

Reducing GHG Emissions in Canada's Transportation Sector

Submission to the Mitigation Measures Working Group

Pan-Canadian Framework on Climate Change and Clean Growth

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Équiterre and the Pembina Institute

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TRANSPORTATION

The transportation sector is currently responsible for 23% of Canada's GHG emissions and offers tremendous opportunities for significant emissions reduction. To reduce emissions in the transportation sector, Canada needs to drive a transition towards zero and low-emissions transportation modes, increase the use of cleaner fuels in Canada, increase public transit ridership, and encourage denser, mixed-use communities.

In Canada, of the approximately 15.4 million people who regularly commute, 12% use public transit as their primary mode of travel. Although the share of commuters choosing public transit is significant, over 12 million Canadians choose to use cars to get to work: 74% of commuters drive a private automobile, while another 5.4% ride as passengers¹. Improvements in the availability and efficiency of public transit, incentives for mode shifting away from solo-car rides towards auto-share, public transit and active transportation, and support to make electric vehicles more affordable would provide Canadians with concrete options to change their travel habits and do their part to tackle climate change.

Heavy-duty trucking is the fastest growing sub-sector of transportation emissions and between 1990 and 2014, freight accounted for almost 60% of the total 55 MT increase in emissions from the transport sector². Incentives to switch to lower emissions modes of transportation for heavy-freight and policies to reduce the emissions intensity of freight are critical to tackle this significant contributor to emissions.

Canada is lagging behind other countries in supporting zero emissions vehicles and other sustainable transportation policies. Other countries have had years of experience in advancing the electrification of transport thus offering evidence and guidance for the implementation of successful policies in Canada. The policy package recommended would ensure consistent federal, provincial and municipal policies to achieve three main objectives in the transportation sector:

- 1) Encourage mode shifting away from solo car rides towards public transit, auto-share and active transportation;
- 2) Significantly increase the market share of zero-emission vehicles sold in Canada;
- 3) Reduce the emissions intensity of the existing fleet of vehicles in Canada, including light and heavy freight.

This coordinated policy package would drive long-term technological innovation in the transportation sector, which will further reduce the cost of future GHG emissions reduction. In addition, investment in public transit and active transportation are progressive and equitable, providing benefits to low and middle-income Canadians. Investments in active transportation are a cost-effective way to reduce GHG emissions, can be deployed rapidly through many 'shovel ready' projects in communities across Canada. In addition, they will deliver significant co-benefits in terms of reduced car fatalities, promoting an active lifestyle and reducing local air pollution. The policies recommended are administratively feasible, rely on commercially available technologies and will build on and complement existing provincial and municipal climate and transport policies.

¹ Statistics Canada. (2013). NHS in Brief: Commuting to Work—National Household Survey (NHS), 2011. (Catalogue no. 99-012-2011003). Labour Statistics Division: Turcotte, M. Government of Canada.

² National Inventory Report 1990-2014: Greenhouse Gas Sources and Sinks in Canada, Part 1, page 43

1. Maximize GHG emission reduction from federal investment in public transit: introduce climate criteria

Policy goal: Maximize the GHG emissions reductions associated with public transit investments by assessing the carbon intensity of proposed projects, encouraging mode shifting (towards public transit and active transportation) and by increasing the utility derived from public transit investments.

Recommendation³

Any federal funding for public transit be conditional upon meeting the following climate criteria:

- **Achieve the greatest GHGs reduction:** assess the carbon intensity of proposed transit projects through a lifecycle assessment of GHG emissions using total km travelled and on a per passenger km (PKM) basis. PKM gives you the ability to better compare across different types of transportation. Provide funding to projects that maximize GHG reduction;
- **Achieve the greatest GHG at the lowest cost:** Proponents of public transit projects should demonstrate their project achieves the GHG emissions reductions at the lowest cost through a cost analysis of cost/ton of GHG emission reduction.
- **Encourage high-density development:** In their request for federal transit funding, municipalities should demonstrate that they have used their legislative, planning and zoning tools to limit urban sprawl by, for instance:

Having fixed urban boundaries;

Establishing densification strategies (minimum target for all new residential development);

Similarly, the federal government should establish minimum density criteria (number of people or jobs) for higher order (light or heavy rail) transit infrastructure funding. Minimum densities should also be established at transit hubs and along transit corridors (Ontario's Growth Plan for the Greater Golden Horseshoe provides a model); Identification of target markets to be served by transit infrastructure and estimates or forecasts of mode shifting.

