Columbia, "Go Electric Incentive Program." <https://www2.gov.bc.ca/gov/content/industry/electricity-alternative-energy/transportation-energies/clean-transportation-policies-programs/clean-energy-vehicle-program>

⁴² ICF, *Comparison of Medium- and Heavy-duty Technologies in California: Part 2: Total Cost of Ownership Technology Analysis*, prepared for California Electric Transportation Coalition and Natural Resources Defence Council (2019), 'Table II-3. 2019 Truck Initial Purchase Price Assumptions in 2019\$', 4. https://caletc.com/assets/files/ICF-Truck-Report_Final_December-2019.pdf

⁴³ Currencies were initially in 2019 U.S. dollars. Conversion to Canadian dollars was done using the Bank of Canada's 2019 Annual Exchange Rate of 1 USD = 1.3269 CAD. Results are rounded to the nearest 500. *Source:* Bank of Canada, "Annual Exchange Rates." <https://www.bankofcanada.ca/rates/exchange/annual-average-exchange-rates/#download>

⁴⁴ Transport Canada, "Zero-emission vehicles."

adoption of vehicles including heavy-duty transport trucks.⁴⁵ Quebec’s Ecocamionnage program provides grants of up to \$75,000 (50% of eligible expenses) for the acquisition of hybrid-electric and electric vehicles.^{46,47}

In 2017, the Sustainable Transportation Action Research Team rated financial incentives as the least cost-effective (in terms of direct government expenditure per ZEV adopted) policy support despite high overall efficacy in increasing ZEV market share.⁴⁸ As volumes of ZEV purchases increase, so will fiscal pressures, and governments will have to strike a balance between ensuring that incentive programs are economically sustainable and providing consistent signals to markets and industry.^{49,50} On the other hand, electric vehicle subsidies do not have to be designed as an indefinite expenditure. They can be phased out as technological improvements and increased manufacturing scale push the cost of ownership of electric vehicles closer to that of non-electric vehicles.⁵¹ It is expected that battery electric truck prices will decrease notably over time, with some predicting even greater price reductions for hydrogen fuel cell trucks.⁵² Some analysis suggests that certain classes of battery electric trucks may reach cost parity with diesel by as early as 2030.⁵³

⁴⁵ Government of British Columbia, “Go Electric Vehicle Incentive Program.”

<https://www2.gov.bc.ca/gov/content/industry/electricity-alternative-energy/transportation-energies/clean-transportation-policies-programs/clean-energy-vehicle-program/commercial-vehicles>

⁴⁶ Transports Quebec, “Programme d’aide Ecocamionnage.” <https://www.transports.gouv.qc.ca/fr/aide-finan/entreprises-camionnage/aide-ecocamionnage/Pages/aide-ecocamionnage.aspx>

⁴⁷ Transports Quebec, *Programme Ecocamionnage* (2019), 12. <https://www.transports.gouv.qc.ca/fr/aide-finan/entreprises-camionnage/aide-ecocamionnage/Documents/liste-technologies-admissibles-francais.pdf>

⁴⁸ *Canada’s ZEV Policy Handbook*, 59, 61.

⁴⁹ Zifei Yang, Peter Slowik, Nic Lutsey and Stephanie Searle, *Principles for Effective Electric Vehicle Incentive Design* (International Council on Clean Transportation, 2016), iv.

https://theicct.org/sites/default/files/publications/ICCT_IZEV-incentives-comp_201606.pdf

⁵⁰ International Energy Agency, *Global EV Outlook 2018* (2018), 97.

http://www.oecd.org/about/publishing/Corrigendum_GEVO2018.pdf

⁵¹ Peter Slowik and Nic Lutsey, *Evolution of Incentives to Sustain the Transition to a Global Electric Vehicle Fleet* (International Council on Clean Transportation, 2016), iii-iv.

https://theicct.org/sites/default/files/publications/EV%20Evolving%20Incentives_white-paper_ICCT_nov2016.pdf

⁵² *Comparison of Medium- and Heavy-duty Technologies in California: Part 2*, 4-5.

⁵³ North American Council for Freight Efficiency, “Medium-Duty Electric Trucks Cost of Ownership.” <https://nacfe.org/future-technology/medium-duty-electric-trucks-cost-of-ownership/>

Opportunity #2

If Canada set a target of 25,000 new zero-emission medium- and heavy-duty vehicles by 2025, a total investment of about \$5 billion would be required for vehicle procurement alone — a cost that could be shared across sectors. Currently, the federal government's Incentives for Zero-Emission Vehicles program does not include medium- and heavy-duty commercial vehicles.

In 2019, the Government of Canada set a target of 5,000 new zero-emission school and transit buses as of 2025.⁵⁴ Currently, buses make up less than 10% of Canada's commercial vehicle fleet.⁵⁵ A study by Navius Research has projected that, given technological advances, Canada could expect to see tens of thousands of medium- and heavy-duty electric vehicles on the road by 2025 and accelerate to about 260,000 medium- and heavy-duty electric vehicles by 2040 — equal to roughly 9% of the medium- and heavy-duty vehicle stock.⁵⁶

If Canada set a target of 25,000 new zero-emission medium- and heavy-duty vehicles by 2025 — representing about 1% of the medium- and heavy-duty vehicle stock — it is estimated that about \$5 billion in total investment would be required, to cover the cost of vehicle procurement alone.⁵⁷ This is a cost that could be shared and distributed across public and private sectors.

