

### "Discussion Paper For Heavy-Duty Vehicles And Engines In Canada: Transitioning To A Zero-Emission Future"

Document sent to ECCC.

January 21, 2022

Submitted by:





To:

The Honorable Steven Guilbeault Environment and Climate Change Minister ministre-minister@ec.gc.ca Steven.Guilbeault@parl.gc.ca

We thank the Minister for giving Electric Mobility Canada (EMC) the opportunity to participate in this very important consultation on the future of electric mobility in Canada. We applaud the government's will to accelerate the zero emission Medium and Heavy-Duty Vehicles (ZEV) deployment process, because the climate change crisis needs action without delay. We will be there to support the Minister, his staff and civil servants as we all rise to the challenges and opportunities in front of us.

Best regards,

Daniel Breton President and CEO - Président et directeur général Electric Mobility Canada - Mobilité Électrique Canada daniel.breton@emc-mec.ca <u>https://emc-mec.ca</u> 514 883 9274

### **About Electric Mobility Canada**

EMC is a national membership-based not-for-profit organization dedicated exclusively to the advancement of electric mobility as an exciting and promising opportunity to fight climate change and air pollution while stimulating the Canadian economy. EMC's mission is to strategically accelerate the transition to electric mobility across Canada.

Established in 2006, EMC is one of the very first electric mobility associations in the world. It represents organizations working to electrify transportation across Canada. Members representing more than 70 billion dollars a year in revenue include vehicle manufacturers (from light to heavy-duty to off-road), utilities, charging infrastructure manufacturers, charging suppliers and networks, research centres, technology companies, mining companies, fleet managers, unions, cities, universities, dealers associations, environmental NGOs and EV owners associations. They range from SMEs to Multinationals and work from British Columbia to Atlantic Canada.

On the Medium- and Heavy Duty side, we represent OEMs who make electric transit buses, school buses, trucks from class 4 to 8, specialized trucks, retrofitted trucks, etc.

EMC is the national voice of electric mobility in Canada.



At EMC, we believe there is enormous potential for zero-emission medium- and heavy-duty vehicles, and with the right set of policies and tools, wide-spread adoption is feasible and will lead to benefits for the Canadian economy, citizens and fleet operators alike.

EMC supports the Government of Canada's commitment to the transition towards zero-emission heavy-duty vehicles and achieve 30% ZE MHDV sales by 2030 and 100% by 2040. We recommend that Environment and Climate Change Canada formalize its <u>global commitment</u> in the forthcoming Emission Reduction Plan and develop and deliver on a concrete implementation plan that is consistent with and meets Canada's emission reduction goals and ZE HDV targets.

**Canada's MHD vehicle manufacturing sector** has grown over the years, and there are opportunities to capitalize on our existing supply chains to build the stock and production of electric MHD vehicles in Canada. With Canadian companies making electric buses, school buses and trucks in the country such as NovaBus, NewFlyer, Lion Electric, and Girardin, plus multinational OEMs such as BYD located in Canada, there is great potential for job creation. Some of these companies also partner with local suppliers, further contributing to growth by generating thousands of indirect jobs.

In addition to jobs associated with vehicles, there is significant job creation potential linked to the charging infrastructure – from engineering, manufacturing, installing and maintaining not only the chargers but the complete power infrastructure and IT systems needed to provide power and manage these new energy distribution systems.

The sector currently employs thousands of Canadians, from EV charger manufacturers to manufacturers of electrical distribution equipment, to electrical and civil engineers, general contractors, IT / IoT designers, systems integrators and cybersecurity experts. For context, a typical light-duty EV charging installation requires 5-10 different job functions and the installation of charging equipment can generate 9.76 direct, indirect and induced jobs for every million invested (Statistics Canada, 2020)

MHD electrification represents a major **revenue growth opportunity** for the Canadian utility sector, particularly generators. In addition, shifting the source of transportation fuel from imported fossil fuels to locally generated power will help to **improve energy security**, especially in provinces such as Quebec and Alberta where more than half the oil used is imported from foreign sources (Canada's Oil and Natural Gas Producers, 2019).