- **Ensure adequate operation and maintenance (O&M) funding to maintain quality of public transit:** The federal government should require that municipalities demonstrate they have funding strategy in place (including support for revenue tools) for adequate long-term funding for operations and maintenance to support new investments in public transit;
- **Support the electrification of transit:** Maximizing the GHG emission reduction from transit infrastructure (first criterion) will require investments to support the electrification of transit. Priority should be given to transit projects with the biggest net emissions reduction gain. Such infrastructure investments should also be linked to transition sources of electricity away from non-renewable energy sources (for example coal phase-out) to renewable energy sources such as wind, solar and biomass.

These criteria should be developed and agreed upon with the provinces and municipalities, and applied consistently to the new Public Transit Fund as well as to the public transit funding allocated through the Gas Tax Fund and the Green Municipal Fund.

³ We recognize there are additional benefits and criteria that should guide transit investments, such as economic benefits and equity considerations.

Additional Recommendations:

- **Eliminate the federal public transit tax credit:** In 2006 the Canadian federal government introduced an income tax credit, the Public Transit Tax Credit, covering 15% of the annual (eligible) cost of public transit. In 2012, the total cost to government of transit expenses claimed under the program was over \$1.38 billion at a cost over \$280million per year in foregone tax revenues (Canada Revenue Agency, 2014). Recent research demonstrates that this income tax credit is costly and ineffective in promoting transit use in Canada. Moreover, it is a regressive tax credit, available only to those with income tax owing⁴. We recommend that the Public Transit Tax Credit be eliminated starting in budget 2017. There are better ways to incentivize public-transit use than subsidizing transit passes.
- **Support the electrification of transit bus fleet:** Canadian bus builders are already active in the design and testing of electric buses (or e-buses) with the support of public funding. However, implementation of those new technologies in urban transit fleets is almost non-existent. The federal and provincial governments should disseminate the results of the few ongoing demonstrations projects, including research done by the suppliers of electric bus solutions (capabilities, requirements, costs). Secondly, it is recommended that a tool be developed to assist transit authorities to appraise the adequacy of e-buses on their routes, and to allow transit authorities to rapidly and inexpensively identify those opportunities for deployment of e-buses.⁵

Rationale:

- The 2016 federal budget provided up to \$3.4 billion in public transit over three years, starting in 2016–17. Funding will be provided through a new Public Transit Infrastructure Fund. and allocated based in current transit ridership.
- Current federal transit funding is intended to support projects that will deliver increased capacity, enhanced service or improved environmental outcomes. The Government of Canada will fund up to 50% of eligible costs for projects. Funding under the program will be allocated to municipalities based on ridership. We recommend that Phase II of federal transit investments be allocated according to the proposed climate criteria, rather than ridership;⁶
- There is precedent for federal funding conditions to be used to advance federal policy objectives in areas beyond federal jurisdiction through the Federal Gas Tax Fund transfer to municipalities;
- The Liberal platform committed to a total of \$20 billion over 10 years for public transit in Canada. A second phase of public infrastructure investments is expected to deliver on this commitment;
- In addition, the Liberal platform committed \$20 billion in green infrastructure over 10 years, which could also be allocated to the proposed fourth “Active Transportation Fund” to support walking and cycling infrastructure projects;
- Public transit funding is also allocated through the Gas Tax Fund and the Green Municipal Fund (through the Federation of Municipalities);
- Since 2010, municipalities have increasingly cited the need to move towards all electric zero emissions vehicles (i.e. battery electric and fuel cell electric vehicles) as part of their internal and municipal sustainability programs. The Partners for Climate Protection (PCP) program is a network of Canadian municipal governments that have partnered together to actively reduce GHGs. In Canada, more than 250 municipalities, making up more than 65% of the Canadian population, have joined PCP by making a public commitment to reduce emissions. Transit electrification has frequently emerged among Canadian municipalities as one of the most realistic goals over the next decade. The average Canadian transit vehicle is typically 6.5 years old. Since buses are kept in service for 12 to 18 years, more than half of transit buses in Canada will need to be replaced over the next decade.

