IEA-Advanced Motor Fuels
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Canada

Technology Collaboration Programme
by iea

Canada

Drivers and Policies

Clean Fuel Regulations (CFR)

Canada is developing regulations for cleaner fuels. When finalized, the proposed Clean Fuel Regulations would require liquid fossil fuel producers and importers to reduce the carbon intensity (CI) of the liquid fossil fuels they produce in and import into Canada. The proposed regulations would also establish a credit market whereby the annual CI reduction requirement could be met via three main categories of credit-creating actions: actions that reduce the CI of the fossil fuel throughout its lifecycle, supplying low-carbon fuels, and specified end-use fuel switching in transportation. Parties that complete these actions (e.g., low-carbon fuel producers and importers) can participate in the credit market as voluntary credit creators. It is estimated that the proposed regulations would result in a reduction of up to 20.6 Mt of GHG emissions in 2030.

Renewable Fuels Regulations (RFRs)[1]

The RFRs require fuel producers and importers to have an average renewable content of (1) at least 5% based on the volume of gasoline and (2) at least 2% based on the volume of diesel fuel and heating distillate oil that they produce or import into Canada. The regulations include provisions that govern the creation of compliance units, allow trading of these units, and also require recordkeeping and reporting to ensure compliance.

Renewable-fuels-related Standards

The Canadian General Standards Board (CGSB) is responsible for developing fuel and renewable fuel quality standards, via consensus by public and private sectors (see Table 1).

Table 1. CGSB Renewable Fuel-quality-related Standards[2]

Fuel Standards	Number
Oxygenated automotive gasoline containing ethanol (E1–E10)	CAN/CGSB 3.511
Automotive ethanol fuel (E50–E85 and E20–E25)	CAN/CGSB 3.512
Denatured fuel ethanol for use in automotive spark ignition fuels	CAN/CGSB 3.516
Diesel fuel containing low levels of biodiesel (B1–B5)	CAN/CGSB 3.520
Diesel fuel containing biodiesel (B6–B20)	CAN/CGSB 3.522
Biodiesel (B100) for blending in middle distillate fuels	CAN/CGSB 3.524

Greenhouse Gas (GHG) Emission Regulations

In 2014, the second phase of action on light-duty vehicles (LDVs) for model years 2017 to 2025, with increasingly stringent GHG standards, was published. Under these regulations, *Passenger Car and Light Truck GHG Emission Regulations*, the average GHG emissions performance of all new passenger automobiles improved from 255 g/mile in the 2011 model year to 206 g/mile in the 2018 model year, a 19.2% reduction in GHG emissions per vehicle. Canada is currently undertaking a mid-term evaluation of the appropriateness of its standards for model years 2022 to 2025, and intends to publish a final decision document on the findings of this review in early 2021. Any changes or improvements required to the regulations in the near term will be determined by the results of this mid-term evaluation.

In 2018, the *Regulations Amending the Heavy-Duty Vehicle (HDV) and Engine Greenhouse Gas Emission Regulations* were published. The amendments established more stringent GHG emission standards for heavy-duty vehicles and their engines, starting with the 2021 model year. Consideration to the amendments introducing new GHG emission standards that apply to trailers hauled by on-road transport tractors are being assessed. Amendments are estimated to result in cumulative fuel savings of 27.7 billion liters with respect to the portion of the lifetime operation of model years 2020 to 2029 that occurs between 2020 and 2050.

