Overview of Canada’s Greenhouse Gas Emission Regulations for New Light-Duty Vehicles

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Outline

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General Policy Context

Contribution of On-Road Vehicles:
• Transportation is one of the largest sources of greenhouse gas (GHG) emissions in Canada
  – 24% of total emissions in 2011 (702Mt)
• In 2011, light-duty vehicles accounted for 13% of total GHG emissions or 52% of total transportation GHG emissions

Government of Canada’s Approach:
• Commitment to Reduce total GHGs by 17% from 2005 levels by 2020
• Vehicle regulations are a critical part of Canada’s approach to reducing GHG emissions
• Canada has implemented a policy of regulatory alignment with the U.S. on vehicle emission standards
Canada’s GHG Emission Regulations for 2011-2016 Model Year Vehicles

Final Regulations published in the Canada Gazette Part II on October 13, 2010
Scope and Application

- Regulations apply to new “passenger automobiles” and “light trucks” of the 2011 and later model years.

- A company’s “fleet” refers to all passenger automobiles or light trucks of a specific model year that a company manufactures in Canada or imports into Canada for the purpose of sale of those vehicles to the first retail purchaser.

- Regulations do not apply to:
  - used vehicles imported into Canada
  - vehicles being exported from Canada
  - vehicles imported on a temporary basis for the purposes of exhibition, demonstration, evaluation and testing.
Basic Structure of the GHG Emission Regulations

• Establish increasingly stringent annual fleet average CO₂ emissions standards for new passenger automobiles and light trucks that must be met by each company manufacturing or importing vehicles for sale in Canada beginning in 2011

• Define unique standards for each company based on the physical size (footprint) of the vehicles in their respective fleets

• Fleet-average standards become progressively more stringent over the 2011-2016 model years, in alignment with U.S. standards

• Individual vehicle standards to reduce exhaust emissions of other GHGs (CH₄ and N₂O)
Companies calculate the CO$_2$ emission target value for each of its vehicles, using the applicable formula – best understood graphically.

The formulae can be presented as continuous curves of CO$_2$ emission target values vs footprint.

There are unique curves for each class of vehicle (i.e. passenger automobiles and light trucks) in each model year. For example:
- In model year 2011, there is a passenger automobile curve and a light truck curve;
- In model year 2012, there are new – more stringent – curves for both passenger automobiles and light trucks.

The company’s fleet average CO$_2$ emission standard is then calculated as the “sales”-weighted average of each vehicle’s CO$_2$ emission target value.
Example – Model Year 2012 Passenger Automobiles

CO₂ Emission Target Value (grams/mile)

Footprint (ft²)
Treatment of Advanced Technology Vehicles (ATVs)

- Regulations include provisions that effectively serve as an incentive for the introduction of advanced technology vehicles (ATVs).
- Companies can earn “credit” for introducing electric, plug-in hybrid, or fuel-cell vehicles by lowering their fleet average GHG performance.
- When calculating its fleet average GHG emissions for the 2011–2016 model years, a company can:
  - use a carbon-related exhaust emission value of zero g/mile for electric vehicles and the electric portion of plug-in hybrids (i.e. when PHEVs operate as electric vehicles) and fuel cell vehicles.
  - multiply the number of ATVs in its fleet by a factor of 1.2 (different than U.S.).
- Use of the value of zero g/mile is limited to a maximum number of vehicles:
  - generally the first 30,000 ATVs during the 2011–2016 model years
  - if cap is exceeded, use a general value of 120 grams of CO$_2$e per mile.
Recognizing Non-Conventional GHG-Reducing Technologies

- Vehicle designs that lower GHGs by means other than directly reducing tailpipe CO$_2$ emissions are recognized, including:
  - technologies that reduce the impact of air conditioning system refrigerant leakage (e.g., hydrofluorocarbons)
  - technologies that improve the efficiency of air conditioning systems
  - innovative technologies that reduce GHG emissions under conditions that are not captured by conventional emission testing procedures

- Benefits of technologies are accounted for by subtracting their GHG-reducing impacts from the average CO$_2$ tailpipe emissions of a company’s fleet.
  - approach provides companies with additional flexibility in complying with the GHG emission standards
  - also provides an incentive to introduce these technologies by reducing a company’s fleet average GHG performance
  - approach to account for these technologies is different than in the U.S., but net credits/deficits in a given model year would be the same
Emission Credit System

- The Regulations include a system of emission credits to help meet overall environmental objectives in a manner that provides the regulated industry with compliance flexibility
  - credits are earned by companies doing better than the applicable fleet average standard for a given model year
  - deficits are incurred for not achieving the applicable fleet average standard in a given model year
  - credits are always linked to the model year in which they were generated and have a lifespan of five model years
  - credits can be exchanged from one compliance category to the other and can be traded between companies without limits
  - deficits incurred in a given model year must be offset with an equivalent number of credits within the subsequent three model years
  - any credits earned by a company in a model year must first be used to offset any existing deficit (i.e. balance can be banked for later use or trading)
Early Action Credits

• Companies could generate credits if their company’s fleet emissions for the 2008–2010 model years were better than the emission levels specified in the Regulations.

• Credits obtained over the 2008–2010 period could be used to comply with the 2011 model year fleet average GHG emission standards.