Similarly, Canada's mining industry is capable of playing an essential role in Canada's transition to a low carbon future by producing and processing the critical metals and minerals required for EVs and sustainable energy developments. These include nickel, copper, iron ore, metallurgical coal, zinc, cobalt, lithium and others. In addition to adopting **sustainable and responsible mining practices**, Canada's mining companies and other natural resource industry participants can become strategic adopters, ambassadors and beneficiaries of emerging EV technology. Alternatively, if Canada does not support the development of a domestic EV industry, we will be forced to import vehicles and supporting services in order to reach our electrification and GHG reductions goals, losing well-paid Canadian jobs and the opportunity to grow an entire Canadian ecosystem of expertise in the process. It is crucial for the Canadian government to **adopt an early investment strategy** for this sector in order to stabilize and improve Canada's trade imbalance and create the opportunity to become a global leader in the development and production of electric MHD vehicles. Such a position will also help to stimulate foreign investment.

Finally, electric MHD vehicles offer the economic benefit of a **higher long-term return on investment (ROI)** for their owners. Canadian fleet operators who transition to electric vehicles have the benefits of lower maintenance, longer lifecycles, lower operational costs all leading to a lower total cost of ownership for the right applications. Furthermore,



Canada is home to world leaders in battery reuse and recycling, where second life for batteries and their materials promotes a circular economy within Canada.

According to a 2021 report titled *Why Regional and Long-Haul Trucks are Primed for Electrification Now* from Berkeley Lab<sup>1</sup> "Zero emission freight trucks are needed to both improve public health and reduce global greenhouse gas emissions but at the same time are generally believed to be uneconomical. However, recent dramatic declines in battery prices and improvement in their energy density have created opportunities for battery-electric trucking today that were seldom anticipated just a few years ago.

At the current global average battery pack price of \$135 per kilowatt-hour (kWh) (realizable when procured at scale), a Class 8 electric truck with 375-mile range and operated 300 miles per day when compared to a diesel truck offers about 13% lower total cost of ownership (TCO) per mile, about 3-year payback and net present savings of about US \$200,000 over a 15-year lifetime. This is achieved with only a 3% reduction in payload capacity. Even this small penalty can be reversed cost-effectively through light-weighting, in any case, only matters for a small fraction of trucks which regularly utilize their maximum payload. Electric trucks appear poised to also meet the performance demands for a large share of regional and long-haul trucking today. The estimated average distance traveled between 30- minute driver breaks is 150 miles and 190 miles for regional-haul and long-haul trucks respectively in the US.

Thirty minutes of charging using 500 kW or mega-Watt scale fast-chargers would add sufficient range without impairing operations and economics of freight movement. However, as with almost any clean technology, higher upfront capital costs of both vehicles and charging infrastructure are major barriers when electric trucking is in its infancy. Without strong policy support, coordinated investments in both vehicle manufacturing and fuel infrastructure will not be forthcoming on the scale needed to harness the true potential of battery electric trucks."

A credible implementation plan must include a clear regulatory pathway, including mandated sales requirements and HDV GHG emission regulations that align with the most stringent North American standards, and swift implementation of the Clean Fuel Regulation. We recommend the federal government create a stronger investment strategy, with financial incentives for public and private sector entities to accelerate ZEV deployment and infrastructure development. While ZEV technology exists today and there are examples of ZE HDVs operating in some Canadian cities, deployment of ZE HDVs outside of the transit sector is still in its infancy. We recommend funding demonstration projects for both public and private commercial sector purposes in high-potential geographic regions. In the North American Council for Freight Efficiency and Rocky Mountain Institute's recent report, <u>High Potential Regions for Electric Truck Deployments</u>, both British Columbia and Ontario were identified as high priority regions for ZE MHDV deployments.

While the benefits are great, the challenges today are complex and will require a comprehensive set of policies and tools to address supply-side (production of vehicles and batteries, vehicle availability) and demand (improving capex and opex, in addition to education and proving out the business case with real-world deployments). Importantly, advancing skills and expertise in this space, including assisting long-term fleet electrification and infrastructure strategies for fleets.

EMC's Medium- and Heavy-Duty Working group is presently working on in depth policy recommendations in collaboration with key members in the MHDV space and the Pembina Institute to help Canada become a leader in the electric MHDV industry.

