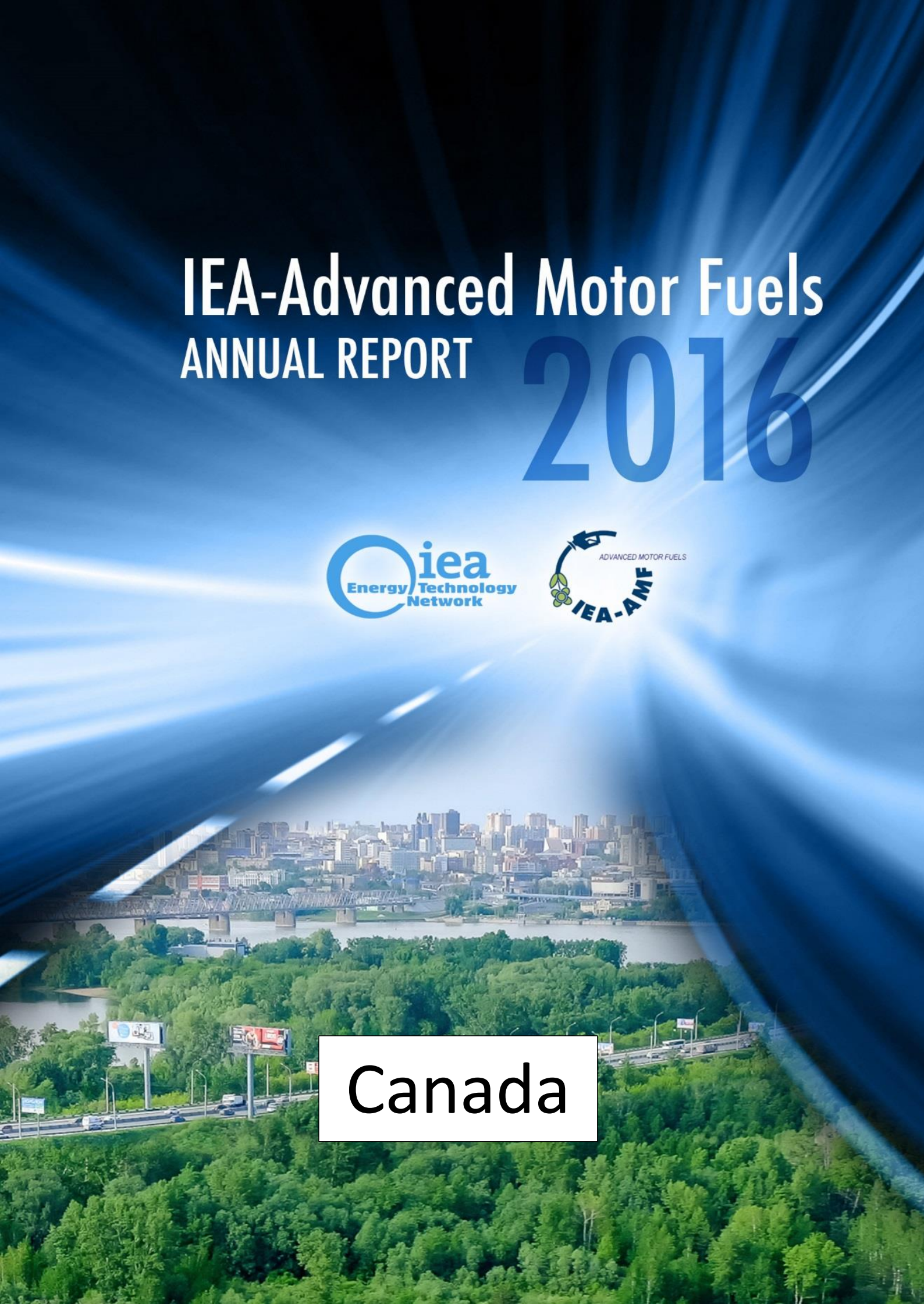
IEA-Advanced Motor Fuels
ANNUAL REPORT 2016



Canada

Canada

Drivers and Policies

Renewable Fuels Regulations (RFRs)[1]

The RFRs require fuel producers and importers to have an average renewable content of at least 5% based on the volume of gasoline that they produce or import commencing December 15, 2010. These regulations include provisions that govern the creation of compliance units, allow trading of these units among participants, and also require recordkeeping and reporting to ensure compliance. The RFRs also require fuel producers and importers of diesel fuel and heating distillate oil to have an average annual renewable fuel content equal to at least 2% of the volume of diesel fuel and heating distillate oil that they produce and import commencing July 1, 2011. The *2013 Regulations Amending the RFRs* introduced a national exclusion of heating distillate oil volumes for space heating purposes as of January 1, 2013.