• Credits obtained over the 2009–2011 period can be used to comply with the fleet average GHG emission standards for the 2012 and later model years.
Temporary Alternative CO$_{2\text{eq}}$ Emission Standards for Smaller Companies

- A company with a combined total 60,000 passenger automobiles and light trucks in Canada in the 2009 model year has the option of subjecting a limited portion of their fleets to a fleet average standard that is 125% of the standard that would otherwise apply:
  - total number of passenger automobiles and light trucks that a company can include in the temporary fleets over the 2012-2015 model years is 15,000
  - a company that chooses this option is subject to restrictions on earning and using credits

- Additional compliance flexibilities for companies having between 750 and 7,500 vehicles in their fleets of the 2009 model year:
  - can apply the less stringent standards to a greater number of vehicles during the transition period (i.e., 30,000) and for an additional year (i.e., 2016)

- The fleet average GHG standards for the 2012 and later model years do not apply to companies with fleets of less than 750 vehicles in 2008 or 2009.
Canada’s Proposed GHG Regulations for 2017 and Later Model Year Vehicles

Proposed Regulations published in the Canada Gazette Part I on December 8, 2012
What are the key changes proposed for 2017 and beyond?

• As with the existing Regulations, each company would be required to comply with unique fleet-average emission standards based on the mix of vehicles it imports or manufactures in Canada
  – GHG target values would continue to be a function of the size of the vehicles (footprint) and the number of vehicles in the company’s fleets

• Emission standards would become more stringent on an annual basis over 2017-2025 period
  – Passenger automobiles: 5% reduction per year (2017 to 2025)
  – Light trucks: 3.5% reduction per year (2017 to 2021)
    5% reduction per year (2022 to 2025)

• The proposed Regulations continue to include provisions to:
  – create a regulatory incentive for companies to bring certain vehicles or vehicle technologies to market (i.e. advanced technology vehicles)
  – recognize improved A/C systems and innovative off-cycle technologies
  – provide additional compliance flexibility for smaller companies
GHG Reduction Benefits

• The existing and Proposed Regulations are projected to result in significant GHG reductions and fuel savings:

  – Over the lifetime operation of all 2017 to 2025 vehicles sold in Canada, the Proposed Regulations for model years 2017 and beyond are estimated to result in a cumulative GHG reduction of 162 Mt (66 billion liters of fuel savings)

  – The above reductions would be in addition to the estimated cumulative GHG reduction of 92Mt for the existing Regulations for model year 2011-2016 vehicles (28 billion liters of fuel savings)

• As a result of the Proposed Regulations for model years 2017 and beyond, it is projected that the average GHG emission performance of new vehicles of the 2025 model year will be about 50% lower than vehicles of the 2008 model year.
Other Notable Canadian Regulations

• Environment Canada has a series of other vehicle and engine emission regulations in place that align with those of the U.S. EPA:
  – GHG emission regulations for on-road heavy-duty vehicles and engines beginning with the 2014 model year
  – air pollutant emission regulations for a broad range of on-road and off-road vehicles and engines

• Environment Canada is developing proposed amendments to its regulations to align with U.S. “Tier 3” standards:
  – tighter air pollutant standards for cars light-trucks and some heavy-duty vehicles
  – lower limits for the sulphur content of gasoline
A Long History of Collaboration to Reduce Transportation Emissions

• The Canada-U.S. Air Quality Agreement (AQA) has resulted in a history of aligning air pollutant emission standards for vehicles and engines.

• In 1991, Canada and the U.S. signed the Canada–U.S. Air Quality Agreement (AQA) to address transboundary air pollution that leads to acid rain.

• In 2000, the Governments completed the Ozone Annex to the AQA to address air pollution that leads to the formation of ground-level ozone, a major component of smog.
  – the Annex included specific obligations towards alignment of regulatory standards for emissions from vehicles and engines

• More recently, the Canada-U.S. Regulatory Cooperation Council builds upon the existing collaborative framework under the U.S.-Canada AQA.
Why collaborate on vehicle and engines?

• U.S. and Canada have:
  – common policy objectives on reducing emissions from the transportation sector
  – similar performance monitoring and verification priorities
  – highly integrated transportation sectors

• A policy of regulatory alignment on vehicle emissions:
  – provides industry with long-term regulatory certainty
  – avoids inefficiencies from different regulations within the same N.A. market
  – provides substantial environmental and economic benefits while minimizing costs to industry and consumers

• Coordinated efforts on regulatory alignment, administration and compliance programs enable parties to:
  – make more effective use of resources and avoid duplication (e.g., joint technical work to support regulatory development, share data, minimize testing overlap)
  – act upon non-compliance in a more targeted and efficient way, given expanded scope of regulated products
  – increase the breadth/depth of monitoring and verification
  – minimize industry burden while improving regulatory oversight
Working Towards Global Harmonization

• International harmonization of technical regulations for vehicles presents important opportunities
  – promote the adoption of progressive standards for improved vehicle safety and environmental performance on a global scale
  – facilitate international trade

• Environment Canada is contributing to the development of new global technical emission regulations through its participation in the U.N. World Forum for Harmonization of Vehicle Regulations (WP29)
  – working closely with the U.S. EPA to bring a North American perspective to the global standards-setting process at the U.N. forum.

• In recent years, EC has also collaborated with CONUEE and ICCT on regulatory plans and analysis to support a common N.A. regulatory approach, with a focus on GHGs for heavy-duty vehicles.