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Heavy-duty Vehicle and Engine Greenhouse Gas Emission Regulations

Statutory authority

Canadian Environmental Protection Act, 1999

Sponsoring department

Department of the Environment

REGULATORY IMPACT ANALYSIS STATEMENT

(*This statement is not part of the Regulations*.)

Executive summary

Issue: As a result of human activities, predominantly the combustion of fossil fuels, the atmospheric concentrations of greenhouse gases (GHGs) have increased substantially since the onset of the industrial revolution. In view of the historical emissions of GHGs from anthropogenic sources, and the quantity of emissions expected in the near future, GHGs, as significant air pollutants, are expected to remain a key contributor to climate change.

Transportation is one of the largest sources of GHG emissions in Canada, accounting for about 28% of total emissions in 2009. Heavy-duty vehicles accounted for around 7% of total GHG emissions or 24% of transportation emissions. Accordingly, taking action to reduce emissions from new on-road heavy-duty vehicles is an essential element of the Government's strategy to reduce air pollutants and GHG emissions to protect the environment and the health of Canadians.

Description: The objective of the proposed *Heavy-duty Vehicle and Engine Greenhouse Gas Emission Regulations* (the proposed Regulations) is to reduce GHG emissions by establishing mandatory GHG emission standards for new on-road heavy-duty vehicles and engines that are aligned with U.S. national standards. The development of common North American standards will provide a level playing field that will lead North American manufacturers to produce more advanced vehicles, which enhances their competitiveness.

The proposed Regulations would 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. They would apply to the whole range of new on-road heavy-duty vehicles from full-size pickup trucks and vans to tractors and buses, as well as a wide variety of vocational vehicles such as freight, delivery, service, cement, and dump trucks. The proposed Regulations would also include provisions that establish compliance flexibilities which include a carbon dioxide (CO_2) emission credit system for generating, banking and trading emission credits. Flexibilities also include additional credits for hybrid vehicles and electric vehicles, as well as for innovative technologies to reduce GHG emissions. Companies would also be required to submit annual reports and maintain records relating to the GHG emission performance of their vehicles and fleets.

Cost-benefit statement: The proposed Regulations are estimated to result in a reduction of approximately 19.0 megatonnes (Mt) of carbon dioxide equivalent (CO_2e) in GHG emissions over the lifetime of vehicles produced in the model years 2014–2018 (MY2014–2018) cohort.

The present value of the cost of the proposed Regulations is estimated at $0.8 billion, largely due to the additional vehicle technology costs required by the proposed Regulations. The total benefits are estimated at $5.0 billion, due to the avoided social cost of carbon, and fuel savings ($4.5 billion). Over the lifetime of vehicles produced in MY2014–2018, the present value of the net benefit of the proposed Regulations is estimated at $4.2 billion.

Business and consumer impacts: Although owners and operators of heavy-duty vehicles would not be subject to the proposed Regulations, they are expected to face higher purchase prices for new heavy-duty vehicles. The technologies embodied in the vehicles in order to comply with the proposed Regulations would bring fuel savings that would outweigh the costs of these technologies. These available technologies were carefully selected to ensure broad industry support through the adoption of safe and currently available "off-the-shelf" technologies. The technology improvements will enhance the competitiveness of heavy-duty vehicles manufacturers; the increased fuel efficiencies of the vehicles are also expected to make the trucking industry more competitive. Despite their benefits, and while there will likely be some vehicle technology improvement, it is not expected that those technologies would be introduced to the same extent in the market place in the absence of regulations.

Domestic and international coordination and cooperation: Consultations were conducted with industry, provincial and territorial governments, other federal government departments and environmental non-governmental organizations (ENGOs). Environment Canada and Transport Canada co-hosted three consultation group meetings that included representatives from the above-mentioned stakeholders. Environment Canada also released two consultation documents. Comments received during consultation served to inform the development of the proposed Regulations. In addition, Environment Canada has conducted joint testing and research with the United States Environmental Protection Agency (U.S. EPA) to support the development of common standards.

Performance measurement and evaluation plan: The Performance Measurement and Evaluation Plan (PMEP) describes the desired outcomes of the proposed Regulations, such as GHG emissions reductions, and establishes indicators to measure and evaluate the performance of the proposed Regulations in achieving these outcomes. The measurement and evaluation will be tracked on a yearly basis, with a five-year compilation assessment, and will be based on the information and data submitted in accordance with the reporting requirements and records of the companies.

1. Issue

As a result of human activities, predominantly the combustion of fossil fuels, the atmospheric concentrations of greenhouse gases (GHGs) have increased substantially since the onset of the industrial revolution. In view of the historical emissions of GHGs from anthropogenic sources, and the quantity of emissions expected in the near future, GHGs are expected to remain a key contributor to climate change.

Across Canada we are witnessing the negative impacts of a changing climate first-hand. For example, a warming climate has been linked to the melting of permafrost in the north that has destabilized the foundations of homes and schools. While the specific impacts vary by region, all of Canada's provinces and territories are experiencing the effects of a changing climate. (see footnote 1)

While Canada accounts for just 2% of global GHG emissions, its per capita emissions are among the highest in the world and continue to increase. In 2009, GHG emissions in Canada totalled 690 megatonnes (Mt) as shown in Table 1 below:

Table 1: Canada's GHG emissions

Source (Mt)	**2005**	**2009**
Total	731	690
Transportation	193	190
Heavy-duty vehicles	44	45

Source: National Inventory report: 1990–2009

As this table indicates, the transportation sector (air, marine, rail, road and other modes) is a significant source of GHG emissions in Canada, accounting for 28% of total emissions in 2009. Within this sector, heavy-duty vehicles account for nearly 24% of GHG emissions, or approximately 7% of total emissions in Canada. (see footnote 2) Emissions in the overall transportation sector fell by about 3 Mt from 2005 to 2009, although heavy-duty vehicle emissions rose by about 1 Mt.

Accordingly, taking action to reduce GHG emissions from new on-road heavy-duty vehicles and their engines is an essential element of the Government of Canada's strategy to reduce GHG emissions to protect the environment and the health of Canadians. Carbon dioxide (CO_2) is the predominant GHG emitted by motor vehicles and is directly related to the amount of fuel that is consumed by vehicles. Vehicles also emit other GHGs, including tailpipe emissions of methane (CH_4) and nitrous oxide (N_2O), and hydrofluorocarbons (HFCs) through the leakage of air conditioning system refrigerant, gases which all have higher global warming potential than CO_2. Reductions of those emissions are not related to or do not significantly contribute to fuel savings.

2. Objectives

2.1. GHG reductions

The Government of Canada is committed to reducing Canada's total GHG emissions to 17% below its 2005 levels by 2020 (i.e. from 731 to 607 Mt) — a target that is identified in the Copenhagen Accord and the Cancun Agreements. By establishing mandatory GHG emission standards for new on-road heavy-duty vehicles and engines beginning in 2014, Canada will move closer to its Copenhagen 2020 target.

The implementation of a comprehensive set of national standards reflecting a common North American approach for regulating GHG emissions from new on-road heavy-duty vehicles and engines would lead to environmental improvements for Canadians and provide regulatory certainty for Canadian manufacturers. Aligning Canadian standards with new U.S. regulations would also set a North American level playing field in the transportation sector.

The proposed Regulations will require manufacturers selling heavy-duty vehicles and engines in Canada to deploy emission reduction technologies, which will benefit both the environment and Canadians.

2.2. Regulatory burden

The proposed Regulations are designed to achieve the objectives above while minimizing the regulatory compliance burden of regulated Canadian industries through the alignment of heavy-duty vehicle regulations in Canada and in the United States. The reporting requirements were designed to assess the performance of the proposed Regulations against the targets established in the Performance Measurement and Evaluation Plan (see section 15) while minimizing the reporting burden of industry. The proposed Regulations would also allow regulatees to use the same GHG emissions model (GEM) as regulatees in the United States will use. This GEM is an accurate and cost-effective tool to assess compliance in either country.

3. Description

3.1. Key elements of the proposed Regulations

The proposed Regulations would introduce progressively more stringent GHG emission standards for new on-road heavy-duty vehicles and engines that would align with the national GHG emission standards and test procedures of the United States Environmental Protection Agency (U.S. EPA) for the 2014 model year and subsequent model years. The proposed Regulations would apply to companies manufacturing and importing new on-road heavy-duty vehicles and engines for the purpose of sale in Canada.

3.2. Prescribed regulatory classes

The proposed Regulations would reduce greenhouse gas emissions from the whole range of new on-road heavy-duty vehicles, from full-size pickup trucks and vans to tractors, from a wide variety of vocational vehicles such as school, transit and intercity buses to freight, delivery, service, cement, garbage and dump trucks.

The new Regulations would be aimed at all on-road vehicles with a gross vehicle weight rating of more than 3 856 kg (8 500 lb.), except those vehicles that are subject to the *Passenger Automobile and Light Truck Greenhouse Gas Emission Regulations*. Trailers would not be subject to the proposed Regulations.

The proposed Regulations would recognize the utility of vehicles and introduce GHG emission standards that would apply to the three prescribed regulatory classes of heavy-duty vehicles. Under the proposed Regulations, the full-size pickup trucks and vans would be regulated as "Class 2B and Class 3 heavy-duty vehicles," and combination tractors as "tractors." All other heavy-duty vehicles not covered by the two previously mentioned prescribed regulatory classes would be regulated as "vocational vehicles," which include buses. Furthermore, the proposed Regulations would establish a prescribed regulatory class for heavy-duty engines designed to be used in a vocational vehicle or a tractor.

3.3. Emission standards for CO_2, N_2O and CH_4

The standards in the proposed Regulations would address emissions of CO_2, N_2O and CH_4 from heavy-duty vehicles and engines. The proposed Regulations would also include measures to require reductions in leakage of the hydrofluorocarbon refrigerant used in cabin air-conditioning systems.

For Class 2B and Class 3 heavy-duty vehicles, the proposed Regulations would include emission standards for CO_2, N_2O and CH_4. In regards to CO_2 emissions, the standard would be a fleet average CO_2 emission standard for all vehicles of a company's fleet.

In regard to vocational vehicles and tractors, the proposed Regulations would include heavy-duty engine standards for CO_2, N_2O and CH_4, and also separate vehicle standards for CO_2.

The proposed standards are structured not to constrain the size and power of heavy-duty vehicles, recognizing that these vehicles are designed to perform work. The proposed standards would be expressed in grams per unit of work, therefore allowing a more powerful vehicle to proportionally emit more GHGs than a less powerful vehicle.

3.4. Compliance assessment and computer simulation model

For standards applicable to Class 2B and Class 3 heavy-duty vehicles, regulatees would measure the vehicle performance using prescribed test cycles on a chassis dynamometer, similarly to existing procedures for light-duty vehicles under the current *Passenger Automobile and Light Truck Greenhouse Gas Emission Regulations*.

The performance of engines installed on vocational vehicles and tractors would be measured using prescribed test cycles on an engine dynamometer, i.e. the same ones used to measure criteria air contaminants under the *On-Road Vehicle and Engine Emission Regulations*.

Compliance with the vehicle standards for vocational vehicles and tractors would be assessed using a computer simulation model. This model is readily available at no charge and would assess the emission reductions of a vehicle equipped with one or more non-engine-related technologies, such as aerodynamic fairings, low rolling resistance tires, a speed limiter, weight reduction technologies, and idle reduction technology. The simulation model will also assign to vehicles a pre-determined payload and engine size. As a result, Canadian manufacturers will not be disadvantaged compared to U.S. manufacturers due to the higher average payloads in Canada.

3.5. CO_2 emission credit system

The proposed Regulations would include a system of emission credits to help meet overall environmental objectives in a manner that provides the regulated industry with compliance flexibility. The CO_2 emission credit system would allow companies to generate, bank and trade emission credits. Under this system, companies would be allowed to manufacture or import vehicles and engines with emission levels worse than the applicable emission standard, and others performing better than the standard, provided that their average fleet emission level does not exceed the applicable emission standard.

Credits would be obtained by companies whose average fleet emission levels fall below the applicable standard, while deficits would be incurred by companies whose fleet emissions exceed the applicable standard. Credits may be applied by a company to offset a past deficit for up to three model years prior to the year in which the credits were earned, or may be banked to offset a future deficit for up to five model years after the year in which the credits were obtained. Credits may also be transferred to another company. A company would calculate emission credits and deficits in units of megagrams of CO_2, for each of its heavy-duty vehicle or engine fleets and averaging sets of a given model year.

3.6. Additional emission credits

The proposed Regulations would allow companies that incorporate certain technologies that provide improvements in reducing CO_2e emissions to be eligible for additional emission credits when participating in the credit system.

Companies that manufacture or import, prior to the coming into force of the applicable standards, heavy-duty vehicles or engines that have emissions that are below the proposed required emissions standards would also have the possibility to generate early action credits.

The methods to calculate the additional credits would be aligned with those of the United States. A company would not be allowed to obtain additional credits more than once for the same type of GHG emission reduction technology.

3.7. Annual reporting requirements

Beginning with the 2014 model year, companies would be required to submit to the Minister an annual preliminary report for their Class 2B and Class 3 heavy-duty vehicles and an annual end of year model report for all their heavy-duty vehicles and engines.

The report would include, for each type of vehicle or engine of a prescribed regulatory class, all necessary information for the calculation of the company’s credits or deficits. This would include,

amongst others, information such as the applicable emission standards, emission values or rates, and family emission limits.

3.8. Other administrative provisions

Several administrative provisions would be aligned with those under existing related regulations under the *Canadian Environmental Protection Act, 1999* (CEPA 1999), including provisions respecting the national emissions mark, maintenance and submission of records, the cost for test vehicles, application for exemptions and notices of defect. The proposed Regulations would introduce requirements for vocational vehicles and tractors manufactured in stages, in line with similar requirements of the *Motor Vehicle Safety Regulations* under the *Motor Vehicle Safety Act*, governed by Transport Canada.

4. Sector profile

4.1. Heavy-duty vehicle manufacturing and importing

The proposed Regulations have divided these vehicles into three different categories: Class 2B and Class 3 heavy-duty vehicles (full-size pick-up trucks and vans), vocational vehicles, and tractors. Heavy-duty vehicles have a gross vehicle weight rating (GVWR) greater than 3 856 kg (8 500 lb.) and span several GVWR classes: tractors (often called combination tractors) are contained mainly within classes 7 and 8, and vocational vehicles span from class 2B through class 8. Vocational vehicles also comprise a range of vehicle types, including various types of buses.

There are currently only two Canadian manufacturers of heavy-duty trucks, Hino and Paccar, which produce approximately 6 400 vehicles annually that are primarily exported to the United States. There is little to no manufacturing of heavy-duty engines in Canada. There are some Canadian body manufacturers that produce finished vocational vehicles. Canadian bus manufacturers hold an important share of the North American market. Notably, MCI in Manitoba and Prevost in Quebec produce intercity buses; New Flyer, Nova Bus, and Orion produce transit buses; and Girardin Minibus produces school buses and smaller buses. All of these manufacturers sell in both American and Canadian markets.

4.2. Statistics of manufacturing and trade

The Canadian industry, classified in national statistics as Heavy-duty Truck Manufacturing in the North American Industry Classification System (NAICS 33612), includes producers of complete heavy-duty vehicles and chassis, which are either tractors or vocational vehicles under the proposed Regulations. Output of the industry has fallen sharply in the recent recession: from 11 321 vehicles in 2009 to 5 630 in 2010. (see footnote 3) Most of the vehicles produced are exported to the United States: over 90% in 2009, and about 80% in 2010. The decline in output reflects a reduction in total vehicles purchased in the United States in consequence of reduced economic activity. The industry defined as Motor Vehicle Body Manufacturing (NAICS 336211) included 197 Canadian establishments producing vocational vehicles in 2009.