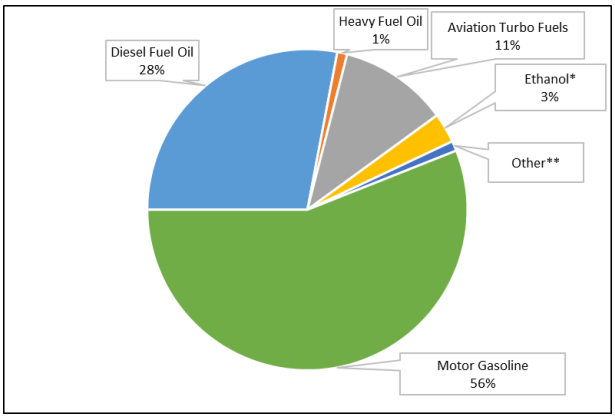
[1] https://pollution-waste.canada.ca/environmental-protection-registry/regulations/view?Id=1031
[2] http://www.tpsgc-pwgsc.gc.ca/ongc-cgsb/index-eng.html

Future amendments required to both of these regulations will be in line with Canada's strengthened climate plan, "A Healthy Environment and a Healthy Economy," which contains new measures for the transportation sector described in the "Clean Transportation" Annex. This includes further improving the efficiency of light-duty and heavy-duty vehicle standards for post-2025 by aligning with the most stringent standards in North America – whether at the United States federal or state level.

Pan-Canadian Framework on Clean Growth and Climate Change (PCF)
The Pan-Canadian Framework is the federal, provincial, and territorial plan to grow the economy, reduce GHG emissions, and build resilience in the face of a changing climate. The PCF includes more than 50 concrete actions that cover all sectors of the Canadian economy and puts Canada on a path toward meeting Canada's Paris Agreement GHG-emissions-reduction target of 30% below 2005 levels by 2030.

Advanced Motor Fuels Statistics[3]

Figure 1 shows energy use by fuel type in 2017 for transportation in Canada and Table 2 shows the supply of and demand for ethanol and biodiesel.



* Ethanol proportion is estimated on the basis of production data.
** The "Other" fuel type includes electricity, natural gas, aviation gasoline and propane.

Fig. 1. Fuel Mix of the Canadian Transportation Sector 2017

Table 2. Canadian Supply and Demand of Biofuels in 2018 (in millions of liters)

Parameter	Ethanol	Biodiesel
Canadian production	1,900	400
Imports	1,232	548
Exports	0	301
Domestic use	3,132	647

[3] https://www.nrcan.gc.ca/sites/nrcan/files/energy/energy_fact/energy-factbook-2020-2021-English.pdf

Research and Demonstration Focus

ecoTECHNOLOGY for Vehicles (eTV) Program

Transport Canada's eTV Program is an initiative that conducts in-depth safety and environmental performance testing on a range of new and emerging advanced passenger car and truck technologies. The program investigates the performance of alternative-fueled vehicles, including renewable fuels, hybrid and electric, CNG, and hydrogen fuel cell vehicles.

Program of Energy Research and Development (PERD)

The Natural Resources Canada (NRCan) program PERD supports energy R&D conducted by the federal government and is designed to ensure a sustainable energy future for Canada. Key research areas focus on knowledge and technology that will help reduce the carbon footprint of fuels and emissions from transportation sources.

Electric Vehicle and Alternative Fuel Infrastructure Deployment Initiative (EVAFIDI)

NRCan continued to invest in the expansion of the network of electric vehicle (EV) charging and alternative refueling stations across Canada through EVAFIDI. Funding will establish a coast-to-coast network of fast-charging stations along the national highway systems, natural gas refueling stations along key freight corridors and hydrogen refueling stations in major metropolitan areas. As of December 2020, approved projects will result in 1,108 electric vehicle fast chargers, 22 natural gas and 15 hydrogen refueling stations, meeting or exceeding all program targets. Almost half of these stations are already open to the public. Investments are also made to support the development of enabling codes and standards for vehicles and charging and refueling infrastructure.

Energy Innovation Program (EIP)

NRCan's EIP supports clean energy innovation both internally within government and externally with industry. Accelerating clean technology R&D is a key component of Canada's approach to promoting sustainable economic growth, reducing emissions including GHGs, and supporting Canada's 2050 clean growth targets.

Clean Transportation System-Research and Development Program (CTS-RD)

Transport Canada established the CTS-RD to support projects that help improve the environmental performance of Canada's transportation system, specifically in the rail, marine and aviation sectors. The program looks to advance new clean technology innovations, practices or research.