In terms of publicly led incentive programs, there are three prominent programs providing incentives for zero-emission vehicle procurement in North America: British Columbia's Specialty Use Vehicle Incentive Program (SUVI), Canada's Incentives for Zero-Emission Vehicles (iZEV) program and California's Hybrid and Zero-Emission

⁵⁴ Office of the Prime Minister, "Minister of Infrastructure and Communities Mandate Letter," December 13, 2019. <https://pm.gc.ca/en/mandate-letters/2019/12/13/minister-infrastructure-and-communities-mandate-letter>

⁵⁵ Pembina Institute, "Investments now in building retrofits, clean vehicles and power will create jobs, lower emissions," media release, October 1, 2020. <https://www.pembina.org/media-release/investments-now-building-retrofits-clean-vehicles-and-power-will-create-jobs-lower>

⁵⁶ Navius Research and Sustainable Transportation Research Action Team, *Simulating zero emission vehicle adoption and economic impacts in Canada*, prepared for the International Council on Clean Transportation (2020), ii, 19, 25-26. <https://theicct.org/sites/default/files/publications/ZEV-impacts-Canada-Navius-042020.pdf>

⁵⁷ Calculations are based on representative vehicle MSRP data sourced from the British Columbia SUVI program eligible vehicle list and assumptions on the split between medium and heavy trucks in the total vehicle fleet. Source: PlugInBC, *Specialty-Use Vehicle Incentive Program Eligible Vehicle List October 30th, 2020*. <https://pluginbc.ca/wp/wp-content/uploads/2020/08/SUVI-vehicle-list.pdf>

Truck and Bus Voucher Incentive Project (HVIP). Comparative information on iZEV, SUVI and HVIP is summarized in Table 4, below.

Table 4. Zero-emission vehicle incentive programs

Program	Jurisdiction	Total Program Funding (period)	Incentive Range	Maximum MSRP
iZEV	Canada – federal	\$300 million (2019–20 to 2021–22) ⁵⁸	\$2,500–\$5,000	\$45,000–60,000
SUVI	Canada – British Columbia	\$2.5 million (2017–20) ⁵⁹	\$666–\$100,000 ⁶⁰	\$500,000+
HVIP	United States – California	US\$142 million (2019–20)	US\$6,000–\$300,000	

Sources: Government of Canada^{61,62}, Government of British Columbia^{63,64}, California HVIP⁶⁵

Canada’s iZEV program provides a maximum incentive of \$5,000 for vehicles with a maximum manufacturer’s suggested retail price (MSRP) of between \$45,000 and \$60,000 depending on configuration.⁶⁶ This represents a coverage rate of about 10%. British Columbia’s SUVI program, meanwhile, provides a maximum coverage of 33%.⁶⁷

⁵⁸ Note: The 2020 federal fall economic statement proposed a \$54 million top-up to the iZEV program for 2020–21 and \$232 million for 2021–22. *Source:* Government of Canada, *Supporting Canadians and Fighting COVID-19: Fall Economic Statement 2020* (2020), 96. <https://www.budget.gc.ca/fes-eea/2020/home-accueil-en.html>

⁵⁹ Note that the SUVI program was topped up with \$2 million in August 2020. *Source:* TruckNews.com, “B.C. adds \$2 million to electric vehicle rebates,” August 6, 2020. <https://www.trucknews.com/transportation/b-c-adds-2-million-to-electric-vehicle-rebates/1003143275>

⁶⁰ Note that, as of October 2020, rebates increased as \$31 million was added to the SUVI program. *Source:* Government of British Columbia, “Go Electric Specialty Use Vehicle Incentive Program.” <https://www2.gov.bc.ca/gov/content/industry/electricity-alternative-energy/transportation-energies/clean-transportation-policies-programs/clean-energy-vehicle-program/commercial-vehicles/17208>

⁶¹ Government of Canada, *Investing in the Middle Class: Budget 2019* (2019), 82. <https://www.budget.gc.ca/2019/docs/plan/budget-2019-en.pdf>

⁶² Transport Canada, “Zero-emission vehicles.”

⁶³ Plug In BC, “Specialty-Use Vehicle Incentive.” <http://pluginbc.ca/suvi/>

⁶⁴ *Specialty-Use Vehicle Incentive Program Eligible Vehicle List October 30th 2020*, 1–12.

⁶⁵ California HVIP, “Program Updates.” <https://www.californiahvip.org/resources/#link-FAQ>

⁶⁶ Transport Canada, “Zero-emission vehicles.” <https://tc.canada.ca/en/road-transportation/innovative-technologies/zero-emission-vehicles>

⁶⁷ PlugInBC, “Specialty Use Vehicle Incentive.” <https://pluginbc.ca/suvi/>

Canada's federal iZEV program has been allocated \$300 million for the period 2019–20 to 2021–22.^{68,69,70} The program is currently targeted at light-duty passenger vehicles, but it could be made more useful for commercial goods-movement fleets by adding light-, medium- and heavy-duty zero-emission vehicles to its eligibility list.⁷¹ This would likely require adjustments to its maximum incentive level and MSRP.

SUVI provides incentives of up to \$100,000 for on-road zero-emission medium- and heavy-duty vehicles — including trucks — with MSRPs for the on-road medium- and heavy-duty category generally in the \$200,000 to \$700,000 price range.^{72,73} Similarly, HVIP, which provides point-of-sale discount vouchers for zero-emission and low NO_x commercial vehicles — including parcel, food-distribution, and beverage trucks — had base voucher amounts ranging from US \$6,000 to US \$300,000 in fiscal year 2018–19.⁷⁴

At the federal level, Natural Resources Canada's Green Freight Assessment Program, which was launched in 2018 with a commitment by the Government of Canada of \$3.4 million over four years,⁷⁵ represents an additional potential delivery mechanism for medium- and heavy-duty ZEV procurement subsidies. This program assists companies with fleets to obtain third-party green-freight assessments (up to \$10,000 (50% of costs))⁷⁶ to improve fleet efficiency and then helps them to implement the recommendations that flow from those consultations (up to \$100,000, on a cost-sharing

⁶⁸ *Investing in the Middle Class: Budget 2019*, 82.

⁶⁹ Transport Canada, “Zero-emission vehicles.”