In 2009, these two heavy-duty vehicle manufacturing industries together generated approximately $3.6 billion in gross revenue and $1.2 billion in gross domestic product; and employed over 10 500 workers. Of total revenue, some $2.1 billion was from exports, including $2.0 billion from the United States. Imports of heavy-duty vehicles and engines totalled $3.3 billion in the same year, of which $2.8 billion was from the United States. (see footnote 4)

4.3. Truck carriers

In 2009, there were some 750 000 heavy-duty trucks of GVWR over 4 536 kg in operation in Canada (Canadian Vehicle Survey, 2009). There were approximately 435 000 medium heavy-duty trucks below 14 970 kg GVWR and 314 000 heavier heavy-duty trucks. The medium heavy-duty truck usage was 8.2 billion vehicle-kilometres, an average of 18 900 km per truck, while the heavy heavy-duty truck usage totalled 21.2 billion vehicle-kilometres, an average of 67 500 km per vehicle. There were 194 000 trucks described as "for-hire," only 26% of the total fleet, but responsible for 46% of total vehicle-kilometres. A further 128 000 trucks were owned by owner-

operators, responsible for 21% of total vehicle-kilometres. Such trucks are usually contracted to a larger carrier or company. Some 319 000 vehicles were used in "private trucking," the term used to describe trucks that are not for hire, but are used to carry the owners' goods, including trucks owned by major manufacturers and retailers to transport the goods they own, and also trucks owned by farmers or tradesmen, for example. Such trucks were 43% of the fleet, but were used for only 23% of total vehicle-kilometres, at an average of only 21 000 km per vehicle.

Table 2: Heavy-duty truck use in Canada in 2009

Ownership/ Use	**Vehicles (thousands)**				**Vehicle-kilometres (billions)**			
	Medium	Heavy	Total	Proportion	Medium	Heavy	Total	Proportion
For-hire	51.8	142.5	194.3	0.259	1.1	12.6	13.7	0.464
Owner-operator	63.3	64.2	127.6	0.170	1.8	4.5	6.3	0.221
Private	240.0	79.0	319.0	0.426	3.9	2.7	6.7	0.227
Other	79.5	28.5	108.0	0.144	1.4	1.4	2.8	0.095
Total	434.6	314.2	748.8	1.000	8.2	21.2	29.5	1.000

Ownership/ Use	**Kilometre/vehicle**		
	Medium	Heavy	Total
For-hire	22 236	88 421	70 510
Owner-operator	28 436	70 093	49 373
Private	19 250	34 177	21 003
Other	17 610	49 123	25 926
Total	18 868	67 473	39 391

Source: Canadian Vehicle Survey, 2009, Statistics Canada

4.4. Trade by transport mode

Table 3 shows preliminary 2010 values of Canada's merchandise trade with the United States and Mexico, combining imports and exports. Trucking is responsible for the largest proportion of North American merchandise trade by value — 57% in 2010.

Table 3: Total North American merchandise trade by transport mode

Mode	**Trade 2010** (millions of U.S. dollars)
Road	298,832
Rail	87,151
Pipeline and other	71,652
Air	29,267
Marine	27,305
Total	514,208

Source: North American Transportation Statistics Database

In 2008, employment in the for-hire trucking industry in Canada was estimated at 415 000. It included 182 000 full- and part-time employees of the medium and large for-hire carriers with annual operating revenues of $1 million or more; 26 000 employees of small for-hire carriers with annual operating revenues between $30,000 and $1 million; 104 000 owner-operators with annual operating revenues of $30,000 or more; and 103 000 delivery drivers. Of this total for-hire trucking employment, 36% was in Ontario, 20% in Quebec and 27% in the Prairie provinces, with smaller proportions in the other provinces and territories.

4.5. Bus carriers

Bus carrier companies operate in several sub-markets or sub-industries. A total of 1 371 companies earned service revenues of $6.4 billion, and received an additional $7.2 billion in Government contributions, primarily for urban transit services. Urban transit services earned 53% of total industry revenues excluding those contributions, and school bus services earned another 23%. Scheduled intercity, charter and shuttle services together earned 16% of total revenues.

5. Background on policy development

5.1. National context

In 2009, the Government of Canada committed in the Copenhagen Accord and the Cancun Agreements to reducing, by 2020, total GHG emissions by 17% from 2005 levels, a target that is aligned with that of the United States. An important step toward meeting that goal included the 2010 publication in the *Canada Gazette*, Part Ⅱ, of the *Passenger Automobile and Light Truck Greenhouse Gas Emission Regulations* that are aligned with those of the United States.

On May 21, 2010, the Government of Canada and the Government of the United States each announced the development of new regulations to limit GHG emissions from new on-road heavy-duty vehicles. Canada announced that the proposed Regulations would be made under CEPA 1999

and in alignment with those of the United States. On October 25, 2010, the Government of Canada released an initial consultation document describing the key elements being considered in the development of Canadian regulations to seek stakeholder views early in the process.

On August 9, 2011, Environment Canada published a second and more detailed consultation document to provide an additional opportunity for stakeholders to provide comments and to participate in the regulatory development process.

5.2. Canada's collaboration with the U.S. EPA

Environment Canada, in partnership with Canada's National Research Council, has conducted joint aerodynamic testing and research with the U.S. EPA as well as heavy-duty vehicle emissions testing at Environment Canada facilities to support regulatory development. This collaboration is taking place under the Canada-U.S. Air Quality Committee and builds on the joint work with the United States on the development and implementation of GHG emission standards for vehicles. This collaboration served to inform the development of the proposed Regulations in Canada.

5.3. Actions in other Canadian jurisdictions

Provinces and territories have not indicated any intention to regulate GHG emissions from new on-road heavy-duty vehicles. Furthermore, provincial environment ministries have communicated strong support for federal Canadian regulations aligned with those of the United Stated.

The provincial and territorial governments set requirements for in-use vehicles including tractor-trailer weights and trailer dimensions. All provinces will continue to be consulted to ensure a consistent pan-Canadian approach to regulating on-road heavy-duty vehicle emissions.

5.4. Actions in international jurisdictions

5.4.1. United States

On November 30, 2010, the National Highway Traffic Safety Administration (NHTSA) and the U.S. EPA jointly published a Proposed Rule describing a set of complementary new proposed regulations for heavy-duty vehicles and engines for model years 2014 and later. On September 15, 2011, the Final Rule was published in the U.S. *Federal Register*. The U.S. rules establish coordinated federal regulations to address the closely intertwined issues of energy efficiency and climate change under a joint Heavy-Duty National Program. In this joint rulemaking, the NHTSA implements fuel economy standards under the *Energy Independence and Security Actof 2007*, while the U.S. EPA regulations under the *Clean Air Act* implement the GHG emission standards for heavy-duty vehicles.

The U.S. National Program is based on a common set of principles, which includes, as stated in the Final Rule: (see footnote 5) "increased use of existing technologies to achieve significant GHG emissions and fuel consumption reductions; a program that starts in 2014 and is fully phased in by 2018; a program that works towards harmonization of methods for determining a vehicle's GHG and fuel efficiency, recognizing the global nature of the issues and the industry; standards that recognize the commercial needs of the trucking industry; and incentives leading to the early introduction of advanced technologies."

In 2004, the U.S. EPA launched SmartWay, a voluntary program that encourages the trucking sector to identify strategies and technologies for reducing fuel consumption and CO_2e emissions and allows companies to be SmartWay certified.

The SmartWay program has allowed the U.S. EPA to work closely with heavy-duty vehicle manufacturers and fleet operators in evaluating numerous technologies and developing test procedures that achieve fuel and CO_2e reductions. The experience and knowledge acquired with SmartWay served in developing the Heavy-Duty National Program of the GHG regulations of the United States.

5.4.2. California

The California Air Resources Board adopted a GHG emission regulation for heavy-duty vehicles in 2008. This regulation is to reduce GHG by improving the fuel efficiency of heavy-duty vehicles through aerodynamic enhancement of vehicles and the use of low rolling resistance tires. This regulation covers tractors that pull a 53-foot or longer box-type semi-trailer, as well as covering the trailers themselves, and applies to the users of these tractor-trailer vehicles.

Since January 1, 2010, 2011 and later model year sleeper-cab heavy-duty tractors pulling a 53-foot or longer box-type trailer operating on a highway within California must be U.S. EPA Certified SmartWay, which requires certified aerodynamic equipment and low rolling resistance tires. As for day-cab tractors, the regulation requires that they be equipped with SmartWay verified low rolling resistance tires. The California regulation also requires that existing tractors, mainly all 2010 model year and older sleeper-cab and day-cab tractors, be equipped with SmartWay verified low rolling resistance tires starting in January 2012. The regulation also includes similar requirements for 53-foot or longer box-type trailers.

5.4.3. Other international regulatory actions to reduce GHGs/fuel consumption of vehicles

Other international jurisdictions have established or are developing regulatory regimes that directly or indirectly serve to reduce GHG emissions from new heavy-duty vehicles.

Japan has implemented the Top-Runner Program, which identifies and designates as the "top-runner" the most fuel-efficient vehicle in each weight range. The program has the objective to improve the fleet average fuel-efficiency of all vehicles in a particular weight range to match that of its top-runner. In the case of heavy-duty vehicles, the most fuel-efficient vehicle of model year 2002 (excluding hybrids) was set as the baseline and regulation would start with model year 2015.

The European Commission is currently developing a new certification procedure and a strategy targeting fuel consumption and CO_2e emissions from heavy-duty vehicles. Simulation modelling is being considered. A draft regulation is expected to be completed during 2012. It is expected that mandatory reporting would be effective in 2013–2014 and that possible regulation would be in a 2018–2020 timeframe.

6. Regulatory and non-regulatory options considered

6.1. Status quo approach

Currently, there is no federal requirement in Canada to reduce GHG emissions from new on-road heavy-duty vehicles. Heavy-duty vehicles are an important contributor to overall emissions and reducing GHGs from these vehicles is a key element in meeting the Government's climate change goals. Maintaining the status quo would make it more difficult for Canada to achieve this goal, while preventing Canadians from benefiting from the associated environmental improvements. Therefore, for the Government of Canada, maintaining the status quo is not an appropriate option for reducing GHG emissions from new heavy-duty vehicles in Canada.

6.2. Voluntary approach

New regulations in the United States will require manufacturers to adopt more GHG-reducing technologies in new heavy-duty vehicles sold in the United States beginning in 2014. However, because of the highly customized nature of the heavy-duty vehicle industry, manufacturers may choose not to install those technologies in vehicles sold in Canada. Therefore, while a voluntary program can result in some emission reductions, it would not necessarily amount to the same emission reductions as a regulatory regime.

6.3. Regulatory approach

Given the importance of addressing climate change, most industrialized countries are moving to establish regulated requirements for the control of fuel consumption and/or GHG reductions from new vehicles. The implementation of a comprehensive set of national standards reflecting a common North American approach for regulating GHG emissions from new on-road heavy-duty vehicles and engines would lead to environmental improvements for Canadians, and provide

regulatory certainty for Canadian manufacturers. Aligning Canadian standards with U.S. standards would also set a North American level playing field in the transportation sector.

6.3.1. Regulations under the *Motor Vehicle Fuel Consumption Standards Act*

The Government of Canada has previously considered reducing GHG emissions through the adoption of vehicle fuel consumption standards under the *Motor Vehicle Fuel Consumption Standards Act* (MVFCSA). When the *Passenger Automobile and Light Truck Greenhouse Gas Emission Regulations* were developed in 2010, it was determined that significant amendments were required to the MVFCSA in order to be able to put in place regulations that would align with the U.S. fuel economy standards. Therefore, the approach of proceeding with Canadian fuel consumption regulations under the MVFCSA was then excluded in favour of regulating under CEPA 1999.

6.3.2. Regulations under CEPA 1999

CEPA 1999 enables the implementation of innovative compliance flexibilities such as a system for the banking and trading of emission credits to help meet overall environmental objectives in a manner that provides the regulated industry with maximum compliance flexibility.

This approach is also consistent with the existing use of CEPA 1999 to establish standards limiting smog-forming air pollutant emissions from new vehicles and engines, as well as to regulate GHG emissions from light-duty vehicles under the *Passenger Automobile and Light Truck Greenhouse Gas Emission Regulations*.

The Government of Canada has determined that establishing regulated heavy-duty vehicle GHG emission standards under CEPA 1999 represents the best option to introduce these proposed Regulations and to align Canada's requirements with the national regulated standards of the United States.

7. Benefits and costs

The proposed Regulations are estimated to result in a reduction of approximately 19.0 Mt of CO_2e in GHG emissions over the lifetime of new on-road heavy-duty vehicles sold between 2014 and 2018 (MY2014–2018), the period during which the proposed Regulations first come into effect (2014) and then are gradually phased into full effect (2015 to 2018). The proposed Regulations are also expected to reduce fuel consumption by 7.2 billion litres over the lifetime of the MY2014–2018 fleet.

Over the lifetime of MY2014–2018 vehicles, the present value of the cost of the proposed Regulations is estimated at $0.8 billion, largely due to the additional vehicle technology costs required by the proposed Regulations. The total benefits are estimated at $5.0 billion, due to the value of GHG reductions ($0.5 billion) and fuel savings ($4.5 billion). Over the lifetime of MY2014–2018 vehicles, the present value of the net benefit of the proposed Regulations is estimated at $4.2 billion. The detailed analysis of benefits and costs is presented below.

7.1. Analytical framework

The approach to cost-benefit analysis identifies, quantifies and monetizes, to the extent possible, the incremental costs and benefits of the proposed Regulations. The cost-benefit analysis framework applied to this study incorporates the following elements:

Incremental impacts: Impacts due to the proposed Regulations are analyzed in terms of changes to vehicle technologies, emissions, and associated costs and benefits in the regulatory scenario compared to the business-as-usual (BAU) scenario. The two scenarios are presented in detail below. The incremental impacts are the differences between the estimated levels of technologies and emissions in the two scenarios, and the differences between the associated costs and benefits in the two scenarios. These differences (incremental impacts) are thus attributed to the proposed Regulations.

Timeframe: The analysis considers new heavy-duty vehicles sold between 2014 and 2018 (MY2014–2018), the period during which the proposed Regulations first come into effect (2014) and then are gradually phased into full effect (2015 to 2018). The analysis assumes that new vehicles survive for up to 30 years. This timeframe is consistent with other analyses, and with Canadian data that shows that few vehicles survive beyond 30 years. Thus the overall timeframe for the analysis is 35 years (2014 to 2048), the total lifespan of the MY2014–2018 new vehicle fleet. The impact of vehicles sold after 2018 is not considered in this analysis, but is expected to be similar to the impact for MY2018.

Costs and benefits have been estimated in monetary terms to the extent possible and are expressed in 2010 Canadian dollars. Whenever this was not possible, due either to lack of appropriate data or difficulties in valuing certain components, incremental impacts were evaluated in qualitative terms. Table 4 summarizes the benefits and costs which were evaluated quantitatively.

Table 4: Monetized benefits and costs

Benefits	**Costs**
Pre-tax fuel savings Avoided GHG damages	Technology costs Noise, accidents, congestion Government administration

Discount rate: A social discount rate of 3% is used in the analysis for estimating the present value (2011 base year) of the costs and benefits under the central analysis. This level is within the range prescribed by the Treasury Board Secretariat's cost-benefit analysis (CBA) guidelines. This is consistent with discount rates used for other GHG related measures in Canada, as well as those used by the U.S. EPA.