Renewable-Fuels-Related Standards

The Canadian General Standards Board (CGSB) is the responsible authority for developing fuel quality standards, including standards for renewable fuel quality through a consensus process with the public and private sectors. Table 1 shows the biofuel-related standards for transportation.

Table 1 CGSB Renewable Fuel Quality Related Standards[2]

Fuel Standard	Number
Oxygenated automotive gasoline containing ethanol (E1–E10)	CAN/CGSB 3.511
Automotive ethanol fuel (E50–E85)	CAN/CGSB 3.512
Denatured fuel ethanol for use in automotive spark ignition fuels	CAN/CGSB 3.516
Automotive 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

Passenger Automobile and Light Truck Greenhouse Gas (GHG) Emission Regulations[3]

In 2010, the Government of Canada released the final *Passenger Automobile and Light Truck GHG Emission Regulations*, which prescribe progressively more stringent annual emission standards for new vehicles of model years 2011 to 2016. The Government also published regulations in 2014 for the second phase of action on light-duty vehicles (LDVs), which contain increasingly stringent GHG emissions standards for LDVs of model years 2017 to 2025. Under both phases of LDV regulations, spanning model years 2011 to 2025, the fuel efficiency of new cars will increase by 41% as compared with model year 2010, and the fuel efficiency of new passenger light trucks will increase by 37%. The sales-weighted fuel efficiency of new cars is projected to improve from 8.6 liters per 100 kilometers (L/100 km) in 2010 to 6.4 L/100 km in 2020 and to 5.1 L/100 km by 2025. The sales-weighted fuel efficiency of new passenger light trucks is projected to improve from 12.0 L/100 km in 2010 to 9.1 L/100 km in 2020 and to 7.6 L/100 km by 2025.

Heavy-duty Vehicle and Engine GHG Emission Regulations[4]

The *Heavy-duty Vehicle and Engine GHG Emission Regulations* establish mandatory GHG emission standards for new on-road heavy-duty vehicles and engines. The regulations apply to companies manufacturing and importing new on-road heavy-duty vehicles and engines of the 2014 and later model years for the purpose of sale in Canada. These include the whole range of on-road heavy-duty full-size pickup trucks, vans, tractors, and buses, as well as a wide variety of vocational vehicles such as freight, delivery, service, cement, and dump trucks. The regulations also include provisions that establish compliance flexibilities, which include a system for generating, banking, and trading emission credits. The regulations include additional credits for hybrid and electric vehicles, as well as for

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1 http://www.ec.gc.ca/energie-energy/default.asp?lang=En&n=0AA71ED2-1.
2 http://www.tpsgc-pwgsc.gc.ca/ongc-cgsb/index-eng.html.
3 https://ec.gc.ca/ges-ghg/default.asp?lang=En&n=E0533893-1.
4 https://ec.gc.ca/ges-ghg/default.asp?lang=En&n=E0533893-1.

innovative technologies to reduce GHG emissions. The average fuel efficiency of trucks will improve from 2.3 L/100 tonne-km in 2012 to 2.2 L/100 tonne-km by 2020.

Advanced Motor Fuels Statistics

Figure 1 shows the energy use by fuel type in 2013 for transportation in Canada.

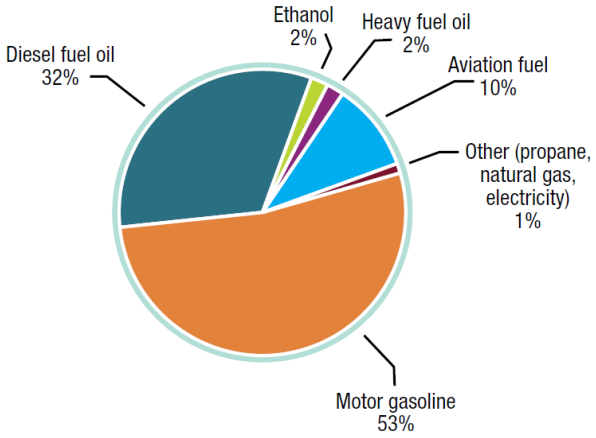

Fig. 1 Energy Use by Fuel Type for Transportation in 2013[5]

Table 2 shows the Canadian supply of and demand for ethanol and biodiesel in 2015.