⁴ Rivers, Nicholas and Plumpton, Bora, The Effectiveness of Public Transit Subsidies on Ridership and the Environment: Evidence from Canada (January 29, 2016). Available at SSRN: <http://ssrn.com/abstract=2724768> or <http://dx.doi.org/10.2139/ssrn.2724768>

⁵ Electric Mobility Canada, March 3, 2016. *Roadmap for Accelerating the Deployment of Electric Vehicles in Canada 2016-2020*.

⁶ See: http://www.budget.gc.ca/2016/docs/plan/ch2-en.html#_Toc446106680

2. Encourage mode-shifting: invest in active transportation infrastructure and auto-share programs

Policy goal: Encourage mode shifting from single vehicle rides towards auto-sharing and active transportation (walking and cycling).

Recommendations:

- The federal government to establish a fourth infrastructure fund dedicated to supporting active transportation projects (walking and designated cycling paths)⁷ to support multiples modes of transportation. The fund should provide initial funding to municipalities of at least \$1billion over ten years for eligible active transportation projects;
- The federal government to develop a biennial national benchmarking report, mandated by Transport Canada, that tracks progress in such areas as cycling and walking infrastructure (dedicated bike lanes, paths, trails, etc.), integration with transit hubs and corridors, cycling policies, public health and safety indicators, in order to guide additional investments in walking and cycling infrastructure⁸;
- Coordinated federal, provincial and municipal policies should also be developed to promote auto-share programmes, such as minimum dedicated free-parking spaces for car sharing services (in both private and public institutions) and funding for infrastructure to support the electrification of the car share fleet (e.g. charging stations).

Rationale:

- The emergence of car-sharing services has offered a new mode of public transportation in urban areas. Car-sharing demonstrably reduces personal trip distances, as well as reducing vehicle ownership: a car share vehicle is estimated to replace ten private cars. Furthermore, it is estimated that the intrinsic characteristics of car-sharing vehicles, including being newer and more efficient, allows for the same trips to be completed with an average of 30% less GHG emissions than the average of personal vehicles in Canada.
- Through coordinated policies and investments in infrastructure, car-sharing services offer the potential to electrify transportation thus reducing local air pollution and GHG emissions;
- Across Canada, cycling and walking are growing in popularity as a daily commuting option. It offers a healthy, convenient and affordable solution to driving and will play an increasingly important role in helping Canada meet its carbon commitments. However, not all cities are investing in cycling and walking infrastructure to the same degree, particularly when it comes to creating separated lanes and other measures that improve safety and attract new cyclists and pedestrians. Understanding the current cycling and walking infrastructure in cities across Canada will help the federal government identify opportunities to improve infrastructure as well as adopt or support policy tools to ensure these modes are a viable transportation option.
- Based on the proposed national benchmarking assessment, cities and major municipalities should develop targets for mode shifting (walking, cycling and ride share programs).

⁷ If current trends continue, bike commuters will outnumber car commuters in London by 2018. This is attributed to congestion pricing and designated, protected cycling lanes on London's busiest streets. Source : <http://www.corporateknights.com/channels/transportation/12504-14622609/>

⁸ See for example *L'état du vélo au Québec*: <http://www.velo.qc.ca/fr/expertise/etat-du-velo-au-Quebec>

3. Increase the share of zero-emission vehicles sold in Canada

Policy goal: Implement complementary federal and provincial policies to increase the share of zero-emission vehicles (ZEV) sold in Canada.

3.1 A federal zero-emission vehicle legislation

Recommendation: Starting with models manufactured in Canada in 2018, federal legislation would require that a minimum percentage of major vehicle manufacturers' sales⁹ have zero or near-zero tailpipe emissions.¹⁰

The required fraction of zero-emission vehicles (ZEV) in the sales mix in Canada would increase every five years.

In order to increase flexibility and reduce the cost of compliance, vehicle manufacturers would receive credits for the sale of various types of zero-emission vehicles, and can trade those credits with other vehicle manufacturers.¹¹ A federal ZEV legislation would allow vehicles manufacturers the flexibility to initially meet sales target in provinces with the highest demand for ZEV. Eventually, complementary demand-side policies, such as those recommended below, would support demand across Canada, making it easier for vehicles manufacturer to meet their sales targets.