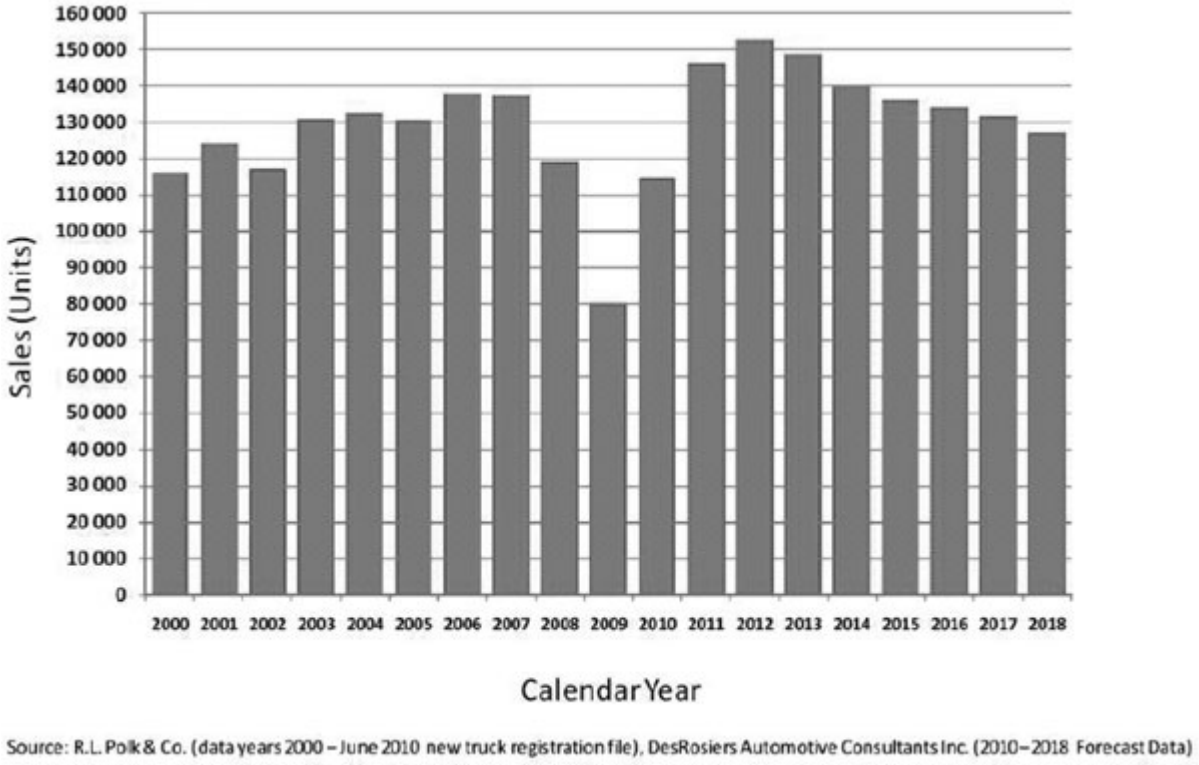
7.2. Key data and information

To assess the impact of the proposed Regulations, it was necessary to obtain Canadian estimates of future vehicle sales, fuel prices and monetary values for GHG reductions; to identify the technologies that manufacturers would likely adopt, and the costs they would incur in order to comply with the proposed Regulations; and then to model future vehicle emissions, fuel consumption and distance travelled, with and without the proposed Regulations. These key sources of data and information are described below.

7.2.1. Canadian sales forecast

For years 2011 through 2018, a vehicle sales forecast from DesRosiers Automotive Consultants (DAC) was used in the analysis. For the purpose of this study, all historical (calendar year 2005 through year-to-date June 2010) medium and heavy-duty vehicle data was provided by R. L. Polk (Polk). Using the Polk data file, DAC developed aggregate medium and heavy-duty historical registration data and forecast data using proprietary DAC forecasting methodologies and input from industry representatives. This study required an in-depth review of core Canadian economic variables. A database containing historical and forecast economic factors from calendar year 2000 through 2018 was provided by Environment Canada's Energy-Economy-Environment Model for Canada (E3MC) in March of 2011. DAC also considered provincial economic forecast data from Informetrica Limited (March 14, 2011), BMO Capital Markets Economics (March 14, 2011) and TD Economics (March 2011). The overall results of the DAC sales report are displayed below, with historical trends shown from 2000 to 2010, and projected trends shown from 2011 to 2018, based on DAC analysis and forecasts:

Figure 1: Sales forecast for Canadian medium and heavy-duty vehicles



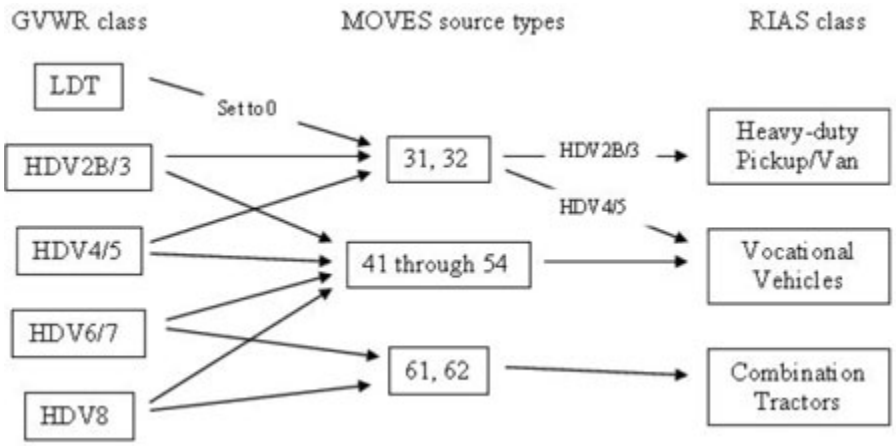
Source: R.L. Polk & Co. (data years 2000 – June 2010 new truck registration file), DesRosiers Automotive Consultants Inc. (2010–2018 Forecast Data)

The analysis of the proposed Regulations incorporates the same detailed DAC sales estimates, for each vehicle regulatory class, into the modelling of vehicle population growth from 2010 to 2018 for both the BAU and policy scenarios. DAC estimated total sales per calendar year, which are used as a proxy for model year sales in this analysis.

7.2.2. Canadian vehicle emissions modelling

Estimates of Canadian vehicle emissions were developed using methods aligned with those initially developed by the U.S. EPA, together with key Canadian data to reflect the impact of the proposed Regulations. The emissions selected were those linked to climate change, air quality and human health, such as greenhouse gases (GHGs) and criteria air contaminants (CACs). The primary modelling tool used to calculate vehicle emissions was the Motor Vehicle Emissions Simulator (MOVES), which is the U.S. EPA's official mobile source emission inventory model for heavy-duty vehicles. Key data for Canadian heavy-duty vehicle populations and distance travelled were then incorporated into the most current version of MOVES (MOVES2010a) in order to produce an analysis for Canada of the impacts of the proposed Regulations. Vehicle data collected by gross vehicle weight rating (GVWR) was mapped into MOVES2010a and then categorized according to the vehicle classifications in the proposed Regulations, as described in this RIAS and as shown in figure 2.

Figure 2: GVWR, MOVES and RIAS classes for this analysis



Canadian vehicle populations were estimated for all calendar years 2005 through 2050. For the purposes of this analysis, data purchased from Polk and Co. on the heavy-duty fleet in Canada for calendar years 2005 through 2010, were used by Environment Canada to develop vehicle population and age estimates for those years. After 2010, future vehicle populations are forecasted based on new vehicle sales and the number, age and estimated survival rates of existing vehicles. For years 2011 through to 2018, the DesRosiers sales forecast were used, as discussed above. For years 2019 and beyond, the default MOVES sales rates were used in the absence of Canada specific sales rates beyond 2018. Comprehensive validated survival estimates for Canadian heavy-duty vehicles were not available for this analysis. Instead, MOVES default vehicle survival rate estimates were generally used. These MOVES survival rate estimates appear similar to available Canadian data for vehicles less than 30 years old, but appear to underestimate survival for Canadian vehicles aged 30 years or more. Therefore, an adjustment was made in MOVES for the survival rate of vehicles aged 30 years or more, to make this rate more consistent with available Canadian data.

Along with vehicle populations, vehicle distance travelled is also important in overall emissions estimation for Canada. Estimates of Canadian vehicle kilometres travelled (VKT) and kilometre accumulation rates (KAR) were developed for all calendar years from 2005 through 2050. KAR is the product of VKT divided by the number of vehicles (the population). In 2010, Environment Canada contracted Stewart-Brown Associates (SBA) to generate KARs from inspection and maintenance (I/M) program data in Canada. Specifically, this was the Drive Clean program in Ontario, and the AirCare program in British Columbia. KARs generated in this manner from Ontario and British Columbia were then applied to Canada as a whole. This baseline Canadian KAR data was used to generate Canadian VKT estimates for each vehicle type and age, for all calendar years 2005 through 2010. Then the default MOVES growth rates were used to estimate VKT for the Canadian fleet for the calendar years 2011 to 2050.

7.2.3. The social cost of carbon (SCC)

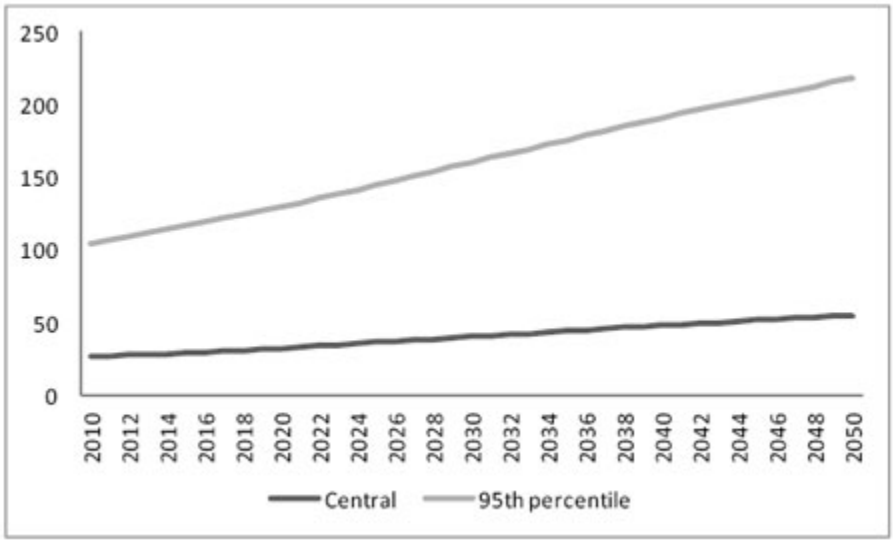
The estimated value of avoided damages from GHG reductions is based on the climate change damages avoided at the global level. These damages are usually referred to as the social cost of carbon (SCC). Estimates of the SCC between and within countries vary widely due to challenges in predicting future emissions, climate change, damages and determining the appropriate weight to place on future costs relative to near-term costs (discount rate).

Social cost of carbon values used in this assessment draw on ongoing work being undertaken by Environment Canada (see footnote 6) in collaboration with an interdepartmental federal government technical committee, and in consultation with a number of external academic experts. This work involves reviewing existing literature and other countries' approaches to valuing greenhouse gas emissions. Preliminary recommendations, based on current literature and, in line with the approach adopted by the U.S. Interagency Working Group on the Social Cost of Carbon, (see footnote 7) are that it is reasonable to estimate SCC values at $26/tonne of CO_2 in 2010, increasing at a given percentage each year associated with the expected growth in damages. (see

footnote 8) Environment Canada's review also concludes that a value of $104/tonne in 2010 should be considered, reflecting arguments raised by Weitzman (2011) (see footnote 9) and Pindyck (2011) (see footnote 10) regarding the treatment of right-skewed probability distributions of the SCC in cost-benefit analyses. (see footnote 11) Their argument calls for full consideration of low probability, high-cost climate damage scenarios in cost-benefit analyses to more accurately reflect risk. A value of $104 per tonne does not, however, reflect the extreme end of SCC estimates, as some studies have produced values exceeding $1,000 per tonne of carbon emitted.

The interdepartmental working group on SCC also concluded that it is necessary to continually review the above estimates in order to incorporate advances in physical sciences, economic literature, and modelling to ensure the SCC estimates remain current. Environment Canada will continue to collaborate with the federal technical committee and outside experts to review and incorporate as appropriate new research on SCC into the future.

Figure 3: SCC estimates (2010 CAN$/tonne)

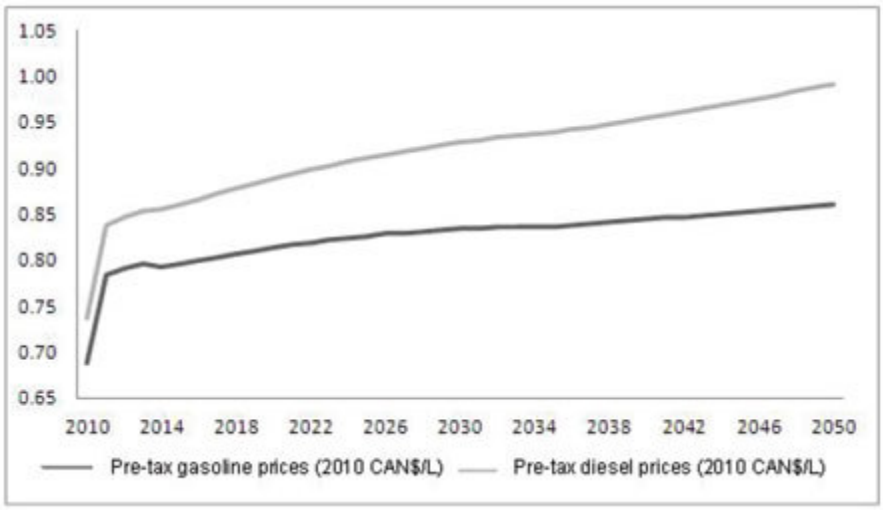


7.2.4. Fuel prices

Fuel price forecasts for both gasoline and diesel were adopted from Environment Canada's E3MC model for the period of 2010 to 2035. The E3MC model is an end-use model that incorporates the National Energy Board's (NEB) forecast for West Texas Intermediate crude oil price as reported in the NEB's *Energy Supply and Demand Projections to 2035 — Market Energy Assessment*. (see footnote 12) The E3MC model uses this data to generate fuel price forecasts which are primarily based on consumer-choice modelling and historical relationships between macroeconomic and fuel price variables. Fuel prices beyond 2035 were projected based on the E3MC model average growth rate of fuel prices for the years 2020 to 2035. Uncertainty regarding these future fuel price forecasts was also considered in a sensitivity analysis.

Pre-tax fuel prices were used in the analysis as taxes are not generally considered in cost-benefit analyses given that they are a transfer rather than an economic cost. Post-tax gasoline and diesel price forecasts were used in a separate payback analysis. Due to regional variations in fuel taxes, post-tax fuel prices were calculated by weighting fuel sales by regional populations and then adding regional taxes accordingly.

Figure 4: Gas and diesel prices (2010 CAN$/L)



7.2.5. Vehicle technologies that reduce GHG emissions

Information on vehicle technologies, costs and adoption rates was obtained from the U.S. EPA's regulatory impact analysis of its *Final Rulemaking to Establish Greenhouse Gas Emission Standards for Medium- and Heavy-Duty Engines and Vehicles*. (see footnote 13)

The technologies considered in this analysis are those most likely to be adopted during the period of the analysis (MY2014–2018) in response to the proposed Regulations, having been developed and being available to some extent already, and already shown by the U.S. EPA to be cost-effective. Table 5 below presents a list of technologies that manufacturers are likely to choose in order to comply with the proposed Regulations.

Table 5: Potential key technologies

Combination trucks	Engine improvements, more use of low rolling resistance tires, mass reduction, improved aerodynamics, increased use of auxiliary power units, reduced air conditioning leakage
Vocational vehicles	Engine improvements, more use of low rolling resistance tires
Heavy-duty pick-ups and trucks	Engine improvements, more use of low rolling resistance tires, mass reduction, improved transmissions, reduced accessory loads

7.2.6. Key assumptions

- Under the business-as-usual scenario, technology choices for MY2014–2018 remain the same as for MY2010. This assumption is further discussed in section 7.3.1 and in the "Rationale" section, and is evaluated in the "Sensitivity analysis" section.
- Under the policy scenario, all technology manufacturing costs will be passed onto vehicle purchasers, who will recoup these costs through fuel savings achieved by the technologies adopted to meet the proposed Regulations. This assumption is evaluated in the payback analysis section.

7.3. *Analytical scenarios*

This analysis considers two scenarios: a business-as-usual (BAU) scenario, which assumes the proposed Regulations are not implemented, and a regulatory scenario, which assumes the proposed Regulations are implemented. These two scenarios are based on the same volume of forecasted vehicle sales between 2014 and 2018. The differences between the scenarios are considered in terms of the estimated changes in vehicle technology choices in the regulatory scenario, and the impacts of these changes on vehicle costs, distance travelled, fuel consumption and emissions.

The analysis assumes that these technology changes will only occur in response to the proposed Regulations; thus, the BAU rate of technology change is zero. This assumption may underestimate any "natural" technology changes that could occur throughout the North American market due to normal technological development in the absence of any regulations, or "complementary" technology changes that might occur in Canada either in response to similar regulations in the United States or in anticipation of the proposed Regulations in Canada. These alternate rates of technology change are difficult to estimate, but are considered in a sensitivity analysis. Whatever the proportion of technology change attributable to the proposed Regulations, the entirety of the changes shown in the analysis is expected to occur, and the analysis can be interpreted to identify the entire costs that Canadians can expect to bear and the benefits they can expect to receive over the lifetimes of MY2014–2018 vehicles.

7.3.1. Business-as-usual scenario

The business-as-usual scenario assumes that the proposed Regulations are not implemented and that vehicle technologies which affect GHG emissions will remain unchanged over the sales period of the analysis. The analysis considers projected vehicle sales for 2014 to 2018 and estimates the impacts of these new vehicles in terms of distance travelled, fuel consumption and emissions, given that technologies will remain constant.