We look forward to advance Canada's discussion on the future of electric MHDVs with the government of Canada.





(Lion 8)

### **Questions and considerations**

Invitation to provide written comments to infovehiculeetmoteur-vehicleandengineinfo@ec.gc.ca.

Note: In our answers to the questions, we sometimes reference recommendations from the <u>2030 EV Action</u> <u>Plan</u> with the following tag: *Recommendation #* 

### **Regulatory approach:**

- 1. Canada has historically aligned its heavy-duty vehicle GHG regulations with those of the U.S. EPA. What will be the challenges and the benefits of also aligning with the sales targets in the California ACT?
  - Electrifying MHD Vehicles Is Critical to Reducing GHG Emissions

In April 2021, Canada announced a new GHG emissions target of 40% to 45% below 2005 levels by 2030. Canada has also committed to net-zero emissions by 2050. These are ambitious goals, given that in the 14 years between 2005 and 2019, Canada's GHG emissions decreased by only 1%. Any effort to meet these emissions reductions will need to see **currently available technology** deployed at a much- accelerated pace, along with additional low-carbon innovations becoming available over time. It is well- understood that **electric vehicles** – as the most mature, readily-available and energy-efficient low- emission vehicle technology -- are critical in the fight against climate change.

The transport sector, specifically, emitted 186 Mt CO2 eq in 2019, an increase of 16% compared to 2005 levels. Within this sector, **freight trucking and passenger bus account for nearly 40%** of total emissions, while only making up 3% of



the on-road vehicle stock (Statistics Canada, 2020)2. Trucking companies in Canada are highly concentrated in the four most populous provinces,3 where the majority of the country's natural resources and manufacturing industry participants operate large MHD fleets. Between 2005 and 2019, **emissions from heavy-duty trucks grew by 35%** (Figure 1.2), and is projected to surpass those from passenger vehicles including cars and light trucks by 2030 (ECCC, 2019)4. Canada's federal government has also acknowledged the criticality of this issue and5 therefore, the electrification of MHD vehicles offers a tremendous opportunity to significantly reduce carbon emissions.

Besides carbon emissions, the oil and gas and transport sectors are responsible for the majority of **air pollutants**. Together, they accounted for 68% of nitrogen oxides, 44% of volatile organic compounds, 43% of carbon monoxide, and 37% of black carbon emissions (ECCC, 2020)6. Notably, a near-road air pollution study by the University of Toronto and Southern Ontario Centre for Atmospheric Aerosol Research found that **large trucks contribute disproportionately to black carbon and nitrogen oxide emissions**. For example, on weekdays and Saturdays, diesel trucks at the highway site emit approximately 80% of black carbon emissions, while representing only 1% of the vehicles (SOCAAR, 2019)7. In addition, bus commuting in major Canadian cities such as Toronto, Ottawa, and Vancouver contribute significantly toward daily exposures of traffic-related air pollution of Canadians: 60-70% of certain fine particles (PM2.5), and 10-20% of black carbon exposure (Van Ryswyk et al., 2020).

Since California represents a very important market in North America, aligning with this state will help Canada be part of a larger market that will help reduce GHG emissions and air pollutants in the very important MHDV segment.

2. What classes and uses of HDV are now technically ready, or close to being ready, for adoption and an HDZEV-specific sales requirement? What criteria should go into that assessment of readiness? What is the lead time that would be appropriate for those classes? What other elements or measures are required to enable a swift transition to HDZEVs over the coming decades and meet our climate change commitments? What regulatory flexibilities would ease the transition?

Every vehicle that does 400 km or less a day can be electric right now. They are no reason for all urban transportation not to be electric. More that 45 % of all commercial trucks are doing 400 km or less per year. Some of our members already produce medium and heavy-duty trucks in 2022.

Our members need incentives that will help Canadian fleets to be electrified, in the same way the ZETF program subsidizes electric buses. But more importantly, in order to speed up the electrification and the Canadian economy, we need to give priority to Canadian manufacturers for the funding available through programs put in place by the Canadian Government through *Clean Procurements* 

- 3. What challenges and opportunities do you foresee for your organization as Canada accelerates the transition to HDZEVs? Please provide suggestions to ease the transition and capture the benefits.
  - Vehicle availability

Some EMC members want to order electric MHDVs but cannot find any before 2-3 years and when they do, it is in very limited quantities.