⁷⁰ Note: The 2020 federal Fall Economic Statement proposed a \$54 million top-up to the iZEV program for 2020–21 and \$232 million for 2021–22. *Source*: Government of Canada, *Supporting Canadians and Fighting COVID-19: Fall Economic Statement 2020* (2020), 96. <https://www.budget.gc.ca/fes-eea/2020/home-accueil-en.html>

⁷¹ Transport Canada, “List of eligible vehicles under the iZEV Program.” <https://www.tc.gc.ca/en/services/road/innovative-technologies/list-eligible-vehicles-under-izev-program.html>

⁷² “Specialty-Use Vehicle Incentive.”

⁷³ *Specialty-Use Vehicle Incentive Program Eligible Vehicle List October 30th, 2020*.

⁷⁴ California HVIP, “Program Updates.”

⁷⁵ Natural Resources Canada, “Green Freight Assessment Program.” <https://www.nrcan.gc.ca/energy-efficiency/energy-efficiency-transportation/greening-freight-programs/green-freight-assessment-program/20893#S1>

⁷⁶ Natural Resources Canada, “Green Freight Assessment.” <https://www.nrcan.gc.ca/energy-efficiency/energy-efficiency-transportation/greening-freight-programs/green-freight-assessment-program/green-freight-assessment/21935>

basis, for implementation).⁷⁷ To date, the Green Freight Assessment Program has supported the implementation of fuel-reduction activities and the purchase of heavy-duty natural gas vehicles.⁷⁸

Opportunity #3

Increased transparency and certainty on the long-term renewal of government financial incentives would provide increased ability for the freight delivery industry to plan its transition to zero-emission vehicles over time.

The renewal of financial incentives — including those at the provincial level — funded with set allocations or set to expire at pre-specified dates could catalyze long-term planning for the goods movement industry. A number of Canadian incentives for goods-movement ZEV adoption have been funded with set allocations. Quebec’s Ecocamionnage program, for example, has been allocated \$81.35 million and is set to end in December 2020.⁷⁹ Federal tax write-offs for zero-emission light-, medium- and heavy-duty vehicles purchased by businesses were allocated \$265 million in Budget 2019.^{80,81} British Columbia’s Specialty-Use Vehicle Incentive program was allocated \$2.5 million in November 2017 and topped up with \$2 million in August 2020.^{82,83}

The renewal of these programs when funding expires would catalyze adoption of zero-emission goods-movement vehicles during this transition period. Certainty in investment decisions is increased for fleet owners when governments improve transparency in administering the program (e.g., status of approvals process, regular updates on how much funding is left in the program) and indicate their long-term plans for funding.

⁷⁷ Natural Resources Canada, “Green Freight Implementation.” <https://www.nrcan.gc.ca/energy-efficiency/energy-efficiency-transportation/greening-freight-programs/green-freight-assessment-program/green-freight-implementation/21936>

⁷⁸ “Green Freight Assessment Program.”

⁷⁹ “Programme d’aide Ecocamionnage.”

⁸⁰ Transport Canada, “Zero-emission vehicles.”

⁸¹ Joe Homsy, “Federal ZEV Policies: June 12, 2019 Workshop – Ottawa,” presented at Sustainable Pathways for Canada’s Onroad Transportation Sector, Ottawa, June 12, 2019, 5. Available at https://theicct.org/sites/default/files/Joe%20Homsy_Federal%20ZEV%20Policies%20-%20Workshop_19jun12.pdf

⁸² “Go Electric Vehicle Incentive Program.”

⁸³ TruckNews.com, “B.C. adds \$2 million to electric vehicle rebates.”

Non-financial incentives

Some incentives prompt a preferred behaviour by providing the targeted consumer with valuable benefits. The Province of British Columbia and City of Vancouver have already begun to implement non-financial incentives, including privileged access to high-occupancy vehicle (HOV) lanes⁸⁴ and dedicated parking stalls⁸⁵ for vehicles marked with an official EV decal. In Quebec, EVs, plug-in hybrid electric vehicles, and fuel cell electric vehicles with a green licence plate can freely access reserved lanes and certain tolled highway sections.⁸⁶ Similarly, Ontario's Green Vehicle Licence Plate Program provides individuals and fleets access to high-occupancy vehicle and high-occupancy toll lanes on certain highways.⁸⁷ Other non-financial incentives are also being explored by cities, such as privileged access to in-demand curbside spaces,⁸⁸ the implementation of low- or zero-emission zones which would restrict access by internal combustion engine vehicles,^{89,90} and exempting EVs from restrictive regulations such as noise bylaws.⁹¹

Opportunity #4

Expanding non-financial mechanisms, such as green licence plate programs, that give preferential treatment to zero-emission vehicles, to commercial vehicles, could encourage the transition to low-emission fleets.

While certain non-financial incentives appear to target commercial vehicles (e.g. preferential curbside access and exemption from noise bylaws), others are more general.

⁸⁴ Government of British Columbia, "Apply for Electric Vehicles in HOV Lanes on B.C. Highways." <https://www2.gov.bc.ca/gov/content/transportation/driving-and-cycling/traveller-information/routes-and-driving-conditions/hov-lanes/electric>

⁸⁵ City of Vancouver, "Electric Vehicles (EVs)." <https://vancouver.ca/streets-transportation/electric-vehicles.aspx>

⁸⁶ Societe de l'assurance automobile Quebec, "Registering a vehicle." <https://saaq.gouv.qc.ca/en/vehicle-registration/registering-vehicle/electric-or-plug-in-hybrid-vehicle/>

⁸⁷ Ontario Ministry of Transportation, "Ontario's Green Vehicle Licence Plate Program." <http://www.mto.gov.on.ca/english/vehicles/electric/green-licence-plate.shtml>

⁸⁸ *Report – Climate Emergency Response*, 34.

⁸⁹ *Report – Climate Emergency Response*, 25.