7.3.2. Regulatory scenario

The regulatory scenario assumes that certain GHG emission-reducing technologies will be chosen to comply with the proposed Regulations. These are assumed to be already existing technologies, so manufacturers can choose among available technologies and increase their usage in new vehicles in order to comply with the proposed Regulations. Given that technologies will change in this scenario, the analysis considers the same BAU projected vehicle sales for 2014 to 2018, and estimates the incremental impacts of the technical modifications to these vehicles in terms of changes in vehicle costs, distance travelled, fuel consumption and emissions.

7.4. Costs

7.4.1. Vehicle technology costs

The proposed Regulations align with the proposed national GHG emission standards of the U.S. EPA for the 2014 and later model years, in order to provide manufacturers with a common set of vehicle GHG emission standards. Therefore, the analysis of the proposed Canadian Regulations assumes that manufacturers will likely adopt similar technologies to meet these proposed common emission standards.

The U.S. EPA selected likely technology choices from existing technologies based on engineering analyses, estimated increased adoption rates for these technologies in order to comply with the proposed U.S. EPA standards, and then estimated the redesign and application costs per vehicle for those technology packages.

The U.S. EPA assessment of technologies that would be available for each of the engine classes and sub-categories of vehicles and the estimates of their effectiveness and costs were guided by published research and independent summary assessments. They first estimated the baseline emissions and fuel consumption rates for each of the regulated subcategories of engines and vehicles. It was assumed that these rates would remain unchanged in the absence of the standards. Then, for each subcategory of engine, they identified technologies which could be applied practically and cost-effectively. Effectiveness and costs of each technology were estimated

and applied independently, then applied in combination. The availability and increase in penetration rates of technologies were assessed together with effectiveness and costs for each model year from 2014 to 2018. Costs were initially estimated as the direct costs to manufacturers of materials, components and assembly, to which some addition was required to represent development costs, the contribution of the manufacturer's corporate resources and costs of distribution.

Given the integration of the North-American vehicle manufacturing sector and the alignment of the proposed Canadian Regulations with the U.S. EPA standards, the same U.S. EPA-estimated vehicle technology choices and adoption rates, and the same proportional costs per vehicle, adjusted for exchange rates, were used as in the U.S. EPA analysis. The resulting estimates of the present value of the costs of the technologies required to meet the proposed Regulations are presented in Table 6.

Table 6: Summary of technology costs, by model year, in millions of 2010 CAN$

	MY2014	**MY2015**	**MY2016**	**MY2017**	**MY2018**	**Combined MYs 2014–18**
Present value of technology costs	138	133	135	138	151	695

MY = lifetime (30 years) impacts for each year of vehicle sales. Present value in 2010 CAN$, using a 3% discount rate.

The proposed Regulations would also include a system of CO_2e emission credits to help meet overall environmental objectives in a manner that provides the regulated industry with compliance flexibility. As use of these credits is difficult to predict with any precision, the analysis did not model the benefits of these compliance flexibilities. It is therefore reasonable to conclude that the costs of vehicle technology may be somewhat overestimated.

The analysis of the proposed Regulations assumes that manufacturers will pass the GHG emission-reducing vehicle technology costs to their purchasers. Because these technologies are estimated to also generate substantial fuel savings for vehicle owners and operators, the proposed Regulations are assumed not to impact on the volume of new heavy-duty vehicle sales. No other potential operating cost impacts of new technologies (e.g. maintenance and repairs) were considered in the analysis, as any such incremental costs are expected to be quite small in relation to expected fuel savings.

7.4.2. Government costs

Costs of the Regulations to the Government of Canada fall into three principal categories: compliance promotion costs, enforcement costs, and regulatory program costs. The estimates of these are described below:

Compliance promotion: The overall present value of costs over the 2014–2018 period is estimated at approximately $100,000. Compliance promotion activities include information sessions for manufacturers and importers on the main requirements of the Regulations, in particular new emission standards and report submission. In subsequent years, the annual costs will be $20,000 (undiscounted) per year, and the compliance promotion activities would be adjusted according to the regulated community compliance level and to the compliance strategy.

Enforcement: The present value of overall costs over the 2014–2018 period is estimated at approximately $500,000 and will be used for inspections (which includes operation and maintenance costs, transportation and sampling costs), investigations, measures to deal with alleged violations (including warnings, environmental protection compliance orders and injunctions) and prosecutions.

Regulatory administration: The present value of overall costs over the 2014–2018 period is estimated at approximately $8 million. These costs include amendments to the Regulations, regulatory administration and verification testing, and also include salaries, operation and maintenance. Regulatory administration would be used to develop and maintain a reporting system to compile data submitted by companies related to their fleet emissions and related credits or deficits for each model year fleet. The costs for verification testing would be used to deliver and administer the testing and emissions verification program, including associated laboratory costs and vehicle and engine acquisition. These costs also include an upgrade to the testing facilities and associated equipment to accommodate heavy-duty vehicle and engine testing.

The present value of the costs related to these three categories are estimated to total $8.6 million over the 2014–2018 period in this analysis, and are presented in Table 7.

Table 7: Incremental cost to Government, 2014–2018, in millions of 2010 CAN$

	2014	**2015**	**2016**	**2017**	**2018**	**5-Year Total**
Present value of compliance promotion costs	0.035	0.017	0.017	0.016	0.016	0.100
Present value of enforcement costs	0.113	0.110	0.107	0.104	0.101	0.534
Present value of regulatory program costs	1.684	1.584	1.546	1.582	1.536	7.932
Total	**1.833**	**1.711**	**1.670**	**1.701**	**1.652**	**8.566**

Due to rounding, some of the totals may not match. Present value in 2010 CAN$, using a 3% discount rate.

7.4.3. Accidents, congestion and noise

As fuel savings lower vehicle operating costs, it is assumed that there will be some increase in vehicle distance travelled, which could lead to more accidents, congestion and noise. This analysis assumes that heavy-duty vehicle owners consider these savings within the total cost of vehicle operation. The increase in vehicle distance travelled in response to lower vehicle operating costs is referred to as the "rebound" effect, and is measured here in vehicle-kilometres travelled (VKT).

For heavy-duty vehicles, the U.S. EPA estimated the net rebound rate to be small overall and to vary by vehicle type: an approximate 0.5% to 1.5% increase in annual VKT per vehicle in response to total vehicle operating cost savings due to fuel savings. The Canadian analysis used the same rebound rates as the U.S. EPA, and applied them to annual Canadian fleet estimates of baseline VKT from MOVES in order to estimate the increase in VKT attributable to the rebound effect.

There are no identified Canadian estimates of heavy-duty vehicle costs per kilometre for accidents, congestion and noise. For Class 2B and Class 3 heavy-duty vehicles, this analysis used Canadian estimates for light-duty pickup trucks and vans. This is the same approach used by the U.S. EPA. The Canadian estimates for these vehicles are 46% lower than the U.S. EPA's estimates. This analysis applied the U.S. EPA's estimates per kilometre for heavy-duty vocational vehicles and tractors, assuming that Canadian estimates would also be 46% lower than the U.S. EPA's estimates for the same heavy-duty vehicle classes. These per-kilometre cost estimates for accidents, congestion and noise were then applied to the Canadian VKT rebound estimates in order

to obtain estimates of the overall value of accidents, congestion and noise for each vehicle class in this analysis. The results are presented below.

Table 8: Summary of costs of additional noise, accidents, and congestion, by model year, in millions of 2010 CAN$

	MY2014	MY2015	MY2016	MY2017	MY2018	Combined MYs 2014–18
Present value of noise, accidents, and congestion	26	25	25	24	23	123

MY= lifetime (30 years) impacts for each year of vehicle sales. Present value in 2010 CAN$, using a 3% discount rate.

7.5. Benefits

7.5.1. GHG emissions reductions

The MOVES emissions model was used to estimate the impact of the proposed Regulations in terms of reductions in vehicle GHG emissions, as presented in Table 9 below. The proposed Regulations are estimated to result in a lifetime model-year reduction of 2.9 Mt beginning in MY2014 and increasing each year to 5.3 Mt for MY2018. Thus, as the proposed Regulations come into full effect over the MY2014–2018 period, they will result in a cumulative lifetime GHG emission reduction of 19 Mt arising from new vehicles entering the market in these five years.

For MY2019 and subsequent model years, the proposed Regulations would remain in full effect, and thus the lifetime reductions that would be observed under a regulatory scenario would likely be similar to the MY2018 level of 5.3 Mt for each subsequent MY, assuming similar sales and other modelling parameters. However, looking beyond MY2018, it also becomes more likely that some of these GHG emission reductions would have occurred even in the absence of the proposed Regulations and could not therefore be fully attributed to the proposed Regulations.

7.5.2. Value of avoided GHG emission damages

The estimated value of avoided damages from GHG reductions is based on the climate change damages avoided at the global level. Based on an estimated SCC of $26/tonne, the present value of incremental GHG emission reductions under the proposed Regulations is estimated to be over $0.5 billion over the lifespan of the MY2014–2018 new vehicle fleet. Under the $104/tonne SCC estimate, the present value of incremental GHG emission reductions would be estimated at over $1.8 billion for the 2014–2018 model year vehicles.

Table 9: Summary of GHG benefits, by model year, in millions of 2010 CAN$

	MY2014	MY2015	MY2016	MY2017	MY2018	Combined MYs 2014–18
Reduction in GHG emissions — undiscounted (Mt CO_2e)	2.9	3.0	3.2	4.6	5.3	19.0

Present value of the reduction in GHG emissions (SCC at $26/tonne)	73	74	80	115	130	472
Present value of the reduction in GHG emissions (SCC at $104/tonne)	283	288	311	445	503	1,831

MY= lifetime (30 years) impacts for each year of vehicle sales. Due to rounding, some of the totals may not match. Present value in 2010 CAN$, using a 3% discount rate.

7.5.3. Fuel savings benefits

Manufacturers are expected to meet the requirements of the proposed Regulations by adopting vehicle technologies that reduce GHG emissions. Most of these technologies (e.g. low rolling resistance tires and improved aerodynamics) will achieve these GHG emission reductions by improving vehicle energy efficiency. MOVES was used to estimate vehicle energy efficiency improvements due to vehicle technology improvements, and then these energy savings were converted to fuel savings using standard metrics. Thus these technologies are expected to reduce fuel consumption by 7.2 billion litres (undiscounted) over the lifetime of the MY2014–2018 fleet, as presented in Table 10 below.

Based on projected fuel prices, the benefits to vehicle owners arising from these fuel reductions are estimated to be $4.5 billion in fuel savings, and these cumulative savings are estimated to outweigh the technology costs ($0.7 billion) by a ratio of more than 6:1 over the lifetime of the MY2014–2018 fleet. Fuel prices are calculated pre-tax, so vehicle owners could expect higher savings than those resulting from this analysis. A post-tax payback analysis for vehicle owners is also presented in section 11.

Fuel savings are also expected to reduce the frequency of refuelling, which is a time-saving benefit for vehicle operators. The analysis used refuelling fill rates to calculate the total time saved due to reduced fuel consumption. The value of these time savings was calculated using an estimated mean wage rate for a typical truck driver ($23.33 per hour in 2010 CAN$). (see footnote 14) Using these values, the benefits of refuelling time savings due to the proposed Regulations are expected to be $34 million over the lifetime of the MY2014–2018 fleet, as presented in Table 10.

Table 10: Summary of fuel-related benefits, by model year, in millions of 2010 CAN$

	MY2014	**MY2015**	**MY2016**	**MY2017**	**MY2018**	**Combined MYs 2014–18**
Fuel savings — undiscounted (million litres)	1,080	1,111	1,215	1,758	2,015	7,179
Present value of fuel savings	716	718	764	1,079	1,204	4,481

Present value of reduced refuelling time	5	5	6	8	10	34
Present value of the sum of fuel benefits	*720*	*723*	*770*	*1,088*	*1,214*	*4,515*

MY = lifetime (30 years) impacts for each year of vehicle sales. Due to rounding, some of the totals may not match. Fuel savings are pre-tax. Present value in 2010 CAN$, using a 3% discount rate.

8. Non-quantified impacts

8.1. Fuel savings impacts on upstream petroleum sector

Canada is a small open economy and a price-taker in the world petroleum market. The estimated reduction in domestic fuel consumption resulting from the proposed Regulations would therefore not be expected to impact on the price of petroleum. Reduced domestic fuel consumption from any fuel savings resulting from the proposed Regulations would therefore be expected to be redirected from domestic consumption to increased exports, with no incremental impact on the upstream petroleum sector.

8.2. Criteria air contaminant impacts

The proposed Regulations are also expected to impact on CACs such as CO, NO_x, $PM_{2.5}$, SO_x and VOC. Overall it is expected that vehicle emissions of most CACs will decrease slightly in response to the proposed Regulations, primarily due to anticipated fuel savings. Conversely, it is anticipated that emissions of $PM_{2.5}$ will rise slightly, primarily due to the expected increased use of diesel-powered auxiliary power units as a fuel saving measure for extended idling in tractors. The net impact of these changes in emissions of CACs on air quality, and the resulting impacts on human health are expected to be very minor. Given the small scale of the expected CAC emissions and the challenges in estimating their value, these impacts have not been quantified.

8.3. Regulatory certainty and reduced compliance costs for manufacturers

The proposed Regulations are designed to align with similar regulations being introduced in the United States in 2014. The heavy-duty vehicle manufacturing sectors in Canada and the United States are highly integrated, so there are several benefits to regulatory alignment between the two countries. First, responding to new United States regulations with proposed Regulations in Canada provides a degree of regulatory certainty for Canadian manufacturers, which should facilitate their investment decision-making.

Then, by aligning regulations, as opposed to establishing different regulatory requirements than the United States, the proposed Regulations will further benefit Canadian companies subject to these regulations. Canadian companies manufacturing and/or importing into Canada vehicles that are concurrently sold in the United States can use U.S. information and data, such as emission tests results, to demonstrate compliance with the proposed standards. This significantly reduces the companies' compliance assessment and administrative costs. Aligned regulations would also set a North American level playing field in the transportation sector by preventing any manufacturer from producing less expensive and higher emitting vehicles, and therefore putting other manufacturers in a competitive disadvantage. These benefits have been assessed qualitatively, as there are no available quantified estimates of the benefits of regulatory alignment.

9. Summary of costs and benefits

Over the lifetime of MY2014–2018 vehicles, the present value of the cost of the proposed Regulations is estimated at $0.8 billion, largely due to the additional vehicle technology costs

required by the proposed Regulations. The total benefits for MY2014–2018 are estimated at $5.0 billion, due to the value of GHG reductions ($0.5 billion) and fuel savings ($4.5 billion). Over the lifetime of MY2014–2018 vehicles, the present value of the net benefits of the proposed Regulations is estimated at $4.2 billion. The results of the cost-benefit analysis of the proposed Regulations are presented in Table 11.

Table 11: Summary of main results, by model year, in millions of 2010 CAN$

Incremental costs and benefits (millions of dollars)	**MY2014**	**MY2015**	**MY2016**	**MY2017**	**MY2018**	**Combined MYs 2014–18**
Monetized costs						
A. Sector costs						
Present value of the technology costs	138	133	135	138	151	695
B. Societal costs						
Present value of the noise, accidents and congestion	26	25	25	24	23	123
Present value of the government administration costs	2	2	2	2	2	9
Sum of costs	*166*	*160*	*162*	*164*	*175*	*827*
Monetized benefits						
A. Sector benefits						
Present value of the pre-tax fuel savings	716	718	764	1,079	1,204	4,481
Present value of the reduced refuelling time	5	5	6	8	10	34
B. Societal benefits						
Present value of reduction in GHG	73	74	80	115	130	472

emissions (SCC at $26/tonne)						
Sum of benefits	*793*	*798*	*850*	*1,202*	*1,344*	*4,987*
NET BENEFIT — with SCC at $26/tonne	**627**	**638**	**688**	**1,039**	**1,168**	**4,160**
NET BENEFIT — with alternate SCC at $104/tonne	837	852	919	1,369	1,542	5,519
Qualitative and non-monetized impacts	Positive regulatory alignment impacts No net critical air contaminants impacts No net upstream fuel impacts					

MY = lifetime (30 years) impacts for each year of vehicle sales. Present value in 2010 CAN$, using a 3% discount rate. Due to rounding, some of the totals may not match.