**Recommendation #8:** Make electric trucks, buses and off-road vehicles more affordable: Tax credits and rebates are needed to lower the upfront cost of zero-emission buses, trucks and off-road vehicles. In addition, more should be done to offset the costs of electrical upgrades associated with the specific charging infrastructure these types of vehicles need.

**Recommendation #9:** Continue to provide predictable and long-term funding to municipalities, transit agencies and school bus operators that plan to convert their entire fleet to electric vehicles. Funding should help cover the cost of the electric buses themselves, their charging infrastructure, and any grid upgrades needed to support them.

**Recommendation #10:** Phase out fossil-fuel vehicles at federally regulated properties, such as ports and airports, through a combination of tolls on polluting vehicles, restrictions on access for polluting trucks, and through support for charging infrastructure.

**Recommendation #17:** Enact legislation requiring the federal government to establish a Canadian EV strategy and a regularly updated EV action plan through 2035. Legislation should require the government to implement actions sufficient to achieve 100% passenger vehicle sales by 2030 and by 100% zero-emission bus and truck sales by 2040 at the latest. Launch a pan-Canadian EV Strategy that includes an EV Action Plan to accelerate EV adoption. Enact legislation requiring the federal government to (1) establish an EV strategy, and, (2) maintain and regularly update an EV action plan through 2035. Legislation should require the government to implement actions sufficient to achieve 100% passenger vehicle sales by 2030, and by 2040 at the latest for MHDVs. Accountability measures, such as audit, should be established. The initial strategy and plan should adopt the actions contained in this Platform document.



(Nova LFSe transit bus)



**Recommendation #20:** Set a target to achieve 100% zero-emission bus and truck sales by 2040, at the latest, with interim milestones along the way. Increase ambition as technology and product offerings improve. Align Canada's requirements with the most ambitious targets in North America.

### • Infrastructure deployment

Whether at the individual or fleet level, there are very few charging or refueling infrastructure deployed so far across the country on public and private sites.

**Recommendation #15:** Moving freight and large volumes of passenger vehicles with electricity will require electrical service upgrades to accommodate the power needs of large-scale charging infrastructure. These installations are costly today. Federal and provincial governments, electric utilities, provincial regulators and charging operators must work together to better allocate these costs while recognizing the economic opportunities. In the near-term, Canada can support charging investments by providing time-limited rebates for large-scale charging investments.

**Recommendation #22:** Establish a program that gets gasoline and diesel vehicles off the road and replaces them with zero emission vehicles. Allow all polluting vehicles—from cars to buses to snowmobiles—to be scrapped and recycled as part of the program. Government could also offer other clean transportation options such as public transit passes, vouchers for bicycles, vouchers for EV-only car/rideshare services etc, for those Canadians who are not looking to purchase a new vehicle.

### • EV awareness and Education

Many Canadian companies and organizations want to go electric, but have unanswered questions or don't know where to start. Work with leading and trusted organizations like Plug'n Drive, EV Society, Plug in British Columbia, AVÉQ and others to establish a suite of programs to educate and support consumers in making the transition to electric vehicles. Many Canadians want to go electric, but low levels of consumer awareness continue to be a barrier. Work with leading and trusted organizations like Plug n' Drive, EV Society, Plug in British Columbia, AVÉQ and others to establish a suite of programs to educate and support fleet managers, consumers, governments and institutions in making the transition to electric vehicles. *(see Recommendation #7)* 

### • Training

- a) EVs are far less complicated machines than gas vehicles. Work with provinces to revamp the vehicle mechanic curriculum to prioritize EVs by fast-tracking training for EV mechanics, and provide them with more apprenticeship opportunities. *(see Recommendation #25)*
- b) Building a labour force with the right skills– from engineering and research, electrical and mechanical, charging infrastructure installation, maintenance, and fleet management–will be critical to the success of Canada's transition to a zero carbon economy. Explore opportunities for the government to support employers, whether traditional industry or all-EV, to train new employees who have not previously worked in the EV industry. Maintain existing funding commitments for training and re-training. (see Recommendation #26)



### 4. What issues impede adoption of ZEVs in Northern and remote communities?

Access to a sufficient supply of ZEVs and charging infrastructure are two common issues for northern, rural and remote communities, but ZEVs can still be successful in those communities, if they are provided with sufficient supply of the correct type of make and model, which currently they are not.