Policies to electrify transportation, such as a ZEV legislation, must be implemented together with a phase-out of coal-generated electricity in Canada and increased renewable generation in the electricity sector.¹²

Rationale:

- More than one quarter of Canadians are ready to purchase a zero-emission vehicle, but the vehicles are not available in Canada.¹³ A ZEV standard is intended to not only increase the share of ZEV available, but also the variety of models available on the Canadian market;
- To significantly increase the uptake of ZEV vehicles in Canada, both demand-side and supply-side policies are required;
- Zero-emission vehicles are vehicles that emit little to no carbon pollution at tailpipe. They include battery electric vehicles like a Tesla Model S, plug-in hybrid vehicles like a Nissan Leaf or Chevy Volt;
- Zero-emission vehicle standards are increasingly common: a zero-emission vehicle standard currently covers one third of the U.S. vehicle market¹⁴.
- California has required vehicle manufacturers and retailers to achieve rising market shares for zero-emission vehicles (ZEVs), partial-zero-emission vehicles (PZEVs), and ultra-low emission vehicles (ULEVs) since 1990. In 2016, the California targets are 3% ZEV and 12% PZEV/ULEV. By 2025, 15% of new vehicle sales in California are to be ZEVs;

⁹ A federal ZEV would apply to vehicles manufactured and imported into Canada.

¹⁰ The federal government would need to consider the potential negative interaction between federal ZEV legislation with Canadian GHG emission regulations¹⁰. Research shows that increased share of ZEV sales in a manufacturer's fleet may allow for increased sales of high-emitting vehicles due to the bonus credit offered for EVs under current Canadian regulations. The permitted CO2 emissions per vehicle model are related to the footprint of each vehicle. Given a vehicle footprint, such a vehicle is permitted to emit x grams of CO2 equivalent per kilometre travelled, and between 2016 and 2025 this permitted emission level will decline by 5% per annum for every footprint size. To further incentivize the production of EVs, the regulations award such vehicles a bonus credit, above the amount that would enter into a simple averaging formula. This bonus factor, or multiplier, depends upon the vehicle technology and its model year.

For detailed analysis see: Irvine, Ian. 2016. *Electric Vehicle Subsidies: The public economics of public policy*, unpublished.

¹¹ Centre for Climate and Energy Solutions (no date) ZEV Program. <http://www.c2es.org/us-states-regions/policy-maps/zev-program>

¹² EV operating using coal-powered electricity can generate as much as twice the level of CO2 as gasoline vehicles.

¹³ Axsen, Jonn (2015) The Canadian Plug-in Electric Vehicle Study. [http://rem-main.rem.sfu.ca/papers/jaxsen/Electrifying_Vehicle_\(Early_Release\)-The_2015_Canadian_Plug-in_Electric_Vehicle_Study.pdf](http://rem-main.rem.sfu.ca/papers/jaxsen/Electrifying_Vehicle_(Early_Release)-The_2015_Canadian_Plug-in_Electric_Vehicle_Study.pdf)

¹⁴ O'Dell, John (2015) Will California's Zero-Emission Mandate Alter the Car Landscape? <http://www.edmunds.com/fuel-economy/will-californias-zero-emissions-mandate-alter-the-car-landscape.html>

- California's ZEV mandate has reduced GHG emissions, improved air quality, and spurred technological innovation. California leads the U.S. in clean vehicle innovation, as measured by new patents secured.
- The Government of Quebec recently introduced ZEV legislation that will require ZEV sales reach 15.5% in Quebec by 2025;¹⁵
- The Government of Ontario recently adopted of a ZEV sales target requiring that electric vehicle sales constitute at least 5% of all vehicles sold in Ontario by 2020;¹⁶
- A federal ZEV legislation would also complement Ontario, Quebec and B.C.s electric vehicle purchase incentive programs and investment in charging infrastructure;

3.2 Increase the federal excise tax on fuel-inefficient vehicles to finance a fee-bate program for ZEV purchase

Recommendations:

- Starting in 2018/2019, significantly increase the federal excise tax on fuel-inefficient vehicles (the Canadian Green Levy), starting at a minimum of \$1,000 tax for vehicles consuming >6L/100 km¹⁷ and rising per fuel consumption threshold. The Canadian Green Levy would not apply to vehicles consuming less than 6L/100 km. The Canadian Green Levy should be stringent enough to significantly increase sales price of high-emitting vehicles. In addition, the Canadian Green Levy should be designed to generate sufficient revenues to fund the fee-bate program for the purchase of ZEV (revenue neutral policy).
- Provide a federal fee-bate system (similar to France), whereby revenues from the federal excise tax on fuel-inefficient vehicles would be used to provide a sales rebate for the purchase of ZEV. The federal fee-bate should complement existing provincial sales rebate and provide a consistent sales rebate in all Canadian jurisdictions to non-luxury zero-emissions vehicles sold in Canada.¹⁸
- Remove the GST on zero-emissions vehicles sold in Canada.
- Provinces and municipalities should offer other kinds of incentives for ZEV drivers, including free access to high-occupancy vehicle (HOV) lanes, designated parking spaces in cities, at public institutions and government workplaces, low-cost electricity rate structures adapted to EVs that maximize GHG benefits.

Rationale:

- Current share of EVs in Canada is one of the lowest in the world, at 0.4%¹⁹;
- By contrast, in 2015 EV sales represent 25% of all vehicles sold in Norway;
- Affordability remains another major barrier to EV sales in Canada. This is due partially to the cost of battery technologies²⁰. Economies of scale supported by zero-emission legislation and rebates for purchases of EV can help address affordability issues;
- Purchase subsidies have been effective at increasing sales of ZEV vehicles in Canada. 97 per cent of all EVs sold in Canada last year were purchased in the three provinces that currently offer rebates;

¹⁵ http://www.mddelcc.gouv.qc.ca/infuseur/communiqu_e_en.asp?no=3437

¹⁶ Ontario's Climate Change Action Plan, available at : <https://www.ontario.ca/page/climate-change-action-plan#section-4>

¹⁷ For a list the list of fuel-inefficient vehicles and current associated tax rates see: http://www.cra-arc.gc.ca/E/pub/et/ets164/list/1st_vh-2015-eng.html The Canadian Green Levy currently starts at a threshold of 13L/100km at a tax of \$1,000. In comparison, the Ontario Tax and Credit for Fuel Conservation (or feebate program) applies a tax starting at a threshold of 6.0L/100km. Research shows that a \$1,000 results in a 30% decrease in sales for specific vehicle category. Source: Rivers, Nicholas and Brandon Schaufele, 2014, *New Vehicle Feebates : Theory and Evidence*, <http://www.ivey.uwo.ca/cmsmedia/1361413/new-vehicle-feebrates.pdf>

¹⁸ The purchase rebates could sunset after a number of years and would only apply to non-luxury vehicles (could be defined as vehicles with a sales price below \$50,000) to address the regressive aspect of this subsidy and provide an incentive for vehicle manufacturers to introduce small, affordable ZEV in the Canadian market that are already available in other countries.

¹⁹ Based on 2015 vehicles sales in Canada from Stats Canada and estimated battery electric and hybrid-electric vehicles from IHS Automotive

²⁰ A recent analysis from Bloomberg Energy Finance found that continued decline in the cost of electric car batteries, they fell 35 per cent last year alone, will make electric vehicles cost-competitive with internal combustion engines by 2022.