The analysis indicates that in the first years of the proposed Regulations (MY2014–16), the lifetime costs will range from $160 to $166 million, the lifetime benefits will range from $793 to $850 million, and the lifetime net benefits will range from $627 to $688 million. These values reflect the impacts of the initial levels of compliance standards in the proposed Regulations, and the level of vehicles sales over this period. For MY2017–18, the proposed Regulations introduce higher compliance standards, resulting in higher costs ($164 to $175 million), higher benefits ($1,202 to $1,344 million) and higher net benefits ($1,039 to $1,168 million).

For MY2019 and subsequent model years, the proposed Regulations maintain the MY2018 compliance standards, and, all else being equal, results would be expected to be similar to those for MY2018, given similar volumes of annual vehicle sales.

Table 12: Summary metrics

	MY2014	**MY2015**	**MY2016**	**MY2017**	**MY2018**	**Combined MYs 2014–18**
Benefit to cost ratio — discounted at 3% (SCC at $26/tonne)	4.8	5.0	5.2	7.4	7.7	6.0
Fuel savings — undiscounted (million litres)	1,080	1,111	1,215	1,758	2,015	7,179
Reduction in GHG emissions — undiscounted (Mt CO_2e)	2.9	3.0	3.2	4.6	5.3	19.0

Present value of CO_2 damages avoided (Mt CO_2e)	2.7	2.7	2.9	4.2	4.7	17.2
Present value of the socio-economic costs which equal total costs minus non-GHG benefits (in millions of 2010 CAN$)						–3,688
Present value of the socio-economic cost per tonne of CO_2 damages avoided ($/tonne)						–215

MY = lifetime (30 years) impacts for each year of vehicle sales. CO_2 damages are grown at 2% per year to reflect the growth in climate change damages over time as emissions cumulate in the atmosphere. Present value uses a 3% discount rate. Due to rounding, some of the totals may not match.

For the proposed Regulations, the benefit to cost ratio is estimated to be 6 to 1 for the overall MY2014–2018 fleet of new heavy-duty vehicles. The benefit to cost ratio also increases from 4.8 to 1 for MY2014 to 7.7 to 1 for MY2018. This trend reflects the positive impact of fully implementing the proposed Regulations.

Over the lifetime of the MY2014–2018 fleet, the proposed Regulations are expected to reduce fuel consumption by 7.2 billion litres, and reduce GHG emissions (CO_2e) by 19.0 Mt.

In order to allow a comparison of social cost-effectiveness with other government climate change measures, we present the socio-economic cost per tonne of CO_2 emissions avoided. This ratio is calculated by subtracting the present value of the sum of all non-GHG benefits from the present value of the costs of the proposed Regulations, and then dividing by the present value of the tonnes of CO_2 emissions avoided. This ratio measures the lifetime socio-economic costs of reducing GHG emissions if the proposed Regulations are implemented over the MY2014–2018 analysis period, on a per tonne basis. For the proposed Regulations, the ratio of –$215/tonne is negative, indicating that the carbon emission reduction under the proposed Regulations would result in a net benefit rather than net cost.

10. Sensitivity analysis

A sensitivity analysis was done to consider the impact of uncertainty in key variables (i.e. changes in estimated sales, technology costs, fuel prices and discount rates). The sensitivity analysis shows that the results are robust in terms of demonstrating positive net benefits for the proposed Regulations across a broad range of plausible values for variables and assumptions.

Table 13: Results of sensitivity analysis

	NET BENEFIT		
SENSITIVITY VARIABLES	**Lower**	**Central**	**Higher**
1. Sensitivity to sales forecasts: (–30%, central, +30%)	2,909	4,160	5,411
2. Sensitivity to technology costs: (+30%, central, –30%)	3,966	4,160	4,354

3. Sensitivity to fuel prices: (–30%, central, +30%)	2,816	4,160	5,504
4. Sensitivity to discount rates: (7%, 3%, undiscounted)	2,669	4,160	6,307

All values are in millions of 2010 CAN$, using a 3% discount rate except where otherwise indicated.

A sensitivity analysis was also done to consider the impact of the assumption in the business-as-usual scenario (BAU) regarding the rate of technology change in the absence of the proposed Regulations. Throughout the regulatory analysis, it is assumed that this rate is zero. This sensitivity analysis shows, however, that by assuming instead that some technology change would occur even in the absence of the proposed Regulations, costs and benefits attributable to the Regulations would be reduced proportionately.

Table 14: BAU sensitivity analysis

BAU rate of technology adoption	0%	25%	50%
Costs	827	623	418
Benefits	4,987	3,740	2,494
Net benefit	4,160	3,118	2,076
Rate of technology adoption attributable to the Regulations	100%	75%	50%

All figures are in million 2010CAN$, using a 3% discount rate.

The regulatory analysis provides information to the public and stakeholders about the costs they can expect to bear and the benefits they can expect to receive over the lifetime of new heavy-duty vehicles sold with more GHG emission reducing technologies. It is unclear whether some or many of the technologies would be adopted in the absence of the proposed Regulations. To the extent that they would, the costs and the benefits attributed to the proposed Regulations would be overstated. The sensitivity analysis shows that even if the BAU rate of technology adoption was as high as 50%, the proposed Regulations would still result in a positive net benefit.

11. Distributional impacts

The automotive manufacturing sector is concentrated within Ontario and Quebec, with other plants in Manitoba, Saskatchewan, Alberta, and British Columbia. (see footnote 15) The compliance costs of the proposed Regulations are estimated to increase the production cost of vehicles for manufacturers by more than $130 million per year. These costs are expected to be distributed according to the future purchases and use of these regulated heavy-duty vehicles, and it is not expected that there will be significantly disproportionate impacts on any region within Canada.

The proposed Regulations will require manufacturers to comply by adopting more GHG emission reducing technologies in new vehicles. The analysis of the proposed Regulations assumes that manufacturers will generally be able to pass on all GHG emission reducing technology costs to vehicle purchasers, because these purchase costs can be shown to be quickly recouped through fuel savings. All new heavy-duty vehicle purchasers are assumed to be businesses, not consumers,

given that heavy-duty vehicles are generally designed for commercial use. Businesses are expected to evaluate costs and benefits in terms of the expected payback on investment costs.

A simple payback analysis of MY2018 vehicle costs (Table 15) shows that average first-year fuel savings (including taxes) for owners and operators are expected to be greater than the manufacturer's average costs for adding new technologies. For all three heavy-duty vehicle regulatory classes, the payback period is less than one year.

Table 15: Average technology costs per new vehicle and fuel savings

MY2018	**HD Pickups and Trucks**	**Vocation Vehicles**	**Combination Tractors**
Technology costs per new vehicle	1,071	455	6,476
First-year fuel savings per new vehicle	2,269	1,200	9,636
Net first-year savings	1,198	745	3,160

Fuel prices are post-tax, by MY2018 vehicle class. All figures are in 2010 CAN$.
Technology costs are the average cost for vehicles in their respective RIAS class.

12. Rationale

The proposed Regulations are intended to reduce GHG emissions by requiring manufacturers to increasingly adopt emission-reducing technologies. The analysis shows that if manufacturers comply, then GHG emission reductions will be achieved and there will also be a large net economic benefit, due primarily to fuel savings. In perfect markets, such fuel savings would be enough to motivate reductions in GHG emissions even in the absence of the proposed Regulations. Accordingly, it may be reasonably asked why the proposed Regulations would be necessary in order to achieve these cost-effective results. To try to understand this issue, the U.S. EPA surveyed published literature and held discussions with numerous truck market participants. From these sources, five categories of possible explanations were derived.

First, comprehensive and reliable information on the effectiveness and efficiency of new technologies is not always available. Thus buyers may understandably be reluctant to spend additional money to purchase vehicles equipped with these new technologies.

Second, although it seems reasonable to assume that people are willing to pay more for better vehicles, new or used, it is not clear whether buyers of used vehicles can tell which are the better vehicles. As a result, the purchasers of original equipment may expect the resale market to provide inadequate compensation for the new technologies, even when those technologies would reduce costs for resale buyers.

Third, if for some reason a truck purchaser will not be directly responsible for future fuel costs, or the individual who will be responsible for fuel costs does not decide which truck characteristics to purchase, then those price signals (higher vehicle prices offset by lower fuel costs) may not be transmitted effectively, and incentives can be described as "split."

Fourth, there may be uncertainty about future fuel prices. When purchasers have less than perfect foresight about future operating expenses, they may implicitly apply much higher discount rates to future potential fuel savings, due to their uncertainty.

Fifth, transaction costs of changing to new technologies may slow or prevent their adoption. If a conservative approach to new technologies leads truck buyers to adopt new technologies slowly, then successful new technologies are likely to be adopted over time without market intervention, but with potentially significant delays in achieving fuel saving and environmental benefits.

It is unclear whether some or many of the technologies would be adopted in the absence of the proposed Regulations. There is, however, highly imperfect information in the original and resale markets, split incentives, uncertainty about future fuel prices, and adjustment and transaction costs. These market failures would limit the adoption of these technologies in the absence of the proposed Regulations. Therefore, regulations that force the adoption of these technologies can bring net benefits to Canadians, as demonstrated in the summary cost-benefit table for the proposed Regulations (Table 11).

13. Consultation

13.1. The consultation process

On May 21, 2010, the Minister of the Environment and the U.S. President announced their respective intent to regulate GHG emissions from new on-road heavy-duty vehicles. The Minister of the Environment's announcement specified that Canada's regulations would be developed under CEPA 1999 and would be aligned with those of the United States.

In order to inform the development of the regulations, Environment Canada co-hosted with Transport Canada a number of stakeholder working group meetings comprised of industry representatives (manufacturers, carriers and other vehicle owners and operators), environmental non-governmental organizations, provinces and territories, as well as other federal departments such as Natural Resources Canada and Industry Canada.

The working group met twice in 2010, in August and November, and then on September 21, 2011, to present and discuss publicly released consultation documents, as described below, and to provide an update on the development of the regulations.

On October 25, 2010, the Government of Canada released an initial consultation document describing the key elements being considered in the development of Canadian regulations aligned with those of the United States. The document was distributed to key stakeholders, provinces and territories and also published on Environment Canada's CEPA Registry Web site to make it broadly available to all interested parties. The purpose of the document was to seek early stakeholder views for the development of the proposed Regulations and provide for a 30-day comment period.

On August 9, 2011, Environment Canada published a second and more detailed consultation document with a 30-day comment period to provide an additional opportunity for stakeholders to comment and to participate in the regulatory process.

In response to the consultation, the Department received 10 written submissions from a range of stakeholders, mostly industry stakeholders. The Department also collected the views of stakeholders during the stakeholder consultation working group meetings.

While stakeholders generally expressed broad support for national GHG emission regulations for new vehicles aligned with U.S. national standards, some industry stakeholders raised a certain number of issues. Those and the manner in which they were considered are summarized in the following sections.

13.2. GHG-reducing technologies

Some commented on the fact that Canada could go beyond the U.S. regulations by accepting additional technologies, such as automatic transmissions, that could be used to comply with the standards and that were not considered under the U.S. regulations.

Environment Canada is proposing performance-based standards that will provide manufacturers and importers with the flexibility to choose the most cost-effective technologies to comply with the

proposed Regulations. While Environment Canada recognizes the potential value-added of additional technologies, the Department is proposing the same suite of technologies as is the United States, which does not include automatic transmissions. Credits can be obtained for hybrid, electric and fuel cell vehicles, as well as other technologies, referred to as "innovative technologies," which provide emission reductions that cannot be measured by the prescribed test procedures.

There were also comments on whether Environment Canada should conduct an analysis of the current use of GHG-reducing technologies in Canada to inform the development of Canadian standards.

Environment Canada conducted an analysis of the Canadian fleet in light of the structure of the final U.S. regulations. The analysis identified that the proposed Regulations would take into consideration the range of applications of heavy-duty vehicles and engines with emission standards for vehicles expressed as grams of GHG emissions per unit of work. The same range of applications also exists in the United States and aligning Canadian methods of calculating emissions addresses any potential specificities of the Canadian trucking fleet.

13.3. Low-volume importers

Some stakeholders raised potential issues for companies importing small numbers of vehicles and engines, which, they indicate, makes it more difficult to meet the standards even with the available flexibilities to average, bank and trade emission credits.

Environment Canada acknowledges that there are a number of companies in Canada importing very small numbers of vehicles and engines. In those cases, Environment Canada determined that the available flexibilities would not be sufficient.

The United States addressed this issue via small business legislation. Environment Canada is proposing a CO_2e exemption for companies importing or manufacturing less than 100 vocational vehicles and tractors, and is seeking comments on the threshold. For engines, Environment Canada is proposing to allow companies to import engines that have CO_2 emission levels that are greater than the applicable emission standard without having to demonstrate compliance using the CO_2 emission credit system in Canada, provided that these engines are covered by a U.S. EPA certificate and are concurrently sold in greater number in the United States than in Canada.

13.4. Low rolling resistance tires

A number of stakeholders commented on the use of low rolling resistance tires as a possible technology to comply with the proposed standards. Anecdotal evidence was provided that those tires may have poor performance or reliability, especially in winter conditions.

Currently available data indicates that low rolling resistance tires have the same range of winter performance as conventional tires. There are also no data suggesting that low rolling resistance tires pose any additional safety risk than conventional tires.

The U.S. preamble of its regulations reports the same conclusion. Transport Canada, whose mandate includes vehicle safety, is proactively undertaking additional tests to measure the safety performance of low rolling resistance tires and will, in consultation with Environment Canada, undertake safety activities, if required.

13.5. Applicable regulated entities

As it relates to the import of engines, some engine manufacturers and importers expressed the desire to have the engine manufacturer be the responsible regulatee even in cases where the importer on record is not the manufacturer.

Environment Canada recognizes that many importers are importing engines built by a different company, which could be perceived as placing undue burden on the importer if the latter is responsible under the Regulations. However, the proposed Regulations are developed under the

authorities of Part 7, Division 5, of CEPA 1999, which applies to all importers of engines, regardless of who manufactured the engine, or where it was manufactured.

13.6. Less stringent payload restrictions

Some stakeholders commented on the fact that provinces have less stringent payload restrictions for tractor trailers compared to the U.S. interstate limit, and asked if this should be taken into consideration in the development of the Regulations.

Environment Canada is proposing standards structured in a way as not to constrain the size and power of heavy-duty vehicles. The proposed standards are expressed in grams per unit of work, therefore allowing a more powerful vehicle to proportionally emit more GHG emissions compared to a less powerful vehicle. Moreover, compliance with the proposed tractor standards will be assessed with a simulation model that uses a fixed payload. As a result, Canadian manufacturers will not be disadvantaged compared to U.S. manufacturers due to potentially higher average payloads in Canada.

14. Implementation, enforcement and service standards

14.1. Implementation

Environment Canada currently administers a comprehensive program to verify compliance with the *On-Road Vehicle and Engine Emission Regulations* under CEPA 1999, which establish federal emission standards for smog-forming emissions. The proposed Regulations would be implemented and enforced in a similar manner. Manufacturers and importers would be responsible for ensuring that their products comply with the proposed Regulations and would be required to produce and maintain evidence of such conformity. The program will include

- Authorizing and monitoring the use of the national emissions mark;
- Reviewing company evidence of conformity;
- Monitoring data submission for compliance with the applicable GHG emission standards for heavy-duty vehicles and engines and the banking or trading of emission credits;
- Registering company notices of defects affecting emission controls;
- Inspections of test vehicles and engines and their emission-related components;
- Laboratory emissions tests on a sample of new vehicles and engines that are representative of products offered for sale in Canada; and
- Laboratory emissions tests on a sample of typical in-use vehicles.

Environment Canada plans to coordinate monitoring efforts with the U.S. EPA by sharing information to increase program efficiency and effectiveness.

In administering the proposed Regulations, Environment Canada will respond to submissions and inquiries from the regulated community in a timely manner taking into account the complexity and completeness of the request.

14.2. Enforcement

Since the proposed Regulations would be made under CEPA 1999, enforcement officers will, when verifying compliance with the proposed Regulations, apply the Compliance and Enforcement Policy implemented under the Act. The Policy sets out the range of possible responses to violations, including warnings, directions, environmental protection compliance orders, ticketing, ministerial orders, injunctions, prosecution, and environmental protection alternative measures (which are an alternative to a court trial after the laying of charges for a CEPA 1999 violation). In addition, the Policy explains when Environment Canada will resort to civil suits by the Crown for costs recovery.