⁹⁰ City of Toronto, *City of Toronto Electric Vehicle Strategy: Supporting the City in achieving its TransformTO transportation goals*, prepared by Dunsky Energy Consulting (2019), 37. <https://www.toronto.ca/wp-content/uploads/2020/02/8c46-City-of-Toronto-Electric-Vehicle-Strategy.pdf>

⁹¹ *City of Toronto Electric Vehicle Strategy*, 37.

Jurisdictions can provide opportunities for non-financial incentives for commercial vehicles that are not generally available to all vehicles.

For example, green licence plate programs administered by the provinces and municipalities could be expanded to include commercial vehicles. Weight restrictions on these policies could be eliminated to incent the adoption of medium- and heavy-duty commercial ZEVs in these jurisdictions. British Columbia, Ontario, and Quebec’s decal or green vehicle licence plate programs exclude heavier vehicles. The programs are currently limited to vehicles weighing less than 6,000 kg in British Columbia,⁹² and 3,000 kg in Ontario⁹³ and Quebec.⁹⁴ The green licence plate program in Quebec is the only one of the three that explicitly states that commercial vehicles are eligible (up to the specified weight limit).

Additionally, governments can further incent participation in decal or green vehicle licence plate programs by expanding the programs’ access to HOV networks. The applicable authority would need to undertake the necessary analysis to ensure that HOV or other reserved lanes have the capacity to support increased levels of green-plated commercial vehicles.

Opportunity #5

Commercial fleet operators would be more likely to move to ZEV fleets if municipalities restricted the travel of high-polluting vehicles, over time, and set targets for emission reductions that align with Canada’s decarbonization goals.

Some cities are exploring policies that restrict access by high-polluting vehicles to specific areas within their limits and give preferential parking and access to low-polluting vehicles such as ZEVs. Restrictions may initially be partial in nature (e.g. applying only on business days) and tightened over time. Cities around the world such as Madrid, Spain; Paris, France; and Berlin, Germany, have implemented low-emission zones.⁹⁵ In Canada, some municipalities are now exploring this option:

⁹² “Apply for Electric Vehicles in HOV Lanes on B.C. Highways.”

⁹³ “Ontario’s Green Vehicle Licence Plate Program.”

⁹⁴ Societe de l’assurance automobile Quebec, “Registering a vehicle.”

⁹⁵ Delphi Group and Pollution Probe, *Opportunities for Low-Carbon Mobility Actions in Canadian Municipalities: Best Practices and Guidance* (2020), 14. Available at [https://www.nrcan.gc.ca/sites/nrcan/files/energy/pdf/TAFD Delphi-Probe - Low-Carbon Mobility Actions - Accessible.pdf](https://www.nrcan.gc.ca/sites/nrcan/files/energy/pdf/TAFD%20Delphi-Probe%20-%20Low-Carbon%20Mobility%20Actions%20-%20Accessible.pdf)

- The City of Vancouver’s Climate Emergency Response report recommended engagement on zero-emissions areas, which would restrict access by combustion-engine vehicles with a goal of encouraging ZEV adoption, including in goods movement.⁹⁶
- The City of Toronto’s EV Strategy recommended a low-emission vehicle or zero-emission vehicle zone as a pilot project.⁹⁷
- Laval, Quebec has implemented a low-emission zone.⁹⁸

A recent study found low-emission zones to be highly effective at reducing GHG and criteria air contaminants from vehicles travelling within municipalities, but implementation of the zones is complex and requires high levels of stakeholder buy-in and significant planning.⁹⁹ The degree of benefit can also be expected to depend on scale and context. As jurisdictions consider such regulations and policies, they should work with relevant stakeholders including goods-movement fleets affected to ensure that there is enough lead time and the overall desired outcomes are achieved. Jurisdictions can also implement targets for emission reductions that are aligned with Canada’s decarbonization goals — a target of 30% below 2005 levels as of 2030, and a commitment to net-zero by 2050.

Opportunity #6

Municipalities have the authority to implement curbside management tactics, which could incent commercial ZEV uptake.

Curbside management tactics vary across Canada’s major cities. Toronto, Calgary, and Vancouver, for example, are at various stages of policy development. In 2017, Toronto developed a Curbside Management Strategy with tactics ranging from quick wins to long-term goals.¹⁰⁰ Similarly, in 2018, the City of Vancouver released its Congestion Management Strategy with priority goals that include, among other things, improving safety and co-ordinating street use.¹⁰¹ This strategy document supports the city’s 2040

⁹⁶ Report – Climate Emergency Response, 25.

⁹⁷ City of Toronto Electric Vehicle Strategy, 37.

⁹⁸ Opportunities for Low-Carbon Mobility Actions in Canadian Municipalities, 14.

⁹⁹ Opportunities for Low-Carbon Mobility Actions in Canadian Municipalities, 25- 28.

¹⁰⁰ City of Toronto, Curbside Management Strategy (2017), 9-12.

<https://www.toronto.ca/legdocs/mmis/2017/pw/bgrd/backgroundfile-109540.pdf>

¹⁰¹ City of Vancouver, Congestion Management Strategy (2018), 7. <https://vancouver.ca/files/cov/congestion-management-strategy.pdf>

Transportation Plan.¹⁰² The City of Calgary released a Goods Movement Strategy¹⁰³ in 2018 and is piloting a curbside loading zone project¹⁰⁴ to manage congestion in the inner city.

Curbside management tactics can be used to incent the adoption of zero-emission commercial vehicles. The City of Vancouver’s Climate Emergency Response report, for example, recommended that on-street curbside zone management and enforcement be updated to achieve goals including an acceleration of zero-emission commercial vehicle uptake. It suggested this could be accomplished by offering preferential access to curbside zones (e.g. streets, parking areas and loading zones).¹⁰⁵ Similarly, the Pembina Institute report *Sharing the Curbside: Advancing curbside management in the City of Toronto* recommended favorable access to loading zones for vehicles including electric cargo vans.¹⁰⁶ Curbside management tactics can also incent zero-emission commercial vehicle uptake by providing disincentives to internal combustion engine technologies and restrictions on internal combustion engine vehicles.