Canada's Action Plan to Reduce GHG Emissions from Aviation

Canada's Action Plan to Reduce GHG Emissions from Aviation includes research and development to support the future use of sustainable aviation fuel. Within this plan, the Green Aviation R&D Network has several on-going projects focusing on bio-derived jet fuel applications for Canada.

Memorandum of understanding between the California Air Resources Board and Environment and Climate Change Canada

In 2019, California, the US state with the strictest emissions regulations, and Canada signed a cooperation agreement to advance clean transportation. The memorandum of understanding commits to working together on respective regulations to reduce GHG pollution from vehicles, promote the uptake of cleaner vehicles, and share best practices related to cleaner fuels.

Vehicle Propulsion Technologies (VPT) Program

The National Research Council Canada's VPT program assists Canadian automotive manufacturers to improve the efficiency of internal combustion engines, powertrains, and the use of electric and fuel cell propulsion.

Clean Growth Program (CGP)

NRCan's Clean Growth Program is providing $155 million ($123 million US) investment in clean technology R&D and demonstration projects in three Canadian sectors: energy, mining and forestry.

Breakthrough Energy Solutions Canada (BESC)
The BESC program supports Canadian start-ups to advance clean energy technologies, which could significantly reduce global GHGs, by targeting four areas: manufacturing, electricity, transportation, and buildings. The program was developed in partnership with Breakthrough Energy as well as Business Development Bank of Canada (BDC) to increase the impact of NRCan investment and to give the winners the opportunity to access additional funding and receive valuable insight from private investors.

Strategic Innovation Fund (SIF)
The SIF, managed by Innovation, Science and Economic Development Canada, is provided to support Canadian businesses investing in innovation. The program helps offset costs related to researching and implementing new technologies, including the automotive sector.

Incentives for Zero Emissions Vehicles Program
In 2019, Canada set federal ZEV sales targets of 10% of new LDVs by 2025, 30% by 2030, and 100% by 2040. Without any further action, it is projected that Canada could achieve zero-emissions vehicle sales of 4% to 6% of all new light-duty vehicles purchased by 2025, and 5% to 10% by 2030. However, to help achieve these targets, Canada introduced a suite of new policy measures, including a federal purchase incentive program for eligible ZEVs.

Electric Vehicle Infrastructure Demonstration (EVID) Program
NRCan's EVID program supports the demonstration of next-generation and innovative ZEV charging and hydrogen refueling infrastructure. Over 20 demonstration projects are addressing key technical and non-technical barriers in a range of applications focusing on challenges to the implementation of EV charging infrastructure, such as bi-directional charging combined with energy storage, fast charging performance in the North and interoperability of electric bus charging infrastructure.

Outlook

As depicted in Table 3, the Canadian transportation sector is comprised of several distinct subsectors. Each subsector exhibits different trends during the projected period. GHG emissions from cars, trucks, and motorcycles are projected to decrease by 21 Mt between 2005 and 2030, while those for heavy-duty trucks and rail are projected to increase by 11 Mt.

Table 3. Transportation: GHG Emissions (Mt CO_2-eq)[4]

Transportation Subsector	2005	2020	2030	Δ 2005 to 2030
Passenger Transport	**90**	**88**	**70**	**-20**
Cars, light trucks, and motorcycles	82	79	61*	-21
Bus, rail, and domestic aviation	8	9	9	1
Freight Transport	**62**	**73**	**73**	**11**
Heavy-duty trucks, rail	54	68	68	14
Domestic aviation and marine	8	5	5	-3
Other: recreational, commercial, and residential	**10**	**9**	**10**	**0**
Total	**162**	**170**	**153**	**-9**

* These projections are based upon the current emissions standards, which are in place for model years 2017 to 2025.

[4] https://unfccc.int/sites/default/files/resource/br4_final_en.pdf