When, following an inspection or an investigation, an enforcement officer discovers an alleged violation, the officer will choose the appropriate enforcement action based on the following factors:

- Nature of the alleged violation: This includes consideration of the damage, the intent of the alleged violator, whether it is a repeat violation, and whether an attempt has been made to conceal information or otherwise subvert the objectives and requirements of the Act.
- Effectiveness in achieving the desired result with the alleged violator: The desired result is compliance within the shortest possible time and with no further repetition of the violation. Factors to be considered include the violator's history of compliance with the Act, willingness to cooperate with enforcement officers, and evidence of corrective action already taken.
- Consistency: Enforcement officers will consider how similar situations have been handled in determining the measures to be taken to enforce the Act.

Environment Canada will monitor the GHG emission performance of heavy-duty vehicles and engines and their fleets and compliance with the proposed Regulations. In the situation where a vehicle or engine is found to exceed applicable standards or exceed the family emission limit specified by the company, the normal course of events would be to perform sufficient engineering assessment to determine if a notice of defect should be issued by the company to the owners of the particular model of vehicle. This may result in a product recall to fix the defect. In the case of the emission credit system, companies would have three years to offset a deficit. In the situation where a company would fail to meet this requirement, the issue would be referred to enforcement to consider actions in accordance with its Compliance and Enforcement Policy for CEPA 1999.

14.3. Service standards

For the proposed Regulations, in its administration of the regulatory program, Environment Canada would provide these services in a timely manner:

- reviewing applications and preparing authorizations to use the national emissions mark; and
- assessing requests for exemptions from the proposed Regulations.

In addition, the Department would audit evidence of conformity for engines and vehicles and provide to manufacturers an acknowledgement of its receipt and whether it is presented "in a form and manner that is satisfactory" based on a set of criteria established by the Department. The Department intends to develop a technical guidance document describing the required evidence of conformity and the procedures to be followed when submitting required documentation.

15. Performance measurement and evaluation

The Performance Measurement and Evaluation Plan (PMEP) describes the desired outcomes of the proposed Regulations and establishes indicators to assess the performance of the proposed Regulations in achieving these outcomes. The PMEP package is composed of three documents:

- the PMEP, which details the regulatory evaluation process;
- the logic model, which provides a simplified visual walkthrough of the regulatory evaluation process; and
- the table of indicators, which lists clear performance indicators and associated targets, where applicable, in order to track the progress of each outcome of the proposed Regulations.

The three documents complement each other and allow the reader to gain a clear understanding of the outcomes of the proposed Regulations, the performance indicators, as well as the evaluation process.

15.1. Outcomes

The PMEP details the suite of outcomes for each unit as they comply with the proposed Regulations. These outcomes include the following:

- Upon publication of the proposed Regulations, the regulated community will become aware of the proposed Regulations, start importing or manufacturing vehicles and engines that comply with the standards and meet the reporting requirements, when applicable (immediate outcome).

- Then, as fuel-saving technologies enter the market, owners and operators of heavy-duty vehicles will experience fuel savings (intermediate outcome), which directly translates into GHG emission reductions and economic benefits (final outcome).

As a key feature of the proposed Regulations, companies will be subject to progressively more stringent standards during the 2014 to 2018 model year period. Also, the proposed Regulations only target new vehicles. Existing vehicles are not subject to the proposed Regulations. As a result, the outcomes, such as anticipated reductions in GHG emissions, will take place progressively and accumulate over time as the Canadian vehicle fleet turns over.

15.2. Performance indicators and evaluation

Clear, quantitative indicators and targets, where applicable, were defined for each outcome — immediate, intermediate, and final — and will be tracked on a yearly basis or every five years, depending on the indicator and outcome. In addition, a compilation assessment will be conducted every five years starting in 2020 to gauge the performance of every indicator against the identified targets. This regular review process will allow the Department to clearly detail the impact of the proposed Regulations on the on-road heavy-duty vehicle sector as more and more low GHG-emitting vehicles enter the market, and to evaluate the performance of the proposed Regulations in reaching the intended targets.

These performance indicators are available in the PMEP table of indicators, and make direct references to the outcomes listed in the logic model.

16. Contacts

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PROPOSED REGULATORY TEXT

Notice is hereby given, pursuant to subsection 332(1) (see footnote a) of the *Canadian Environmental Protection Act, 1999* (see footnote b), that the Governor in Council, pursuant to sections 160 and 162 of that Act, proposes to make the annexed *Heavy-duty Vehicle and Engine Greenhouse Gas Emission Regulations*.

Interested persons may, within 60 days after the date of publication of this notice, file with the Minister of the Environment comments with respect to the proposed Regulations or a notice of objection requesting that a board of review be established under section 333 of that Act and stating the reasons for the objection. All comments and notices must cite the *Canada Gazette*, Part I, and the date of publication of this notice, and be addressed to Mark Cauchi, Director,

Transportation Division, Environmental Stewardship Branch, Department of the Environment, Gatineau, Quebec K1A 0H3.

A person who provides information to the Minister may submit with the information a request for confidentiality under section 313 of that Act.

Ottawa, March 15, 2012

JURICA ČAPKUN
Assistant Clerk of the Privy Council

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(This table is not part of the Regulations.)

HEAVY-DUTY VEHICLE AND ENGINE GREENHOUSE GAS EMISSION REGULATIONS

INTERPRETATION

Definitions

1. (1) The following definitions apply in these Regulations.

"Act"
« *Loi* »

"Act" means the *Canadian Environmental Protection Act, 1999*.

"adjusted loaded vehicle weight"
« *poids ajusté du véhicule chargé* »

"adjusted loaded vehicle weight" means the numerical average of the curb weight and the GVWR, and in the case of vehicles referred to in subsection 33(6) with an adjusted loaded vehicle weight of more than 6 350 kg (14,000 pounds), the value corresponding to the nearest 225 kg (500 pounds) increment.

"aftertreatment device"
« *dispositif de traitement postcombustion* »

"aftertreatment device" means a catalytic converter, particulate filter or any other system or component mounted downstream of the exhaust valve or exhaust port that is designed to decrease engine exhaust emissions before they are released into the environment.

"A to B testing"
« *essais A à B* »

"A to B testing" means testing performed in pairs to allow comparison of vehicle A to vehicle B or engine A to engine B, as the case may be.

"auxiliary emission control device"
« *dispositif antipollution auxiliaire* »

"auxiliary emission control device" means any element of design that senses temperature, vehicle speed, engine RPM, transmission gear, manifold vacuum, or any other parameter for the purpose of activating, modulating, delaying or deactivating the operation of any part of an emission control system.

"averaging set"
« *groupe de calcul de points* »

"averaging set" means, for the purpose of a company's participation in the CO_2 emission credit system set out in sections 40 to 53, any of the following groups of fleets of vehicles or engines:

(*a*) Class 2B and Class 3 heavy-duty vehicles and heavy-duty incomplete vehicles, excluding those referred to in the definition "vocational vehicle";

(*b*) Class 2B, Class 3, Class 4 and Class 5 vocational vehicles and incomplete vocational vehicles;

(*c*) Class 6 and Class 7 heavy-duty vehicles and heavy-duty incomplete vehicles;

(*d*) Class 8 heavy-duty vehicles and heavy-duty incomplete vehicles;

(*e*) heavy-duty engines that are spark-ignition engines;

(*f*) light heavy-duty engines that are compression-ignition engines;

(*g*) medium heavy-duty engines that are compression-ignition engines; or

(*h*) heavy heavy-duty engines that are compression-ignition engines.

"basic vehicle frontal area"
« *surface frontale du véhicule de base* »

"basic vehicle frontal area" means the area enclosed by the geometric projection of the basic vehicle — including tires but not mirrors or air deflectors — along the longitudinal axis of the vehicle onto a plane perpendicular to that axis.

"cab-complete vehicle"
« *véhicule à cabine complète* »

"cab-complete vehicle" means a heavy-duty incomplete vehicle with either a completed occupant compartment that requires only the addition of a cargo-carrying surface, work-performing equipment or load-bearing component to perform its intended functions or with the back of the cab cut out for the intended installation of a structure that permits access from the driver's area to the back of the vehicle.

"calibration"
« *calibrages* »

"calibration" means the set of specifications and tolerances specific to a particular design, version or application of a component or assembly that describes its operation over its working range.

"CFR"
« *CFR* »

"CFR" means the *Code of Federal Regulations* of the United States, as amended from time to time.

"CH_4"
« *CH_4* »

"CH_4" means methane.

"Class 2B"
« *classe 2B* »

"Class 2B" means a class of heavy-duty vehicle that has a GVWR of more than 3 856 kg (8,500 pounds) but not more than 4 536 kg (10,000 pounds).

"Class 3"
« *classe 3* »

"Class 3" means a class of heavy-duty vehicle that has a GVWR of more than 4 536 kg (10,000 pounds) but not more than 6 350 kg (14,000 pounds).

"Class 4"
« *classe 4* »

"Class 4" means a class of heavy-duty vehicle that has a GVWR of more than 6 350 kg (14,000 pounds) but not more than 7 257 kg (16,000 pounds).

"Class 5"
« *classe 5* »

"Class 5" means a class of heavy-duty vehicle that has a GVWR of more than 7 257 kg (16,000 pounds) but not more than 8 845 kg (19,500 pounds).

"Class 6"
« *classe 6* »

"Class 6" means a class of heavy-duty vehicle that has a GVWR of more than 8 845 kg (19,500 pounds) but not more than 11 793 kg (26,000 pounds).

"Class 7"
« *classe 7* »

"Class 7" means a class of heavy-duty vehicle that has a GVWR of more than 11 793 kg (26,000 pounds) but not more than 14 969 kg (33,000 pounds).

"Class 8"
« *classe 8* »

"Class 8" means a class of heavy-duty vehicle that has a GVWR of more than 14 969 kg (33,000 pounds).

"compression-ignition engine"
« *moteur à allumage par compression* »

"compression-ignition engine" means an engine that operates as a reciprocating internal combustion engine, but does not include an engine that operates under characteristics significantly similar to the theoretical Otto combustion cycle and an engine that uses a spark plug or other sparking device.

"CO_2"
« *CO_2* »

"CO_2" means carbon dioxide.

"CO_2 family certification level"
« *niveau de certification de la famille applicable au CO_2* »

"CO_2 family certification level" means the maximum CO_2 emission level of a fleet or subfleet of heavy-duty engines that is determined by a company.

"criteria air contaminant"
« *principaux contaminants atmosphériques* »

"criteria air contaminant" means emissions of oxides of nitrogen (NO_X), hydrocarbon (HC), particulate matter (PM) and carbon monoxide (CO).

"curb weight"
« *masse en état de marche* »

"curb weight" means the actual or manufacturer's estimated weight of a heavy-duty vehicle in operational status with all standard equipment and includes the weight of fuel at nominal tank capacity and the weight of optional equipment.

"day cab"
« *cabine de jour* »

"day cab" means a tractor cab that is not a sleeper cab.

"deteriorated emission level"
« *niveau d'émissions détérioré* »

"deteriorated emission level" means the emission level that results from applying the applicable deterioration factor to the emission test results for a vehicle or engine.

"deterioration factor"
« *facteur de détérioration* »

"deterioration factor" means the relationship between the emission level measured at the end of useful life or at the point where it is the highest during the useful life and the undeteriorated emission level measured at the point corresponding to a maximum of 6 437 km (4,000 miles) of operation in relation to a vehicle that has stabilized emissions and a maximum of 125 hours of operation in relation to an engine that has stabilized emissions, determined in accordance with

(*a*) section 104(d)(5) of Title 40, chapter I, subchapter U, part 1037, subpart B, of the CFR, in the case of Class 2B and Class 3 heavy-duty vehicles, excluding those referred to in the definition "vocational vehicle";

(*b*) section 241(c) of Title 40, chapter I, subchapter U, part 1037, subpart C, of the CFR, in the case of vocational vehicles, incomplete vocational vehicles, tractors and incomplete tractors; and

(*c*) section 150(g) of Title 40, chapter I, subchapter U, part 1036, subpart B, of the CFR, and section 241(c) of Title 40, chapter I, subchapter U, part 1036, subpart C, of the CFR, in the case of heavy-duty engines.

"electric vehicle"
« *véhicule électrique* »

"electric vehicle" means a heavy-duty vehicle that is not equipped with an internal combustion engine and is powered solely by an external source of electricity or solar power or a combination of both electricity and solar power.

"element of design"
« *élément de conception* »

"element of design" means, in respect of a vehicle or engine,

(*a*) any control system, including computer software, electronic control systems and computer logic;

(*b*) any control system calibrations;

(*c*) the results of systems interaction; or

(*d*) any hardware items.

"emission control system"
« *système antipollution* »

"emission control system" means any emission control device, auxiliary emission control device, engine modification and strategy, and other element of design used to reduce exhaust emissions from a vehicle or engine.

"engine configuration"
« *configuration de moteur* »

"engine configuration" means a unique combination of heavy-duty engine hardware and calibration that has an effect on measured emissions.

"EPA"
« *EPA* »

"EPA" means the United States Environmental Protection Agency.

"EPA certificate"
« *certificat de l'EPA* »

"EPA certificate" means a certificate of conformity with U.S. federal standards issued by the EPA.

"family emission limit"
« *limite d'émissions de la famille* »

"family emission limit" means,

(*a*) the value corresponding to the product of 1.03 multiplied by the CO_2 family certification level in the case of a heavy-duty engine's CO_2 emissions; or

(*b*) the maximum emission level of a fleet or subfleet determined by a company, in the case of

(i) a heavy-duty vehicle's CO_2 emissions, and,

(ii) a heavy-duty vehicle's and heavy-duty engine's N_2O or CH_4 emissions.

"final-stage manufacturer"
« *fabricant à l'étape finale* »

"final-stage manufacturer" means a company that performs the manufacturing operations on a heavy-duty incomplete vehicle that turn that vehicle into a heavy-duty completed vehicle.

"FTP-based city test"
« *essai en ville* »

"FTP-based city test" means the Federal Test Procedure referred to in subpart B of Title 40, chapter I, subchapter C, part 86, of the CFR.

"GAWR"
« *PNBE* »

"GAWR" means the gross axle weight rating that is specified by a manufacturer as the load-carrying capacity of a single axle system, as measured at the tire-ground interface.

"GCWR"
« *PNBC* »

"GCWR" means the gross combination weight rating that is specified by a manufacturer as the maximum design loaded weight of a vehicle and trailer.

"GEM computer simulation model"
« *modèle de simulation informatique GEM* »

"GEM computer simulation model" means the EPA's GEM computer simulation model referred to in section 520 of Title 40, chapter I, subchapter U, part 1037, subpart F, of the CFR.

"GVWR"
« *PNBV* »

"GVWR" means the gross vehicle weight rating that is specified by a manufacturer as the maximum design loaded weight of a vehicle.

"heavy-duty completed vehicle"
« *véhicule lourd complet* »

"heavy-duty completed vehicle" means, for the purposes of paragraph 9(1)(*d*) and sections 11 to 17, a heavy-duty vehicle that has a cargo-carrying surface, work-performing equipment or primary load-carrying device or that is capable of pulling a trailer.

"heavy-duty engine"
« *moteur de véhicule lourd* »

"heavy-duty engine" means an engine that is designed to be used for motive power in a vocational vehicle or a tractor.

"heavy-duty incomplete vehicle"
« *véhicule lourd incomplet* »

"heavy-duty incomplete vehicle" means a heavy-duty vehicle that is manufactured in stages by assembling components — none of which, taken separately, constitutes a heavy-duty incomplete vehicle — and that consists of, at a minimum, a chassis structure, a powertrain and wheels in the state in which all of those components are to be part of the heavy-duty completed vehicle, but that requires further manufacturing operations to become so.

"heavy-duty vehicle"
« *véhicule lourd* »

"heavy-duty vehicle" means an on-road vehicle that has a GVWR of more than 3 856 kg (8,500 pounds), a curb weight of more than 2 722 kg (6,000 pounds) or a basic vehicle frontal area in excess of 4.2 m^2 (45 square feet), but does not include a medium-duty passenger vehicle as defined in subsection 1(1) of the *On-Road Vehicle and Engine Emission Regulations* and a vehicle regulated under the *Passenger Automobile and Light Truck Greenhouse Gas Emission Regulations*.