- Most importantly, high-emissions gasoline cars remain artificially affordable due to the lack of taxation to internalize the externalities associated with the sales of those vehicles. The polluter-pays principle requires that both manufacturers of high emissions vehicles and consumers of such vehicles pay for the pollution costs associated with the sales of high-emitting vehicles²¹;
- Dozens of European countries, the U.S., and Canada employ a federal excise tax to encourage the sale of fuel efficient vehicles;
- The American tax applies to vehicles consuming >10.5L/100 km (\$1,000 U.S.) and rises to a maximum of >18.8L/100 km (\$7,700 U.S.). By comparison, European vehicle taxes begin at higher fuel efficiency thresholds and escalate much more rapidly to discourage the sale of new vehicles that are high GHG emitters.
- In Norway and the Netherlands, the excise tax for a new vehicle that consumes >12L/100km is greater than \$50,000. In Finland and Portugal, the tax on such a vehicle would be at least \$20,000. A purchaser of this car in the United States would pay US \$1,700 under the Gas Guzzler Tax, while Canada’s Green Levy would not apply.
- Canada’s federal tax on fuel-inefficient vehicles, in effect since 2007, is comparatively weak, with the highest threshold for triggering the tax >13L/100 km and the lowest tax rate (starting at \$1,000 and rising to a maximum of \$4,000);
- France employs a fee-bate system based on carbon emissions. When a new vehicle’s CO2 emissions exceed 130 g/km, a graduated fee is paid to a maximum of €8,000. A discount is granted for the purchase of vehicles when CO2 emissions are 110 g/km or less, with a maximum rebate of €6,300, (20 g/km or less). An additional bonus of €200 is granted when a vehicle at least 15 years old is scrapped.
- Quebec provides a rebate of \$8,000 for the purchase — including leasing — of an EV, and a rebate of between \$400 and \$8,000 for rechargeable hybrids, to consumers, municipalities, businesses and not-for-profit organisations. Financing is also available to purchase a residential charging station;²²
- Ontario provides rebates of up to \$13,000 for the purchase of a battery electric vehicle (BEV) and funding to purchase a charging station. The removal of the HST on sales of electric vehicles in Ontario was also recently announced.²³

3.3 Complementary federal and provincial funding to support a network of EV charging stations across Canada

Recommendations:

- Federal government to update the National Building Code to require that all new residential and commercial buildings in Canada include EV charging stations;
- Provide financial incentives to employers to provide workplace charging stations;
- Federal and provincial governments to complete the deployment of fast charging stations on national highways. It is recommended that the federal government take charge of purchasing and installing a minimum of 150 direct current fast charging (DCFC) stations to complete a national EV highway.²⁴

Rationale:

- Quebec provides a rebate of \$8,000 for the purchase — including leasing — of an EV, and a rebate of between \$400 and \$8,000 for rechargeable hybrids, to consumers, municipalities, businesses and not-for-profit organisations. Financing is also available to purchase a residential charging station.²⁵

²¹ As opposed to all taxpayers subsidizing the sales of low-emissions vehicles (as is the case with EV rebates, a costly and regressive policy).

²² <http://vehiculeselectriques.gouv.qc.ca/particuliers/rabais.asp>

²³ <http://www.mto.gov.on.ca/english/vehicles/electric/charging-incentive-program.shtml>

²⁴ Electric Mobility Canada, March 3, 2016. *Roadmap for Accelerating the Deployment of Electric Vehicles in Canada 2016-2020*.

²⁵ <http://vehiculeselectriques.gouv.qc.ca/particuliers/rabais.asp>

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4. Reduce the carbon intensity of all vehicles in Canada

Policy goal: Implement complementary federal and provincial policies to reduce the carbon intensity of the existing vehicle fleet in Canada as well as new personal vehicles, light freight and heavy-duty freight vehicles sold in Canada.

4.1 A national Low-Carbon Fuel Standard

Recommendation:

- Implement a national Low Carbon Fuel Standard (LCFS)²⁷ in Canada - a legislated intensity target (measured in grams of CO₂e per MJ of energy) for all transportation fuels sold in Canada. The national LCFS should require a 10% decrease in CO₂e intensity by 2020 and a 20% decrease by 2030. The federal Low Carbon Fuel Standard would replace the Renewable Fuels regulations;
- A LCFS needs to be based on lifecycle environmental impact assessments that have a carefully defined boundary and encompass all steps from production to consumption. A LCFS should be increasingly stringent, providing clear signals to fuel producers and vehicle manufacturers for their investments and technology development pathways.