The lack of electric MHDVs is a particular challenge for these communities, but that will soon change with the arrival of more electric MHDVs. Electricity supply can also be a challenge for some communities where the grid is not sufficiently developed or supplied at all in the case of non-grid connected communities. Many rural, northern, and indigenous communities in Canada have not yet had equal opportunity to participate in the benefits of the EV transition due to a lack of charging options and vehicle availability, among other things. It is critical that these barriers be addressed to allow all Canadians a meaningful opportunity to drive electric.

5. If you are a First Nation, Inuit or Métis individual, organization or government, what are your suggestions or concerns regarding the transition to HDZEVs and the issues raised in this paper?

NA.

### Supply and demand:

6. How should the requirements factor in anticipated growth in supply? What lead times should be considered when targets are being set?

EMC's MHDV Working Group will work on this question in 2022.



(RAVO electric street sweeper)



### 7. What are the key near-term measures that should be adopted to increase the Canadian supply of HDZEVs? If your organization produces or uses HDZEVs, address the types of vehicles that your organization produces or uses.

**Recommendation #20:** Set a target to achieve 100% zero-emission bus and truck sales by 2040, at the latest, with interim milestones along the way. Increase ambition as technology and product offerings improve. Align Canada's requirements with the most ambitious targets in North America.

### 8. What level of certainty is required to support investments in production capacity?

Market certainty is key to electric MHDV manufacturers since this is an up and coming market. Many electric MHDV OEMS like NewFlyer, NovaBus, Lion Electric, Girardin and others being located in Canada, the more chances Canada has in becoming an important player at a North American level.

Some important fleet companies and organizations are presently looking for electric MHDVs and are ready to order them by the hundreds and even the thousands. In 2019, Amazon ordered 100,000 delivery vans to be built by Vehicle Manufacturer Rivian. Like the EV revolution that we are seeing in the LDV industry, this order is only one of the many orders that will sweep the MHDV industry by storm as technology and availability grows in the coming years.

9. What are the key near-term measures that should be adopted to increase the Canadian demand for HDZEVs? If your organization produces or uses HDZEVs, address the types of vehicles that your organization will produce or use.

It is important to see a real potential and this potential exists when it comes to electric MHDVs. What the industry needs now is incentive and legislation in place that will speed up investments. We also need to invest in innovation, our talent / people. Legislation and incentives will grow demand and at the same time volume and volume will lower prices over time.



(Newflyer Excelsior electric transit bus)



**Canada's MHD vehicle manufacturing sector** has grown over the years, and there are opportunities to capitalize on our existing supply chains to build the stock and production of electric MHD vehicles in Canada. With Canadian companies making electric buses, school buses and trucks such as NovaBus, NewFlyer, Lion Electric, Girardin, plus multinational OEMs such as BYD located in Canada, there is great potential for job creation. Some of these companies also partner with local suppliers, further contributing to growth by generating thousands of indirect jobs.

In addition to jobs associated with vehicles, there is significant **job creation potential linked to the charging infrastructure** – from engineering, manufacturing, installing and maintaining **not only the chargers but the complete power infrastructure and IT systems** needed to provide power and manage these new **distributed energy systems**. The sector currently employs thousands of Canadians, from EV charger manufacturers to manufacturers of electrical distribution equipment, to electrical and civil engineers, general contractors, IT / IoT designers, systems integrators and cybersecurity experts. For context, a typical light-duty EV charging installation employs 5-10 different jobs functions and the installation of charging equipment can generate 9.76 direct, indirect and induced jobs for every million invested (Statistics Canada, 2020).

Installation processes and costs for MHD vehicles are more complex and costly than light-duty vehicles, and thus will increase demand for installation professionals. The installation and maintenance of EV charging stations and depots for MHD fleets, which will be **large-scale electrical-digital hubs** will require a large reskilling of the existing labour force.