3.3 Charging infrastructure

Range anxiety is one of the main barriers for ZEV adoption in goods-movement fleets. Fleets with longer and more unpredictable routes are more likely to require on-route charging and are less likely to be able to depend on depot and private charging than those with shorter and more predictable routes — which are more common in urban environments.^{107,108} As such, it is expected that the electrification of light- and medium-duty freight vehicles for urban delivery purposes will occur sooner than the electrification of heavy-duty freight and long-haul segments.

¹⁰² City of Vancouver, *Transportation 2040*. <https://vancouver.ca/streets-transportation/transportation-2040.aspx>

¹⁰³ City of Calgary, Goods Movement Strategy (2018). <https://www.calgary.ca/content/dam/www/transportation/tp/documents/strategy/goods-movement-strategy-documents/goods-movement-strategy-report.pdf>

¹⁰⁴ Calgary Parking Authority, “Loading Zone Pilot Project.” <https://www.calgaryparking.com/findparking/loadingzone>

¹⁰⁵ *Report – Climate Emergency Response*, 2.

¹⁰⁶ Janelle Lee, *Sharing the Curbside: Advancing curbside management in the City of Toronto* (Pembina Institute, 2020), 12-13. <https://www.pembina.org/pub/sharing-curbside>

¹⁰⁷ ChargePoint, *What It Takes to Manage an EV Fleet* (2018), 4. <https://info.chargepoint.com/what-it-takes-to-manage-an-ev-fleet.html>

¹⁰⁸ *Power Play: Canada’s Role in the Electric Vehicle Transition*, 14.

To encourage electrification, there are opportunities for incentive programs to support the buildout of depot and private charging infrastructure while public infrastructure programs can be designed to maximize applicability to goods-delivery fleets with longer or less predictable routes.

Finally, “EV-readiness requirements” can potentially help encourage electrification. While definitions vary, the term “electric vehicle readiness” generally refers to minimum requirements for electric vehicle charging infrastructure in buildings.¹⁰⁹ EV-readiness requirements range from requirements for installation of an electrical conduit to a parking space to requirements for installation of electric vehicle supply equipment and relevant electrical infrastructure.¹¹⁰ Jurisdictions in Canada including the City of Vancouver and the City of Toronto have implemented EV-readiness requirements.¹¹¹ The usefulness of these requirements — which target residential applications and often exclude visitor parking¹¹² — to fleets is unclear. The potential for EV-readiness requirements to support goods-movement fleet electrification, and the configurations required for them to do so, could merit further research.

Charging infrastructure incentives

Opportunity #7

If Canada set a target of 25,000 new zero-emission medium- and heavy-duty vehicles by 2025, in addition to investments in vehicle procurement, an investment of about \$350 million in charging and refuelling infrastructure would be required.

Zero-emission medium- and heavy-duty vehicles will generally require higher-powered charging infrastructure. While light-duty vehicles with limited range can be adequately served by Level 2 charging¹¹³, medium- and heavy-duty vehicle fleets are more likely to require high-powered AC charging (with power outputs of about 20 kW) or DC fast

¹⁰⁹ Brendan McEwen, “EV Readiness” Requirements Framework, prepared by McEwan Climate and Energy for the Natural Resources Canada Office of Energy Efficiency (2019), 4. <https://cleanairpartnership.org/cac/wp-content/uploads/2019/10/NRCAN-EV-Readiness-Requirements-Framework-Final-Report-4-11-2019-McEwen-Climate-and-Energy.pdf>

¹¹⁰ “EV Readiness” Requirements Framework, 4,11.

¹¹¹ “EV Readiness” Requirements Framework, 11.

¹¹² “EV Readiness” Requirements Framework, 23–24.

¹¹³ ChargePoint, *How Do Level 2 and DC Fast Fit in the Electric Vehicle Charging Landscape?* (2017), 5. http://info.chargepoint.com/rs/079-WYC-990/images/L2_DC_Report_WP_10_17_2017.pdf

charging with outputs up to and above 50 kW. Fleet vehicles that do not return to centralized depots, and/or are not able to charge overnight, are more likely to require the highest power outputs.^{114,115,116,117} Hydrogen fuelling infrastructure, meanwhile, is less likely to differ significantly between light- and heavy-duty vehicles, with a number of fuelling stations already able to serve both heavy-commercial and passenger vehicles.¹¹⁸

If Canada set a target of 25,000 new zero-emission medium- and heavy-duty vehicles by 2025, the Pembina Institute estimates that about \$350 million would be required for associated charging infrastructure, including a mix of high-powered Level 2 and DC fast charging.¹¹⁹

Incentive, rebate and/or loan programs offered by public and private entities are mechanisms to help manage the cost of vehicle procurement and/or associated infrastructure.¹²⁰ With respect to the design of financial programs, considerations include: sufficient cost share to incentivize investment into infrastructure; inclusive program eligibility and accessibility to ensure access by businesses of all sizes and types (e.g., federal crown corporations, small, medium and large private sector businesses and not-for-profits) with freight and delivery operations; project size restrictions that do not unduly limit access to smaller players; and a broad range of eligible costs including those associated with electrical upgrades and with feasibility and planning studies for related capital work.

¹¹⁴ Paul Beck, “AC Fast Charging: The right fit for medium-duty EVs,” *Charged: Electric Vehicles Magazine*, October 6, 2019. <https://chargedevs.com/features/ac-fast-charging-the-right-fit-for-medium-duty-evs/>

¹¹⁵ *How Do Level 2 and DC Fast Fit in the Electric Vehicle Charging Landscape?*, 5-6.