Rationale:

- LCFSs are consistent with principles for good biofuel policy design. Clean Energy Canada's recent review of renewable fuel standards recommends future renewable fuel policies follow five principles: drive greenhouse gas avoidance, support investment in low-carbon fuels, support other sustainability criteria, ensure affordable fuel supplies and have transparent and regular compliance reporting²⁸.
- A key benefit of this approach, employed by California and British Columbia, is that as the LCFS becomes more stringent, the emission rates of all fossil fuel based transportation vehicles fall. This also serves to address the challenge of reducing emissions from air and maritime transport.
- In California, the LCFS requires that transportation fuels used in California meet a baseline target for carbon intensity. That target is reduced each year. If a product is above the annual carbon intensity target, the fuel incurs deficits. If a product is below that target, the fuel generates credits that may be used later for compliance, or sold to other producers who have deficits. So far, fuel producers are over-complying with the regulation. Carbon intensity is determined through a life cycle analysis measuring the amount of carbon generated during the extraction, production, transportation, and combustion of a fuel. The LCFS does not require use of any specific fuel, only that regulated parties find a blend of fuels and credits that will meet the declining target each year.
- Since the start of the LCFS in 2011, low-carbon and renewable fuels in California have replaced more than 5.3 billion gallons of gasoline and 1.2 billion of diesel fuel. For 2015, the compliance rate with the LCFS was 98%.²⁹

²⁶ <http://www.mto.gov.on.ca/english/vehicles/electric/charging-incentive-program.shtml>

²⁷ Low carbon fuel standards were initially adopted to support biofuels production. Corn ethanol, first used as an additive to gasoline in order to battle urban ozone problems, was rebranded as a low carbon fuel. Biodiesel from soy soon joined the portfolio of fuels designated as low carbon. This has led to a continuing confusion between renewable fuels and low carbon fuels. Unfortunately, the two are not the same and controversy over the actual lifecycle emissions of these fuels continues. These renewable biofuels range from having no GHG benefits (e.g. North American corn ethanol) to ~50% GHG reduction (e.g. Brazilian sugar-cane ethanol). The production of these first generation biofuels has significant negative impacts on food markets and local ecosystems. Second generation biofuels such as cellulosic ethanol and algal diesel could potentially lower lifecycle GHG emissions without adverse impacts on food availability or ecosystems. However, these technologies are not yet ready for widespread commercialization.

²⁸ Moorhouse, Jeremy (2016) 5 principles for designing effective biofuel policy. <http://cleanenergycanada.org/5-principles-for-designing-effective-biofuels-policy/>

²⁹ http://www.arb.ca.gov/newsrel/newsrelease.php?id=817&utm_content=buffer2e229&utm_medium=social&utm_source=twitter.com&utm_campaign=buffer

- British Columbia’s low-carbon fuel standard requires life-cycle GHG intensity of transportation fuels decline by 10 percent between 2010 and 2020. The fuel standard has reduced GHG emissions by 900 kt CO_{2eq} in 2012, and accounts for 25% of all GHG reductions between 2007 and 2012 in the province³⁰.

4.2 Strengthened GHG emissions regulation for all personal and light-duty vehicles sold in Canada

Recommendation:

- Reduce the CO₂ equivalent per mile travelled under the *Passenger Automobile and Light Truck Greenhouse Gas Emission Regulations* regulation by 10% per year starting with 2018 models. Apply the same regulation for light trucks and SUV as all personal vehicles.³¹

Rationale:

- Canada-wide sales of passenger vehicles and trucks have changed dramatically between 2013 and 2015, as a result of the decline in oil prices. Statistics Canada reports that 2015 passenger vehicle sales declined by 6%, while sales of trucks (including SUVs and minivans) increased by 21.4% for the same period. Canada-wide, all-vehicle sales were up 9.6%; trucks accounted for 63% of units sold in 2015, up from 57% in 2013.³²
- If the shift for 2013-2015 represents a new trend in sales between passenger and truck vehicles, then for the period 2015-2020, the lower gasoline price will see a restructuring of the Canadian fleet in favour of heavier vehicles, relative to what would have occurred with higher oil prices. This will result in increased GHG emissions, even with emission standards tightening for both trucks and passenger vehicles;
- Existing fuel-efficiency standards for personal vehicles cover model years 2014 through 2017, and they are already bringing cost-effective solutions to market. Proposed regulations covering 2018 models and beyond must do better in terms of GHG emission reduction.