**Recommendation #30:** Establish cross-Canadian guidance for electricity regulators to speed up deployment of charging infrastructure.

Establish an intergovernmental table to examine electrical system regulatory matters to expedite EV charging infrastructure installation and to support utilities. Work through the Council of Canadian Energy Ministers to establish pan-Canadian guidance for electricity regulators to expedite deployment of charging infrastructure. Guidance could address: electrical service size challenges for EV charging; demand charges and opt-in electricity rates for public charging; the need for EV charging station connection prioritization to keep infrastructure expanding in step with EV demand.

### 10. What measures could increase Canadian production of HDZEVs? What are the roles of the public sector in increasing production?

Getting governments and *"Clean procurement"* i.e. getting Canadian governments, municipalities, school boards, transit authorities, etc to purchase electric MHDVs could help Canadian companies build and deliver electric Canadian made MHDVs across the country.

11. In the next five to ten years, how do you see HDZEV products and technologies evolving and the commercial readiness of the HDZEVs? If your organization uses HDZEVs, address the types of vehicles that your organization will use.

EMC's MHDV Working Group will work on this question in 2022.



### **Costs and Benefits and Barriers:**

12. Generally, what are the key hurdles you see to transitioning the fleet to HDZEVs in the coming decades, and how can these be overcome? What are the key opportunities and how can these be captured?

### • Key hurdles and recommendations

**Vehicle availability:** Some EMC members want to order electric MHDVs but cannot find any before 2-3 years and when they do, it is in very limited quantities.

**Recommendation #8:** Make electric trucks, buses and off-road vehicles more affordable: Tax credits and rebates are needed to lower the upfront cost of zero-emission buses, trucks and off-road vehicles. In addition, more should be done to offset the costs of electrical upgrades associated with the specific charging infrastructure these types of vehicles need.

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Launch a pan-Canadian EV Strategy that includes an EV Action Plan to accelerate EV adoption. Enact legislation requiring the federal government to (1) establish an EV strategy, and, (2) maintain and regularly update an EV action plan through 2035. Legislation should require the government to implement actions sufficient to achieve 100% passenger vehicle sales by 2030, and by 2040 at the latest for MHDVs. Accountability measures, such as audit, should be established. The initial strategy and plan should adopt the actions contained in this Platform document.

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### EV awareness

### Education

Many Canadian companies and organizations want to go electric, but have unanswered questions or don't know where to start. Work with leading and trusted organizations like Plug'n Drive, EV Society, Plug in British Columbia, AVÉQ and others to establish a suite of programs to educate and support consumers in making the transition to electric vehicles. Many Canadians want to go electric, but low levels of consumer awareness continue to be a barrier. Work with leading and trusted organizations like Plug n' Drive, EV Society, Plug in British Columbia, AVÉQ and others to establish a suite of programs to educate and support fleet managers, consumers, governments and institutions in making the transition to electric vehicles. *(see Recommendation #7)* 

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- b) Building a labour force with the right skills- from engineering and research, electrical and mechanical, charging infrastructure installation, maintenance, and fleet management-will be critical to the success of Canada's transition to a zero carbon economy. Explore opportunities for the government to support employers, whether traditional industry or all-EV, to train new employees who have not previously worked in the EV industry. Maintain existing funding commitments for training and re-training. (see Recommendation #26)
- 13. What do you project for the expected total costs of operation of HDZEVs, in particular in comparison to an equivalent diesel powered vehicles? The work done by the Argonne National Laboratory, or equivalent Canadian analysis, may provide a framework for your response.

An electric MHD vehicle when calculating Total cost of ownership will almost always be less expensive than combustion, there are 80% saving on energy cost and over 60% savings on maintenance. Not only is electrification of heavy-duty Vehicles good for the environment, it also represents a viable business model.



Because there are significant savings for the operators by converting to EV, about 80% lower energy costs and 60% lower maintenance costs.

Also, as time goes on and battery costs will come down, the acquisition cost will become much lower. The charging speed is also constantly increasing, and the vehicle autonomy is also changing quickly. The range of electric school buses, for example, has more than doubled in the last 5 years.