"heavy heavy-duty engine"
« *gros moteur de véhicule lourd* »

"heavy heavy-duty engine" means a heavy-duty engine that has cylinder liners for the purpose of multiple rebuilds and is designed to be used in Class 8 heavy-duty vehicles.

"heavy heavy-duty vehicle"
« *gros véhicule lourd* »

"heavy heavy-duty vehicle" means a Class 8 heavy-duty vehicle.

"HFET-based highway test"
« *essai sur route* »

"HFET-based highway test" means the Highway Fuel Economy Test Procedure referred to in subpart B of Title 40, chapter I, subchapter Q, part 600, of the CFR.

"high-roof"
« *toit élevé* »

"high-roof" means relating to a tractor with a roof height of 376 cm (148 inches) or more.

"hybrid engine" or "hybrid powertrain"
« moteur hybride » *ou* « *groupe motopropulseur hybride* »

"hybrid engine" or "hybrid powertrain" means an engine or a powertrain that is equipped with energy storage features — other than a conventional battery system or conventional flywheel — such as supplemental electric batteries and hydraulic accumulators.

"hybrid vehicle"
« *véhicule hybride* »

"hybrid vehicle" means a heavy-duty vehicle that is equipped with energy storage features — other than a conventional battery system or conventional flywheel — such as supplemental electric batteries and hydraulic accumulators, in addition to an internal combustion engine or other engine that uses fuel.

"incomplete tractor"
« *tracteur routier incomplet* »

"incomplete tractor" means a heavy-duty incomplete vehicle that becomes a tractor on completion of the manufacturing operations.

"incomplete vocational vehicle"
« *véhicule spécialisé incomplet* »

"incomplete vocational vehicle" means a heavy-duty incomplete vehicle that becomes a vocational vehicle on completion of the manufacturing operations.

"innovative technology"
« *technologie innovatrice* »

"innovative technology" means a greenhouse gas emission reduction technology

(*a*) that meets the qualification criteria set out in sections 1866(d)(1)(i) to (iii) of Title 40, chapter I, subchapter C, part 86, subpart S, of the CFR; or

(*b*) for which GEM computer simulation modelling or emission testing cannot measure the total emission reduction attributable to it.

"intermediate manufacturer"
« *fabricant intermédiaire* »

"intermediate manufacturer" means a company — other than a heavy-duty incomplete vehicle manufacturer or final-stage manufacturer — that performs manufacturing operations on a heavy-duty incomplete vehicle.

"light heavy-duty engine"
« *petit moteur de véhicule lourd* »

"light heavy-duty engine" means a heavy-duty engine designed to be used in Class 2B, Class 3, Class 4 or Class 5 heavy-duty vehicles.

"light heavy-duty vehicle"
« *petit véhicule lourd* »

"light heavy-duty vehicle" means a Class 2B, Class 3, Class 4 or Class 5 heavy-duty vehicle.

"low-roof"
« *toit bas* »

"low-roof" means relating to a tractor with a roof height of 305 cm (120 inches) or less.

"medium heavy-duty engine"
« *moteur moyen de véhicule lourd* »

"medium heavy-duty engine" means a heavy-duty engine designed to be used in Class 6 and Class 7 heavy-duty vehicles.

"medium heavy-duty vehicle"
« *véhicule mi-lourd* »

"medium heavy-duty vehicle" means a Class 6 or Class 7 heavy-duty vehicle.

"mid-roof"
« *toit moyen* »

"mid-roof" means relating to a tractor with a roof height of more than 305 cm (120 inches) but less than 376 cm (148 inches).

"model year"
« *année de modèle* »

"model year" means the year, determined in accordance with section 4, that is used by a manufacturer to designate a model of vehicle or engine.

"nominal tank capacity"
« *capacité nominale du réservoir à carburant* »

"nominal tank capacity" means the fuel tank's volume that is specified by a manufacturer to the nearest three eighths of a litre (one tenth of a U.S. gallon).

"N_2O"
« *N_2O* »

"N_2O" means nitrous oxide.

"on-road vehicle"
« *véhicule routier* »

"on-road vehicle" means a self-propelled vehicle designed for or capable of transporting persons, property, material or permanently or temporarily affixed apparatus on a highway, but does not mean a vehicle that

(*a*) cannot exceed a speed of 40 km/h (25 miles per hour) on a level paved surface;

(*b*) lacks features customarily associated with safe and practical highway use such as a reverse gear, a differential or safety features that are required by federal or provincial laws;

(*c*) exhibits features that render its use on a highway unsafe, impractical or highly unlikely, such as tracked road contact means or inordinate size; or

(*d*) is a military vehicle designed for use in combat or combat support.

"power take-off"
« *prise de mouvement* »

"power take-off" means a secondary engine shaft or other system of a vehicle that provides substantial auxiliary power for purposes unrelated to vehicle propulsion or the functioning of customary vehicle accessories such as air conditioning, power steering and basic accessories.

"sleeper cab"
« *cabine couchette* »

"sleeper cab" means a tractor cab that has a compartment located behind the driver's seat that is designed to be used as a sleeping accommodation and that is accessible either from the driver's compartment or from outside the vehicle.

"spark-ignition engine"
« *moteur à allumage commandé* »

"spark-ignition engine" means an engine that operates under characteristics significantly similar to the theoretical Otto combustion cycle and uses a spark plug or other sparking device.

"static loaded radius"
« *rayon sous charge statique* »

"static loaded radius" means the distance between the level surface where the vehicle is located to the axle centre measured at curb weight when the vehicle is stationary, with the wheels parallel to the vehicle's longitudinal centre line and the tires inflated to the manufacturer's recommended cold tire inflation pressure.

"steady state duty cycle"
« *cycle de service permanent* »

"steady state duty cycle" means the test cycle referred to in section 1362 of Title 40, chapter I, subchapter C, part 86, subpart N, of the CFR.

"test weight"
« *masse à l'essai* »

"test weight" means the vehicle weight used or represented during testing.

"tire rolling resistance level"
« *niveau de résistance au roulement du pneu* »

"tire rolling resistance level" means the rolling resistance of a tire configuration, expressed in kilograms per ton.

"tractor"
« *tracteur routier* »

"tractor" means a Class 7 or Class 8 heavy-duty vehicle manufactured primarily for pulling a trailer but not for carrying cargo other than cargo in the trailer.

"transient duty cycle"
« *cycle de service transitoire* »

"transient duty cycle" means the test cycle referred to in section 1333 of Title 40, chapter I, subchapter C, part 86, subpart N, of the CFR.

"vehicle configuration"
« *configuration de véhicule* »

"vehicle configuration" means,

(*a*) in the case of Class 2B and Class 3 heavy-duty vehicles, a configuration as defined in section 104(d)(12)(i) of Title 40, chapter I, subchapter U, part 1037, subpart B, of the CFR; and

(*b*) in the case of vocational vehicles and of tractors, a unique combination of vehicle hardware and calibration that has an effect on measured or modelled emissions.

"vehicle service class"
« *classe de service d'un véhicule* »

"vehicle service class" means any one of the following groups:

(*a*) light heavy-duty vehicles;

(*b*) medium heavy-duty vehicles; and

(*c*) heavy heavy-duty vehicles.

"vehicle subconfiguration"
« *sous-configuration de véhicule* »

"vehicle subconfiguration" means, within a vehicle configuration of Class 2B and Class 3 heavy-duty vehicles, a unique combination of equivalent test weight and road-load horsepower, and any other operational characteristics or parameters that may significantly affect CO_2 emissions within the vehicle configuration.

"vocational tractor"
« *tracteur routier spécialisé* »

"vocational tractor" means any of the following tractors that are not designed primarily to operate at high and constant speeds such as on highways, or that would not benefit from efficiency improvements designed for line-haul tractors:

(*a*) a low-roof tractor designed for local pickup and delivery;

(*b*) a tractor designed for both on-road and off-road use, such as a tractor with a reinforced frame and increased ground clearance; or

(*c*) a tractor with a GCWR of more than 54 431 kg (120,000 pounds).

"vocational vehicle"
« *véhicule spécialisé* »

"vocational vehicle" means any of the following:

(*a*) a Class 4, Class 5 or Class 6 heavy-duty vehicle;

(*b*) a Class 7 or Class 8 heavy-duty vehicle that is not a tractor;

(*c*) a vocational tractor;

(*d*) a Class 2B or Class 3 heavy-duty incomplete vehicle that is not a cab-complete vehicle and is equipped with an engine conforming to the alternative standard referred to in section 32; or

(*e*) a Class 2B or Class 3 heavy-duty vehicle referred to in section 104(f) of Title 40, chapter I, subchapter U, part 1037, subpart B, of the CFR.

CFR

(2) Standards that are incorporated by reference in these Regulations from the CFR are those expressly set out in the CFR and must be read as excluding

(*a*) references to the EPA or the Administrator of the EPA exercising discretion in any way;

(*b*) references to the Secretary of Transportation exercising discretion in any way;

(*c*) alternative standards related to fleet averages, other averages, emission credits, small volume manufacturers or financial hardship; and

(*d*) standards or evidence of conformity with any authority other than the EPA.

Interpretation

(3) For the purposes of subsection (2), a reference in the CFR to "carbon-related exhaust emissions" and "CREE" must be read as "CO_2 emissions".

Rounding

(4) Unless otherwise provided in these Regulations, the calculations and measurements in these Regulations must be rounded in accordance with section 6 of the American Society for Testing and Materials method ASTM E29, entitled *Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications*.

Useful life

(5) "Useful life", unless otherwise provided in these Regulations, refers to the period of time or use in respect of which an emission standard applies to, as the case may be,

(*a*) Class 2B and Class 3 heavy-duty vehicles and heavy-duty incomplete vehicles — excluding those referred to in the definition "vocational vehicle" in subsection (1) — namely, 11 years or 193 121 km (120,000 miles), whichever occurs first;

(*b*) Class 2B, Class 3, Class 4 and Class 5 vocational vehicles and incomplete vocational vehicles, heavy-duty engines that are spark-ignition engines and light heavy-duty engines that are compression-ignition engines, namely, 10 years or 177 027 km (110,000 miles), whichever occurs first;

(*c*) Class 6 and Class 7 vocational vehicles and incomplete vocational vehicles, Class 7 tractors and incomplete tractors and medium heavy-duty engines that are compression-ignition engines, namely, 10 years or 297 728 km (185,000 miles), whichever occurs first;

(*d*) Class 8 vocational vehicles, incomplete vocational vehicles, tractors and incomplete tractors, namely, 10 years or 700 064 km (435,000 miles), whichever occurs first; and

(*e*) heavy heavy-duty engines that are compression-ignition engines, namely, as set out in section 2 of Title 40, chapter I, subchapter C, part 86, subpart A, of the CFR for criteria air contaminants.

Roof height — tractors

(6) Subject to subsections (7) and (8), "roof height" refers to the maximum height of a tractor, rounded to the nearest centimetre, excluding small accessories such as exhaust pipes and antennas, but including large accessories such as roof fairings, and measured with tires inflated to the manufacturer's recommended cold tire inflation pressure and without occupants or cargo onboard.

Alternative roof height measurement — tractors

(7) The roof height of a tractor may be measured with a static loaded radius equal to the arithmetic mean of the largest and smallest static loaded radius of the tires that are recommended for the tractor by the manufacturer.

Adjustable roof fairing — tractors

(8) In the case of a tractor equipped with an adjustable roof fairing, the roof height must be measured with the fairing in its lowest setting.

Family emission limit

(9) A family emission limit must be expressed to the same number of decimal places as the emission standard it replaces.

Engine particularities — spark-ignition engines

(10) In these Regulations, a spark-ignition engine that is regulated as a "diesel engine" under part 86 of Title 40, chapter I, subchapter C, of the CFR, must conform to the standards, test procedures, fuels and calculation methods applicable to a compression-ignition engine.

Engine particularities — compression-ignition engines

(11) In these Regulations, a compression-ignition engine that is regulated as an "Otto-cycle engine" under part 86 of Title 40, chapter I, subchapter C, of the CFR, must conform to the standards, test procedures, fuels and calculation methods applicable to a spark-ignition engine.

PURPOSE

Purpose

2. The purpose of these Regulations is to reduce greenhouse gas emissions from heavy-duty vehicles and engines by establishing emission standards and test procedures that are aligned with the federal requirements of the United States.

BACKGROUND

Background

3. These Regulations set out

(*a*) prescribed classes of vehicles and engines for the purposes of section 149 of the Act;

(*b*) requirements respecting the conformity of heavy-duty vehicles and heavy-duty engines with greenhouse gas emission standards for the purposes of section 153 of the Act;

(*c*) requirements respecting the conformity of fleets of heavy-duty vehicles and heavy-duty engines to greenhouse gas emission standards and other requirements for carrying out the purposes of Division 5 of Part 7, of the Act; and

(*d*) a credit system for the purposes of section 162 of the Act.

MODEL YEAR

Model year

4. (1) A year that is used by a manufacturer as a model year must,

(*a*) if the period of production of a model of heavy-duty vehicle or heavy-duty engine does not include January 1 of a calendar year, correspond to the calendar year during which the period of production falls; or

(*b*) if the period of production of a model of heavy-duty vehicle or heavy-duty engine includes January 1 of a calendar year, correspond to that calendar year.

Period of production

(2) The period of production of a model of heavy-duty vehicle or heavy-duty engine must include only one January 1.

PRESCRIBED CLASSES OF VEHICLES AND ENGINES

Heavy-duty vehicles

5. (1) The following classes of vehicles are prescribed for the purposes of the definition "vehicle" in section 149 of the Act:

(*a*) Class 2B and Class 3 heavy-duty vehicles;

(*b*) vocational vehicles;

(*c*) tractors; and

(*d*) heavy-duty incomplete vehicles.

Heavy-duty engines

(2) Heavy-duty engines are prescribed for the purposes of the definition "engine" in section 149 of the Act.

Exclusion

(3) The prescribed classes of vehicles and engines referred to in subsections (1) and (2) do not include

(*a*) heavy-duty vehicles whose main assembly was completed 15 years or more before the day on which they were imported into Canada; and

(*b*) heavy-duty vehicles or heavy-duty engines that are to be exported and that are accompanied by written evidence establishing that they will not be sold or used in Canada.

Transportation within Canada — heavy-duty vehicles

(4) For the purposes of section 152 of the Act, the prescribed vehicles are the vehicles referred to in subsection (1) for which the main assembly is completed in Canada, other than a vehicle that will be used in Canada solely for purposes of exhibition, demonstration, evaluation or testing.

Transportation within Canada — heavy-duty engines

(5) For the purposes of section 152 of the Act, the prescribed engines are the engines referred to in subsection (2) that are manufactured in Canada, other than

(*a*) an engine that will be used in Canada solely for purposes of exhibition, demonstration, evaluation or testing;

(*b*) an engine that is to be installed in a heavy-duty vehicle before sale to the vehicle's first retail purchaser; and

(*c*) an engine that is to be installed as a replacement engine in a heavy-duty vehicle that has a national emissions mark applied to it, if the replacement engine is

(i) of the same model year as the original engine, and

(ii) identical to the original engine in all respects material to emissions.

NATIONAL EMISSIONS MARK

Application

6. (1) A company that intends to apply the national emissions mark set out in Schedule 2 to the *On-Road Vehicle and Engine Emission Regulations* to a vehicle or engine must apply to the Minister to obtain an authorization in accordance with subsection 7(2) of those Regulations.

Exception

(2) Subsection (1) does not apply to a company that, on the day on which these Regulations come into force, is authorized to apply the national emissions mark to a vehicle or engine under the *On-Road Vehicle and Engine Emission Regulations*.

National emissions mark

7. Subject to subsections 13(2), 15(2) and 16(2), a company that applies a national emissions mark to a vehicle or engine must comply with section 8 of the *On-Road Vehicle and Engine Emission Regulations*.