¹¹⁶ Bill Loewenthal, “DC Fast Charging: How Businesses Can Benefit,” *ChargePoint*, July 24, 2020. <https://www.chargepoint.com/blog/dc-fast-charging-how-businesses-can-benefit/>

¹¹⁷ Black & Veatch, *Electric Fleets: 8 Steps to Medium and Heavy-Duty Fleet Electrification* (2019), 8. https://www.bv.com/sites/default/files/2019-11/Electric_Fleets_Ebook_2019.pdf

¹¹⁸ Dale Hall and Nic Lutsey, *Estimating the Infrastructure Needs and Costs for the Launch of Zero-Emission Trucks* (International Council on Clean Transportation, 2019), 12. <https://theicct.org/publications/zero-emission-truck-infrastructure>

¹¹⁹ This assumes a 1:1 ratio of chargers to zero-emission vehicles and chargers that are on the higher end of power outputs. This includes Level 2 chargers with outputs of about 20 kW and fast chargers with power outputs of 20 kW or more.

¹²⁰ The Canada Infrastructure Bank’s Growth Plan has a stream for zero-emission buses which notes financial barriers resulting from the high cost of charging infrastructure. *Source*: Canada Infrastructure Bank, “Canada Infrastructure Bank’s Growth Plan Backgrounder.” <https://cib-bic.ca/en/canada-infrastructure-banks-growth-plan-backgrounder/>

The Zero Emission Vehicle Infrastructure Program (ZEVIP) is one of Canada’s most significant initiatives supporting infrastructure for goods-movement fleet electrification. The purpose of the program is to “deploy a network of zero-emission vehicle charging (Level 2 and higher) and refuelling stations in more localized areas where Canadians live, work and play,” as well as to support strategic projects for transportation interests including last-mile delivery fleets and corporate fleets.¹²¹ The program was allocated \$130 million for 2019-2024.^{122,123}

ZEVIP will contribute up to 50% of total project costs to a maximum of \$2 million per project. ZEVIP funds traditional Level 2 chargers along with fast chargers with power outputs of 50kW and above.¹²⁴

ZEVIP currently has two infrastructure streams targeted toward fleets — one to light-duty vehicle fleets and one to medium- and heavy-duty vehicle fleets. Medium- and heavy-duty fleet vehicles are defined as those that have gross vehicle weight ratings above 3,856 kilograms, are “owned or leased by an organization, and used in support of organizational or business operations and activities.” Last-mile delivery vehicles are considered within scope.¹²⁵

Opportunity #8

At the provincial level, charging infrastructure incentive programs could become more useful if funding were expanded to directly target freight vehicles, with flexibility for private, single-use access, and to ensure coverage of higher-powered stations.

At the provincial level, infrastructure incentive programs include British Columbia’s Go Electric Charging Infrastructure program, which provides rebates for EV chargers for

¹²¹ Natural Resources Canada, “Zero Emission Vehicle Infrastructure Program.” <https://www.nrcan.gc.ca/energy-efficiency/energy-efficiency-transportation/zero-emission-vehicle-infrastructure-program/21876>

¹²² “Zero Emission Vehicle Infrastructure Program.”

¹²³ Note: The federal 2020 fall economic statement proposed an additional \$150 million investment in zero-emission vehicle infrastructure. This investment would be over three years and would begin in 2021-22. *Source: Supporting Canadians and Fighting COVID-19: Fall Economic Statement 2020*, 88.

¹²⁴ “Zero Emission Vehicle Infrastructure Program.”

¹²⁵ “Zero Emission Vehicle Infrastructure Program.”

workplaces and homes,¹²⁶ and Quebec’s programs for home, workplace, and multi-unit building charging stations.^{127,128,129} One of Quebec’s programs, Transportez Vert, provides financial assistance for the purchase of DC fast charging stations by vehicle fleets, up to a maximum of \$60,000 for stations with high power outputs.¹³⁰

At the municipal level, the City of Toronto recently included EV charging station installation in home and building improvement loan programs¹³¹ while the City of Vancouver’s Climate Emergency Response report recommended the encouragement of home charging installation through options including a top-up on CleanBC incentives.¹³²

Provincial charging infrastructure incentive programs are currently targeted toward residential and workplace charging. While workplace programs may include stations used to recharge corporate vehicles,¹³³ incentive amounts may be insufficient to purchase the type of higher-power output chargers often required for a large fleet of commercial vehicles. British Columbia’s Go Electric Charging Infrastructure program, for example, provides maximum rebates of just \$2,000.¹³⁴ Quebec’s charging station at work program provides a maximum incentive of \$5,000 per station and covers only lower-powered Level 1 and 2 stations.¹³⁵ By contrast, the federal ZEVIP program and Quebec’s Transportez Vert program provide funding for fast chargers with outputs up to

¹²⁶ Government of British Columbia, “Go Electric Charging Infrastructure Program.” <https://www2.gov.bc.ca/gov/content/industry/electricity-alternative-energy/transportation-energies/clean-transportation-policies-programs/clean-energy-vehicle-program/charging-infrastructure>

¹²⁷ Transition énergétique Québec, “Home charging station rebate.” <https://vehiculeselectriques.gouv.qc.ca/english/rabais/domicile/programme-remboursement-borne-recharge-domicile.asp>

¹²⁸ Transition énergétique Québec, “Remboursement pour une borne au travail.” <https://vehiculeselectriques.gouv.qc.ca/rabais/travail/programme-remboursement-borne-recharge-travail.asp>

¹²⁹ Transition énergétique Québec, “Multi-unit building charging station rebate.” <https://vehiculeselectriques.gouv.qc.ca/english/rabais/multilogement/programme-remboursement-borne-recharge-multilogement.asp>

¹³⁰ Transition énergétique Québec, “Transportez vert.” <https://transitionenergetique.gouv.qc.ca/transport/programmes/transportez-vert/volet-borne-de-recharge-rapide-en-courant-continu>

¹³¹ *City of Toronto Electric Vehicle Strategy*, 24.