Table 2 Canadian Supply of and Demand for Biofuels (in millions of liters) in 2015[5]

Parameter	Ethanol (2015)	Biodiesel (2015)
Canadian production	1,720	307
Imports	1,100	383
Exports	0	238
Domestic use	2,820	452

Research and Demonstration Focus

ecoTECHNOLOGY for Vehicles (eTV) Program[6]

Transport Canada's eTV Program conducts in-depth safety, environmental, and performance testing on a range of new and emerging advanced vehicle technologies for passenger cars and heavy-duty trucks. The eTV Program will help ensure that Canada is ready for new and emerging advanced vehicle technologies, and that Canadians can benefit from these new innovations.

[5] https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/energy/pdf/EnergyFactBook_2016_17_En.pdf.

[6] https://www.tc.gc.ca/eng/programs/ecotechnology-vehicles-program.html.

Program of Energy Research and Development (PERD)[7]

PERD is a federal, interdepartmental program operated by Natural Resources Canada. PERD supports energy research and development conducted in Canada by the federal government and is concerned with all aspects of energy supply and use. Part of PERD consists of coordinated research activities designed to extend key areas of knowledge and technology that will help reduce both the carbon footprint of fuels and vehicle emissions from transportation sources in Canada.

Energy Innovation Program (EIP)[8]

The EIP supports innovation in the clean energy sector by providing funding for research, development, and demonstration (RD&D) projects. EIP is integral to supporting the Government of Canada's commitment that Canada's total GHG emissions be reduced, and to contributing to Canadian prosperity and competitiveness by advancing clean energy RD&D.

Electric Vehicle and Alternative Fuel Infrastructure Deployment Initiative[9]

The objective of this initiative is to increase the awareness, availability, and use of lower carbon vehicles and fuels in Canada by supporting the installation of up to 70 vehicle fast-charging units, and 6 natural gas and 2 hydrogen refuelling locations along key transportation corridors.

Outlook

As depicted in Table 3, the transportation sector consists of several distinct subsectors — passenger, freight, air, and others (e.g., rail and marine). Each subsector exhibits different trends during the projected period. For example, GHG emissions from passenger transportation are projected to decrease by 8 megatonnes (Mt) between 2005 and 2020, while those for ground freight, off-road, and other vehicles are projected to increase by 10 Mt over the same time period due to economic growth. As a result, net emissions remain essentially stable over the period. Although absolute emissions are expected to grow in the freight subsector due to economic growth, emissions are expected to decrease relative to business-as-usual levels as a result of various federal, provincial, and territorial programs.[10]

Table 3 Transportation: GHG Emissions (Mt CO_2 equivalent)

Transportation Subsector	2005	2012	2020
Passenger Transport	96	94	88
Cars, trucks, and motorcycles	87	85	78
Bus, rail, and domestic aviation	9	8	9
Freight Transport	57	61	67
Heavy-duty trucks, rail	49	54	59
Domestic aviation and marine	8	7	8
Other: recreational, commercial and residential	14	11	12
Total	168	165	167

Passenger energy demand declines over the projection period, largely due to increasing fuel economy associated with Canada's *Passenger Automobile and Light Truck GHG Emission Regulations*. Since passenger travel consumes the majority of gasoline in the transportation sector, this leads to a decrease in the fuel share of gasoline demand. Freight demand is driven by growth in the goods-producing industries and increases at a slower rate than it did from 1990 to 2013. This is from fuel economy gains, associated with Canada's *Heavy Duty Vehicle and Engine GHG Emission Regulations* and somewhat slower economic growth over the projection period. The increase in freight share leads to an increase in the fuel share of diesel.[11]

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7 http://www.nrcan.gc.ca/energy/funding/current-funding-programs/perd/4993.
8 http://www.nrcan.gc.ca/energy/funding/current-funding-programs/18709.
9 http://www.nrcan.gc.ca/energy/alternative-fuels/fuel-facts/ecoenergy/18397.
10 https://ec.gc.ca/ges-ghg/default.asp?lang=En&n=E0533893-1.
11 https://www.neb-one.gc.ca/nrg/ntgrtd/ftr/2016/index-eng.html.

Additional Information Sources

- National Research Council Canada
  - Automotive and Surface Transportation[12]
  - Industrial Research Assistance Program[13]
- Natural Sciences and Engineering Research Council of Canada[14]
- Sustainable Development Canada[15]

[12] http://www.nrc-cnrc.gc.ca/eng/rd/ast/.
[13] http://www.nrc-cnrc.gc.ca/eng/irap/index.html.
[14] http://www.nserc-crsng.gc.ca/index_eng.asp.
[15] https://www.sdtc.ca/en/apply/funds.