(Girardin Blue Bird electric school bus)

### 14. Is the prospect of building charging/refuelling infrastructure for your operations a deterrent to adoption?

It depends on where the charging infrastructure is deployed but opportunities are presently being developed to address the main challenges of hubs, downtown areas, etc.

## 15. Is the lack of public charging/refuelling infrastructure a barrier to the adoption of HDZEVs in your community or business? How can that be addressed?

It can be in some communities where infrastructure deployment is lagging. That's why we must set ambitious targets for putting EV charging connectors in key areas such as apartment buildings, workplaces, downtown cores, along highways and remote travel corridors, and at fleet depots. Expand current funding programs to achieve those targets. Ensure charging access for all Canadians by setting targets specific to northern, rural, and indigenous communities. *(Recommendation #11)* 

### 16. How do you foresee those costs changing over the coming decade?

We see the cost going down significantly as technology expands and economies of scale are achieved. Between



# 17. What type of financing would allow you to adopt HDZEVs by covering the higher upfront costs of HDZEV vehicles and charging infrastructure? For example, would you use loans paid back from reduced operating and maintenance costs?

We recommend to make electric MHDVs more affordable through tax credits and rebates are needed to lower the upfront cost of zero-emission buses, trucks and off-road vehicles. In addition, more should be done to offset the costs of electrical upgrades associated with the specific charging infrastructure these types of vehicles need.

### 18. What benefits to you see to implementing HDZEVs, such as cleaner air and better working conditions?

Besides carbon emissions, the oil and gas and transport sectors are responsible for the majority of **air pollutants**. Together, they accounted for 68% of nitrogen oxides, 44% of volatile organic compounds, 43% of carbon monoxide, and 37% of black carbon emissions (ECCC, 2020)<sup>6</sup>. Notably, a near-road air pollution study by the University of Toronto and Southern Ontario Centre for Atmospheric Aerosol Research found that **large trucks contribute disproportionately to black carbon and nitrogen oxide emissions**. For example, on weekdays and Saturdays, diesel trucks at the highway site emit approximately 80% of black carbon emissions, while representing only 1% of the vehicles (SOCAAR, 2019)<sup>7</sup>. In addition, bus commuting in major Canadian cities such as Toronto, Ottawa, and Vancouver contribute significantly toward daily exposures of traffic-related air pollution of Canadians: 60-70% of certain fine particles (PM2.5), and 10- 20% of black carbon exposure (Van Ryswyk et al., 2020)<sup>8</sup>





### • Air pollution & health: 15,300 deaths and \$120 Billion economic impact

According to the *Health Impacts of Air Pollution in Canada report* published in 2021 by Health Canada "Health Canada estimates that above-background air pollution, including air pollution from human sources in North America, contributes to **15,300** premature deaths per year in Canada. This includes an estimated 6,600 premature deaths in Ontario, 4,000 in Quebec, 1,900 in British Columbia and 1,400 in Alberta. National morbidity or nonfatal health outcomes include 2.7 million asthma symptom days and 35 million acute respiratory symptom days per year, with the total economic cost of all health impacts attributable to air pollution for the year being **\$120 billion** (2016 CAD). This is equivalent to approximately 6% of Canada's 2016 real gross domestic product."





#### Transportation: a significant source of air pollution

According to a 2021 Environment Canada report\*, transportation, off-road vehicles and mobile equipment air pollutant emissions accounted for:

- 62% of Canada's Carbon Monoxide (CO) emissions
- 48% of Canada's Nitrogen Oxides (NOx) emissions
- 18% of Volatile Organic Compounds



Figure 24. Contribution of transportation, off-road vehicles and mobile equipment to total air pollutant emissions by transportation mode, Canada, 2019

### Accelerating the deployment of electric MHDVs will

help save thousands of Canadian lives and billions of dollars



## 19. What particular concerns do you have regarding the suitability of HDZEVs in Canada given our climate, geography, provincial and territorial weight and dimension requirements, or other Canada unique factors? Please specify according to class and intended use, if possible.