¹³² *Report – Climate Emergency Response*, 36.

¹³³ “Remboursement pour une borne au travail.”

¹³⁴ “Go Electric Charging Infrastructure Program.”

¹³⁵ “Remboursement pour une borne au travail.”

and above 50 kW, with maximum contributions of \$50,000 and \$60,000 respectively.^{136,137}

To accelerate the transition of zero-emission goods-movement fleets, provincial infrastructure incentive programs could include funding streams directly targeted to freight vehicles with flexibility for private, single-use access, and ensure coverage of higher-powered stations. The program could be designed in a way to ensure high utilization of charging infrastructure and include evaluation requirements to understand performance and impact.

Charging infrastructure projects

Programs for the development of publicly accessible charging and refuelling infrastructure along highway corridors may be useful for long-haul goods-movement trips or for vehicles with unpredictable routes.¹³⁸ In addition, the presence of a reliable and fast charging network in dense city centres could offer a redundant charging network for commercial fleets, in addition to their private depot charging, and/or allow fleets to adopt less expensive vehicles with smaller batteries for short-haul urban deliveries.

Opportunity #9

Buildout of publicly accessible charging and refuelling infrastructure along national highways or provincial or municipal roads could be done in coordination with relevant stakeholders in the goods-movement sector to keep their charging needs in mind.

The construction of publicly accessible EV charging networks is often a staple of federal, provincial and municipal electric vehicle programs. These networks also often include high-powered EV fast chargers. Prominent examples include the following:

- The federal Electric Vehicle and Alternative Fuel Infrastructure Deployment Initiative (EVAFIDI) offers repayable contributions, with the goal of creating a network of fast charging stations coast-to-coast along national highways, hydrogen refuelling stations in metropolitan areas, and natural gas refuelling

¹³⁶ “Zero Emission Vehicle Infrastructure Program.”

¹³⁷ “Transportez vert.”

¹³⁸ *What It Takes to Manage an EV Fleet*, 4.

stations along freight corridors.¹³⁹ Eligible projects must be publicly accessible.¹⁴⁰ As of March 2020, EVAFIDI had selected nearly 900 projects for funding — including 837 electric vehicle fast chargers and eight hydrogen refuelling stations.¹⁴¹

- The Electric Circuit is a charging network for EVs containing 240-volt and 400-volt stations located across Quebec and Eastern Ontario.¹⁴² As of January 2019, the network contained over 1,700 charging stations, including nearly 170 fast-charge stations.¹⁴³ The Electric Circuit is publicly accessible but requires a membership.^{144,145} Electric Circuit partners include businesses such as Metro and Rona, and municipalities including the City of Montreal and Quebec City.¹⁴⁶
- In British Columbia, the Public Fast Charger Network is being built out by the province, municipalities, and private sector organizations.¹⁴⁷
- In Alberta, municipalities including the cities of Calgary and Lethbridge are working to build a network of charging stations across southern Alberta, called the Peaks to Prairies Network, which will include fast charging and Level 2 stations, accessible by any EV type.¹⁴⁸ Grant funding was received from the Government of Canada and the Government of Alberta.¹⁴⁹

¹³⁹ Natural Resources Canada, “Electric Vehicle and Alternative Fuel Infrastructure Deployment Initiative.” <https://www.nrcan.gc.ca/energy-efficiency/energy-efficiency-transportation/electric-vehicle-alternative-fuels-infrastructure-deployment-initiative/18352>

¹⁴⁰ Natural Resources Canada, “Electric Vehicle and Alternative Fuel Infrastructure Deployment Initiative – Eligibility.” <https://www.nrcan.gc.ca/energy-efficiency/energy-efficiency-transportation-and-alternative-fuels/electric-vehicle-and-alternative-fuel-infrastructure-deployment-initiative/electric-vehicle-and-alternative-fuel-0>

¹⁴¹ “Electric Vehicle and Alternative Fuel Infrastructure Deployment Initiative.”

¹⁴² Electric Circuit, “About.” <https://lecircuitelectrique.com/about>

¹⁴³ Hydro Quebec, “The Electric Circuit to deploy 1,600 fast-charge stations in Quebec over the next 10 years,” media release, January 23, 2019. <https://news.hydroquebec.com/en/press-releases/hq/1458/the-electric-circuit-to-deploy-1-600-fast-charge-stations-in-quebec-over-the-next-10-years/>

¹⁴⁴ Electric Circuit, “About.”

¹⁴⁵ Electric Circuit, “My Account: Register.” <https://lecircuitelectrique.com/signup>

¹⁴⁶ Electric Circuit, “Our Partners.” <https://lecircuitelectrique.com/partners>

¹⁴⁷ Government of British Columbia, “Public Fast Charger Network.” <https://www2.gov.bc.ca/gov/content/industry/electricity-alternative-energy/transportation-energies/clean-transportation-policies-programs/clean-energy-vehicle-program/charging-infrastructure/dcf-program>

¹⁴⁸ City of Calgary, “Electric vehicle strategy.” <https://www.calgary.ca/Transportation/TP/Pages/Strategy/Electric-vehicle-strategy.aspx>

¹⁴⁹ Calgary, “Electric vehicle strategy.”

The buildout of publicly accessible charging and refuelling infrastructure along national highway or provincial and municipal roads could be done in co-ordination with relevant stakeholders in the goods movement sector to keep their charging needs in mind. EVAFIDI, for example, has targeted freight corridors for natural gas refuelling stations.¹⁵⁰ Future government-led infrastructure investments should continue to consult with relevant stakeholders including retailers and goods delivery businesses to ensure that publicly funded zero-emission refuelling or recharging stations are located in places that will see high utilization, and could generally seek to prioritize infrastructure supporting vehicle technologies with the lowest anticipated life cycle greenhouse-gas emissions.¹⁵¹

3.4 Fleet capacity

ZEV awareness and education

A lack of readily available information continues to be a major barrier to ZEV deployment. Fleets need to be equipped with accessible, easily digestible resources to support effective decision-making, including information on total cost of ownership, vehicle procurement, infrastructure requirements, GHG emission reductions, and training required for drivers and maintenance workers.