4.3 Reduce emissions from light and heavy freight in Canada

Policy goal: Reduce GHG emissions from the light and heavy freight sector in Canada by 40% by 2025 through new stringent GHG emission regulations for light and heavy duty trucks, incentives for mode switching to lower carbon transportation modes and increased use of biodiesel.

Recommendations:

- Provide R&D investments to spur innovation in technologies to reduce GHG emissions in the heavy-freight sector, including infrastructure and incentives for mode switching to lower emitting transportation (e.g. rail);
- Establish stringent GHG emission regulations for heavy freight for post-2018 models;
- Provide financial incentives and improve infrastructure (e.g. charging stations) for the electrification of light-freight (i.e. short distance delivery trucks);
- Provide incentives for the adoption of renewable biodiesel as a transition fuel for the heavy-freight sector.

³⁰ Navius Research (2014) The Renewable and Low Carbon Fuel Requirement Regulation – Current Impacts and Future potential of British Columbia’s Transportation Fuel Regulation. http://www.naviusresearch.com/data/resources/BC_RLCFRR_Communication_Brief.pdf

³¹ Fuel-efficiency standards in Canada were initially harmonized with the U.S. Corporate Average Fuel Economy standards and replaced with the Canadian GHG emission regulations. The regulations require that vehicles, according to their footprint, emit x grams of CO₂ equivalent per mile travelled. Between 2016 and 2025 this permitted emission level will decline by 5% per annum for every footprint size. For light trucks the permitted emissions will tighten by 3.5% per annum. See : <http://laws-lois.justice.gc.ca/eng/regulations/SOR-2010-201/page-1.html>

³² Statistics Canada: <http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/econ58a-eng.htm>

Rationale:

- It is crucial to put strong standards in place now since heavy-duty trucks are the fastest-growing single source of GHG emissions in the transportation sector;
- In the recent U.S.- Canada Joint Statement on Climate, Energy and Arctic Leadership, Canada and the U.S. committed to continue to establish world-class, aligned regulations and programs to improve the fuel efficiency and reduce GHG and air pollutant emissions from on-road vehicles. This includes the finalization and implementation of a second phase of aligned GHG emission standards for post-2018 models of on-road heavy-duty vehicles and to accelerate the improvement of vehicle efficiency and zero emission technologies.³³
- Representatives of the trucking industry³⁴ believe a 40% reduction in fuel consumption by 2025 – a stronger standard than what has been initially proposed by the Environmental Protection Agency – is technologically feasible and would yield even greater economic and environmental benefits.
- More ambitious fuel-efficiency standards for cars, adopted in 2010, have driven investments in the development and manufacturing of far more fuel-efficient vehicles. Similarly, stringent regulations are required to drive innovation in the manufacturing of new trucks. Without long-term standards in place to level the playing field, truck manufacturers find it much harder to commit to the multi-year investment of bringing fuel-efficient technologies to market.

5. Exemplary government procurement: A Carbon Neutral Federal Public Service

Recommendations:

- Guidelines should be developed to reduce transportation needs and emissions associated with all federal public service activities including promoting tele-work, virtual conferences, providing EV shuttle services between federal workplaces and purchasing carbon offsets for all federal travel;
- Safe bicycle parking spaces and showers should be provided at all federal workplaces;
- The federal government should take a leading role, by requiring the fleet for all federal departments (e.g. all Ministers' cars) and agencies, including Canada Post, to be comprised entirely of EVs by 2030. The federal government should also install EV charging stations at all federal buildings and provide designated free parking spaces for EV drivers and auto-share programs at all federal workplaces.
- The Treasury Board of Canada should provide, as part of the standard benefits provided to public service employees, incentives to use car-share programs and public transit.

³³ See: <http://www.pm.gc.ca/eng/news/2016/03/10/us-canada-joint-statement-climate-energy-and-arctic-leadership#sthash.8mTu60m8.dpuf>

³⁴ See for example, Jeremy Anwyl, chief executive of Trucks.com. (https://www.trucks.com/2016/05/12/ben-jerrys-believes-strict-truck-emissions-rules-help-profits-planet/?utm_content=buffereaca1&utm_medium=social&utm_source=twitter.com&utm_campaign=buffer)

This goal is also supported by recent research by the National Academies of Science and the Southwest Research Institute, as well as data from the Department of Energy's SuperTruck program.