While climate can be an issue regarding range loss for battery electric vehicles, auxiliary systems help mitigate that challenge. It's important to note that contrarily to gas and diesel trucks and buses, electric MHDVs have no issue regarding cabin warmth, carbon monoxide leaks and being stuck in traffic.

20. Are there gaps in technical standards, for example for fueling equipment?

EMC's MHDV Working Group will work on to this question in 2022.

21. What types of demonstrations would be useful to address technical or operational uncertainties, both right away and in the longer term? Specify according to vehicle class and intended use if possible.

EMC's MHDV Working Group will work on this question in 2022.

22. What types of education and awareness programs, or activities for fleet owners and drivers, would be most effective in providing information and building confidence in these types of vehicles?

EMC and its members have developed different types of education and awareness programs suited for all types of uses, from light to heavy-duty and from individuals and fleet. We will happy to share our expertise as needed.

### **Research and information:**

### 23. What technologies and research gaps regarding vehicle and fuelling infrastructure do you see as a priority?

- a) An up-to-date Canadian Vehicle Survey: The most recent report on the subject was published in 2011 as the 2009 Canadian Vehicle Survey. Industry and policymakers require more recent data in order to be able to better plan future ZEV and infrastructure deployment
- **b)** Solid state battery technology: Canadian research centers and universities are presently working on future EV battery chemistry. The "race to the moon" on the development of future EV batteries will change the EV, energy and storage world. Canada needs to fully support R&D in the field.
- c) V2G and V2H: As new EVs offering V2H come to market, Canada must start developing working models to take full advantage of the technological possibilities, especially in the MHDV sector to help fleet managers save money,

## 24. Would you be willing and able to share information and data, especially on costs and operation in Canadian conditions?

EMC's MHDV working group will work on this question in 2022.



### 25. If you have or will gain information on charging/fuelling infrastructure, would you be willing and able to share it?

EMC's MHDV working group will work on this question in 2022.

#### Non-regulatory measures:

26. What are the roles of the private sector, research institutions, electrical utilities and the public sector play in advancing HDZEVs? Who should coordinate their efforts?

The private sector, from vehicle manufactures to charging station manufactures and networks all have a critical role to play in deploying the supply needed to allow Canadians to choose electric. In addition, fleet managers, rideshare companies and drivers and others making vehicle and parking decisions have a critical role to play. Our 2030 EV Action Plan provides numerous recommendations that can support the unlocking of private capital needed to accelerate EV adoption in Canada.

- 27. What additional measures other than regulations and demonstration projects could be implemented in the immediate term between now and 2030 to support decarbonizing the existing fleet and transitioning to a zeroemission future? For such non-regulatory measures, please indicate to whom it would be beneficial and most effective (e.g. provinces and territories, municipalities, manufacturers, fleet owners), and indicate which type of HDVs should be targeted first and in which timeframe. For example, should "proof of concept" pilot projects to reduce HDV emissions or advance ZEV deployment in urban centres be supported, or regional projects such as the hydrogen pilot in Alberta.
  - A) Education and training programs are key to help companies accelerate their transition to a commercial electric fleet.
  - B) Demonstration programs are important to ensure fleet readiness success
  - C) Follow-ups with fleet companies and transit authorities is also key for a successful transition

#### **Retrofitting the on-road fleet:**

28. For the current on-road fleet, what role can aftermarket retrofits play to support and complement the broader effort towards decarbonizing on-road transportation? Ideally, how would such a program be designed?

Retrofit programs can be an alternative way to extend vehicle life especially for fleets and some Canadians companies are developing a dedicated expertise in that field. We recommend retrofit incentives for MHDVs inspired by those of California and Québec.

### 29. How can the Government work with industry to encourage the adoption of retrofits for the fleet of today without diverting investment decisions to HDZEV alternatives?

With purchase and infrastructure incentives.



### Sources:

Berkeley Lab report: https://eta-publications.lbl.gov/sites/default/files/updated\_5\_final\_ehdv\_report\_033121.pdf

EMC 2030 EV Action Plan: https://2030evactionplan.ca

EMC White paper on Electric MHDVs: <u>https://emc-mec.ca/wp-content/uploads/Oct-5-2021-Why-Electrify-Medium-and-Heavy-Duty-Vehicles-Final.pdf</u>