In 2019, the Government of Canada launched the Zero-Emission Vehicle Awareness Initiative, which provided financial support for projects that aimed to increase ZEV awareness.¹⁵² It is unclear whether any of this funding was distributed to support education campaigns pertaining to medium- and heavy-duty commercial ZEVs.

Governments can work effectively with relevant private and non-governmental organizations to create education and awareness campaigns pertaining to commercial ZEV adoption. Several jurisdictions have already developed important education and awareness-building resources; however, these efforts are almost exclusively targeted at passenger ZEVs. As an increasing number of medium-duty ZEV models suitable for

¹⁵⁰ “Electric Vehicle and Alternative Fuel Infrastructure Deployment Initiative.”

¹⁵¹ Lindsay Wiginton, Cedric Smith, Maddy Ewing and Geoffrey Battista, *Fuel savings and emissions reductions in heavy-duty trucking: A blueprint for further action in Canada* (Pembina Institute, 2019), 22, 35. <https://www.pembina.org/pub/fuel-savings-and-emissions-reductions-heavy-duty-trucking>

¹⁵² Natural Resources Canada, “Zero-Emission Vehicle Awareness Initiative.” <https://www.nrcan.gc.ca/energy-efficiency/energy-efficiency-transportation/resource-library/zero-emission-vehicle-awareness-initiative/22209>

commercial goods-movement applications reach market readiness, governments can equip fleets with the information necessary to support a transition to ZEVs.

Several notable information hubs for passenger ZEVs have been established in recent years that could be expanded to provide support for commercial fleets interested in procuring medium- and heavy-duty ZEVs. Plug'n Drive is a non-profit organization with an online information hub that highlights information pertaining to EVs including advantages, models available in Canada, government incentives, and other frequently asked questions.¹⁵³ The organization also operates an EV Discovery Centre in the GTHA that offers test drives, provides resources related to public and home charging solutions, and facilitates information-sharing on all topics EV-related.

Similarly, Plug In BC provides a central source of information on EV-supportive programs and initiatives.¹⁵⁴ It was established by the Fraser Basin Council in collaboration with government, industry, and others. Unlike Plug'n Drive, the Plug In BC website also highlights resources pertaining to medium- and heavy-duty fleet procurement.

All levels of government could play a role in promoting existing ZEV education and awareness initiatives. All levels of government could work with the administrators of these programs to ensure resources pertaining to medium- and heavy-duty ZEVs are included.

Skills training

Opportunity #10

Investments in labour market programs to support good paying jobs and this new energy system are essential for the successful deployment and maintenance of zero-emission vehicles in commercial fleets, especially as the sector moves to scale up from pilot to mass adoption.

Building a labour force with the appropriate competencies, skills and leadership qualities is a critical success factor and driver of Canada's transition to ZEVs. Industry workers, including mechanics, drivers, engineers, electricians and fleet managers, need to adapt to changes in job requirements and may need to acquire new skills in areas

¹⁵³ Plug'n Drive, "Plug'n Drive." <https://www.plugndrive.ca/>

¹⁵⁴ Plug In BC, "Plug In BC." <https://pluginbc.ca/>

such as electrical installation, mechanical installation, maintenance of medium- and heavy-duty vehicles, EV fleet management and fleet-charging infrastructure.

Examples of existing programs include the Electric Vehicle Infrastructure Training Program,¹⁵⁵ which provides training and certification for electricians installing electric vehicle supply equipment in North America, or the Electric Vehicle Maintenance Training program offered at the British Columbia Institute of Technology.¹⁵⁶ Currently these training programs are concentrated in British Columbia.¹⁵⁷

At a minimum, an investment of \$36 million over five years is needed to expand and create new skills-training programs to support the deployment of zero-emission trucks in high-potential and high-demand markets across Canada.¹⁵⁸ Similar to existing labour market programs, a cost-sharing model could be applied between government and employers.

¹⁵⁵ Electric Vehicle Infrastructure Training Program, “Training.” <https://evitp.org/>

¹⁵⁶ British Columbia Institute of Technology, “BCIT Electric Vehicle Maintenance Training Program to Launch in Early 2020.” <https://commons.bcit.ca/news/2019/12/ev-maintenance-training/>

¹⁵⁷ Government of British Columbia, “B.C. Funds Training in Electric Vehicle Infrastructure.” <https://news.gov.bc.ca/releases/2016MEM0001-000061>

¹⁵⁸ This estimate is based on using the same per-capita level of funding that currently exists in British Columbia.

4. Conclusion

This report identifies 10 opportunities that would cultivate a robust ZEV ecosystem in Canada. The key findings are based on an identification of policy and program gaps and the efficacy of programs, where information on program performance is publicly available. For Canada to meet its 2030 climate targets and drive toward a net-zero economy by 2050, effort and investment is required to accelerate decarbonization efforts in the freight and goods-movement sector. This includes developing long-range EV strategic plans and associated capital investment plans for goods-movement vehicles; implementation of a sales mandate for medium- and heavy-duty vehicles; financial investments for vehicle procurement and non-financial incentives to attract widespread deployment; charging infrastructure; and resources and information to build fleet capacity through skills training.

Driving Canada's early zero-emission vehicle transition requires an all-hands-on-deck approach. If Canada wants to have 25,000 new medium- and heavy-duty vehicles on the road by 2025, an economy-wide investment of about \$5 billion will be required for vehicle procurement and about \$350 million for charging infrastructure.