LABELLING

Non-EPA-certified engines

8. (1) Heavy-duty engines and the engines referred to in section 32 that are imported or manufactured in Canada — other than EPA-certified engines — must bear a label that sets out the following information:

(*a*) subject to subsection (3), the statement "THIS ENGINE CONFORMS TO ALL APPLICABLE STANDARDS PRESCRIBED BY THE CANADIAN HEAVY-DUTY VEHICLE AND ENGINE GREENHOUSE GAS EMISSION REGULATIONS IN EFFECT FOR MODEL YEAR [MODEL YEAR] / CE MOTEUR EST CONFORME À TOUTES LES NORMES QUI LUI SONT APPLICABLES EN VERTU DU RÈGLEMENT SUR LES ÉMISSIONS DE GAZ À EFFET DE SERRE DES VÉHICULES LOURDS ET DE LEURS MOTEURS DU CANADA EN VIGUEUR POUR L'ANNÉE DE MODÈLE [ANNÉE DE MODÈLE]";

(*b*) the name of the engine's manufacturer;

(*c*) the engine's model year if the statement referred to in paragraph (*a*) is not provided;

(*d*) the date of the engine's manufacture;

(*e*) the unique identification number of the engine;

(*f*) the engine's gross power;

(*g*) the engine displacement;

(*h*) an identification of the emission control system;

(*i*) the engine family; and

(*j*) the limits on the types of use for the engine to ensure that the emission standards set out in these Regulations are complied with.

Family emission limit

(2) In the case of medium heavy-duty engines and heavy heavy-duty engines designed to be used in both vocational vehicles or incomplete vocational vehicles and tractors or incomplete tractors, the label referred to in subsection (1) must set out the CO_2 family emission limit for the steady state duty cycle and transient duty cycle.

National emissions mark

(3) Paragraph (1)(*a*) does not apply when a national emissions mark is applied to the engine.

Unique identification number

(4) The date of manufacture referred to in paragraph (1)(*d*) and the unique identification number of the engine referred to in paragraph (1)(*e*) may, instead of being set out on the label, be permanently affixed, engraved or stamped on the engine.

Engines referred to in section 32

(5) In the case of spark-ignition engines referred to in section 32, the label referred to in subsection (1) must also set out one of the following statements, whichever applies:

(*a*) a statement in both official languages that the engine conforms to the alternative greenhouse gas emission standards for engines of Class 2B and Class 3 heavy-duty vehicles; or

(*b*) the statement referred to in section 150(m)(4) of Title 40, chapter I, subchapter U, part 1037, subpart B, of the CFR.

Engines referred to in subsection 37(1)

(6) In the case of compression-ignition engines referred to in subsection 37(1), the label referred to in subsection (1) must also set out one of the following statements, whichever applies:

(*a*) a statement in both official languages that the engine conforms to the alternative CO_2 emission standards based on model year 2011 compression-ignition engines; or

(*b*) the statement referred to in section 620(d) of Title 40, chapter I, subchapter U, part 1036, subpart G, of the CFR.

Non-EPA-certified vehicles

9. (1) Heavy-duty vehicles that are imported or manufactured in Canada — other than EPA-certified heavy-duty vehicles — must bear a label that sets out the following information:

(*a*) subject to subsection (2), the statement "THIS VEHICLE CONFORMS TO ALL APPLICABLE STANDARDS PRESCRIBED BY THE CANADIAN HEAVY-DUTY VEHICLE AND ENGINE GREENHOUSE GAS EMISSION REGULATIONS IN EFFECT FOR MODEL YEAR [MODEL YEAR] / CE VÉHICULE EST CONFORME À TOUTES LES NORMES QUI LUI SONT APPLICABLES EN VERTU DU RÈGLEMENT SUR LES ÉMISSIONS DE GAZ À EFFET DE SERRE DES VÉHICULES LOURDS ET DE LEURS MOTEURS DU CANADA EN VIGUEUR POUR L'ANNÉE DE MODÈLE [ANNÉE DE MODÈLE]";

(*b*) the name of the vehicle's manufacturer and, in the case of a vehicle manufactured in stages, the name of the final-stage manufacturer;

(*c*) the vehicle's model year if the statement referred to in paragraph (*a*) is not provided;

(*d*) the date of the vehicle's manufacture and, in the case of a vehicle manufactured in stages, the month and year chosen by the final-stage manufacturer to represent the date

of the heavy-duty completed vehicle's manufacture;

(*e*) the type of vehicle, in both official languages, referred to in subparagraphs 25(3)(*a*)(i) to (xiv);

(*f*) the vehicle family;

(*g*) in the case of a vocational vehicle referred to in subsection 33(3), a statement, in both official languages, that the vehicle is designed for off-road use;

(*h*) in the case of a vocational tractor, a statement, in both official languages, that the vehicle is a vocational tractor; and

(*i*) in the case of a vocational vehicle or a tractor that is exempted under section 24,

(i) a statement to that effect, in both official languages, and

(ii) the CO_2 emission rate, expressed in grams of CO_2 per ton-mile and identified by the words "CO_2 EMISSION RATE" and "TAUX D'ÉMISSIONS DE CO_2".

National emissions mark

(2) Paragraph (1)(*a*) does not apply when a national emissions mark is applied to the vehicle or when the statement referred to in paragraph (1)(*g*) or subparagraph (1)(*i*)(i) is set out on the label.

Requirements

10. All the labels applied to a vehicle or engine, as the case may be, in accordance with sections 8, 9, 13, 15 and 16, must

(*a*) be applied to a conspicuous and readily accessible location;

(*b*) be permanently attached to the vehicle and, in the case of an engine, be permanently attached to an engine part that is necessary for normal engine operation and does not normally require replacement during the engine's useful life;

(*c*) be resistant to or protected against any weather condition;

(*d*) have lettering that is

(i) clear and indelible,

(ii) indented, embossed or in a colour that contrasts with the background colour of the label, and

(iii) in block capitals and numerals that are not less than 2 mm in height; and

(*e*) have units that are identified by the appropriate name or symbol.

VEHICLES MANUFACTURED IN STAGES

APPLICATION

Application

11. (1) Sections 12 to 17 apply to a company that manufactures tractors or vocational vehicles or imports incomplete tractors or incomplete vocational vehicles for which the company does not remain in possession or control throughout the manufacturing process until they are completed.

Heavy-duty incomplete vehicle

(2) For the purposes of this section and sections 12 to 17, the expression "heavy-duty incomplete vehicle" includes an incomplete vocational vehicle and an incomplete tractor.

Participation in the credit system

(3) The heavy-duty incomplete vehicle manufacturer, importer of a heavy-duty incomplete vehicle, intermediate manufacturer or final-stage manufacturer may include its tractors and vocational vehicles that are manufactured in stages in a fleet referred to in section 25 for the purpose of participation in the CO_2 emission credit system.

Evidence of conformity

(4) For the purposes of paragraph 153(1)(*b*) of the Act, a company must obtain and produce the evidence of conformity referred to in sections 60 to 62 if the company

(*a*) is a heavy-duty incomplete vehicle manufacturer or importer of a heavy-duty incomplete vehicle and it makes a statement in accordance with subparagraph 12(1)(*f*)(i), (iii) or (iv) in the heavy-duty incomplete vehicle document; or

(*b*) is an intermediate manufacturer or a final-stage manufacturer that either

(i) provides the written request referred to in paragraph 12(2)(*a*), (*c*) or (*e*) or 14(3)(*a*), (*c*) or (*e*), or

(ii) makes changes to the heavy-duty incomplete vehicle that affect the validity of a statement made by the heavy-duty incomplete vehicle manufacturer, the importer of the heavy-duty incomplete vehicle or the intermediate manufacturer, as the case may be, in accordance with subparagraph 12(1)(*f*)(i), (iii) or (iv).

Reporting

(5) The company referred to in subsection (4) must submit the end of model year report.

HEAVY-DUTY INCOMPLETE VEHICLE DOCUMENT OF A MANUFACTURER OR IMPORTER

Contents

12. (1) A manufacturer or importer of a heavy-duty incomplete vehicle must provide to the intermediate manufacturer or the final-stage manufacturer, as the case may be, on or before the day on which the vehicle is delivered, a heavy-duty incomplete vehicle document that contains the following information:

(*a*) the name and mailing address of the manufacturer and, if applicable, the importer of the vehicle;

(*b*) the month and year in which the manufacturer — or the manufacturer outside Canada, in the case of an importer — performed its last manufacturing operation on the heavy-duty incomplete vehicle;

(*c*) the vehicle identification number;

(*d*) the GVWR that is intended for the vehicle when it is completed, expressed in kilograms;

(*e*) a list of the types of vehicles, amongst those referred to in subparagraphs 25(3)(*a*)(ii) to (xiv), which correspond to the types of vehicles that the heavy-duty incomplete vehicles could become once they are completed;

(*f*) a list of the emission standards referred to in subsection 20(1) that apply to each type of vehicle referred to in paragraph (*e*) at the time specified in paragraph (*b*) and in each case one or more of the following statements, whichever applies:

(i) a statement that the heavy-duty completed vehicle will conform to the standard if no alterations are made to its components that are identified by the manufacturer or importer,

(ii) a statement that conformity to the standard cannot be determined based on the components that are fitted on the heavy-duty incomplete vehicle and that the manufacturer or importer, as the case may be, makes no representation as to conformity to the standard,

(iii) a statement that the heavy-duty incomplete vehicle has been included in a fleet referred to in section 25 for the purpose of participation in the CO_2 emission credit system by the manufacturer or importer, as the case may be, and that the heavy-duty completed vehicle will conform to these Regulations if the CO_2 family emission limit referred to in paragraph (*h*) for that vehicle is not increased by means of alterations made to the heavy-duty incomplete vehicle's components that are identified by the manufacturer or importer, as the case may be, or

(iv) a statement that the heavy-duty incomplete vehicle is exempted under section 24;

(*g*) a statement that the heavy-duty incomplete vehicle is equipped with a heavy-duty engine that meets the requirements of these Regulations; and

(*h*) if the document bears the statement referred to in subparagraph (*f*)(iii), a statement of the CO_2 family emission limit for that vehicle that must not be exceeded — corresponding to the emission rate determined for B in paragraph 41(1)(*b*) in the case of an incomplete vocational vehicle or in paragraph 41(1)(*c*) in the case of an incomplete tractor — expressed in grams of CO_2 per ton-mile, and identified by the words "CO_2 FAMILY EMISSION LIMIT" and "LIMITE D'ÉMISSIONS DE LA FAMILLE APPLICABLE AU CO_2".

Request for delivery

(2) For the purposes of subparagraph (1)(*f*)(ii), the vehicle may only leave the possession or control of the manufacturer or importer if the manufacturer or importer, as the case may be, has received a written request for delivery of the vehicle from the intermediate manufacturer or the final-stage manufacturer. The written request must include one of the following statements, whichever applies:

(*a*) a statement from the intermediate manufacturer or the final-stage manufacturer, as the case may be, that the vehicle will conform to all applicable standards before the vehicle leaves its possession or control;

(*b*) a statement from the intermediate manufacturer that it will obtain the statement referred to in paragraph (*a*) from the final-stage manufacturer or from another intermediate manufacturer, as the case may be, before the vehicle leaves its possession

or control;

(*c*) a statement from the intermediate manufacturer or the final-stage manufacturer, as the case may be, that the vehicle will be included in a fleet referred to in section 25 for the purpose of participation in the CO_2 emission credit system before the vehicle leaves its possession or control;

(*d*) a statement from the intermediate manufacturer that it will obtain the statement referred to in paragraph (*c*) from the final-stage manufacturer or from another intermediate manufacturer, as the case may be, before the vehicle leaves its possession or control;

(*e*) a statement from the intermediate manufacturer or the final-stage manufacturer, as the case may be, that the vehicle will be exempted under section 24 before the vehicle leaves its possession or control; or

(*f*) a statement from the intermediate manufacturer that it will obtain the statement referred to in paragraph (*e*) from the final-stage manufacturer or from another intermediate manufacturer, as the case may be, before the vehicle leaves its possession or control.

Where to keep

(3) The heavy-duty incomplete vehicle document must be kept in a weather-resistant container that is attached to the vehicle in a conspicuous and readily accessible location, or it may be sent directly to an intermediate manufacturer or a final-stage manufacturer, as the case may be.

HEAVY-DUTY INCOMPLETE VEHICLE INFORMATION LABEL OF A MANUFACTURER OR IMPORTER

Contents

13. (1) A manufacturer or importer of a heavy-duty incomplete vehicle, as the case may be, must apply to every heavy-duty incomplete vehicle it manufactures or imports, either the U.S. emission control information label referred to in paragraph 60(*d*) or an information label that sets out the following information:

(*a*) a statement, in both official languages, that the vehicle is a heavy-duty incomplete vehicle;

(*b*) the name of the manufacturer and, if applicable, the name of the importer;

(*c*) the month and year in which the manufacturer — or the manufacturer outside Canada, in the case of an importer — performed its last manufacturing operation on the heavy-duty incomplete vehicle;

(*d*) the vehicle identification number; and

(*e*) the GVWR, expressed in kilograms, that is intended for the vehicle when it is a heavy-duty completed vehicle, and identified by the words “Gross Vehicle Weight Rating” and “Poids nominal brut du véhicule” or the abbreviations “GVWR” and “PNBV”.

National emissions mark

(2) The national emissions mark must be applied on

(*a*) the U.S. emission control information label;

(*b*) the information label referred to in subsection (1); or

(*c*) a label applied to the vehicle, immediately beside either one of the labels referred to in paragraphs (*a*) and (*b*).

HEAVY-DUTY INCOMPLETE VEHICLE DOCUMENT OF AN INTERMEDIATE MANUFACTURER

Delivery of a heavy-duty incomplete vehicle

14. (1) An intermediate manufacturer of a heavy-duty incomplete vehicle must, on or before the date of delivery of the heavy-duty incomplete vehicle to the subsequent manufacturer, provide to the subsequent manufacturer, in the manner specified in subsection 12(3), the heavy-duty incomplete vehicle document that was provided by the previous manufacturer.

Addendum

(2) An intermediate manufacturer must, before providing the document under subsection (1), make an addendum by adding the following information:

(*a*) its name and mailing address;

(*b*) a precise description of all the changes it has made to the heavy-duty incomplete vehicle;

(*c*) if any of those changes affect the validity of a statement made by a previous manufacturer in accordance with paragraph 12(1)(*f*), an indication of the amendments that must be made to those statements to reflect the changes made by the intermediate manufacturer;

(*d*) if a previous manufacturer has not included the heavy-duty incomplete vehicle in a fleet referred to in section 25 for the purpose of participation in the CO_2 emission credit system, an indication as to whether the vehicle has been included in a fleet by the intermediate manufacturer and, if applicable, the CO_2 family emission limit that must be respected for this vehicle, that corresponds to the emission rate represented by the variable B in paragraph 41(1)(*b*) in the case of an incomplete vocational vehicle or in paragraph 41(1)(*c*) in the case of an incomplete tractor, expressed in grams of CO_2 per ton-mile, and identified by the words "CO_2 FAMILY EMISSION LIMIT" and "LIMITE D'ÉMISSIONS DE LA FAMILLE APPLICABLE AU CO_2"; and

(*e*) if applicable, a statement that the heavy-duty incomplete vehicle is exempted under section 24.

Request for delivery

(3) If the heavy-duty incomplete vehicle does not conform to all applicable standards and has not been included in a fleet referred to in section 25 for the purpose of participation in the CO_2 emission credit system, it may only leave the possession or control of the intermediate manufacturer if that manufacturer has received a written request for the delivery of the vehicle from another intermediate manufacturer or the final-stage manufacturer, as the case may be. The written request must include one of the following statements, whichever applies:

(*a*) a statement from another intermediate manufacturer or the final-stage manufacturer, as the case may be, that the vehicle will conform to all applicable standards before the vehicle leaves its possession or control;

(*b*) a statement from another intermediate manufacturer that it will obtain the statement referred to in paragraph (*a*) from the final-stage manufacturer or from another intermediate manufacturer, as the case may be, before the vehicle leaves its possession

or control;

(*c*) a statement from another intermediate manufacturer or the final-stage manufacturer, as the case may be, that the vehicle will be included in a fleet referred to in section 25 for the purpose of participation in the CO_2 emission credit system before the vehicle leaves its possession or control;

(*d*) a statement from another intermediate manufacturer that it will obtain the statement referred to in paragraph (*c*) from the final-stage manufacturer or from another intermediate manufacturer, as the case may be, before the vehicle leaves its possession or control;

(*e*) a statement from another intermediate manufacturer or the final-stage manufacturer, as the case may be, that the vehicle will be exempted under section 24 before the vehicle leaves its possession or control; or

(*f*) a statement from another intermediate manufacturer that it will obtain the statement referred to in paragraph (*e*) from the final-stage manufacturer or from another intermediate manufacturer, as the case may be, before the vehicle leaves its possession or control.

HEAVY-DUTY INCOMPLETE VEHICLE INFORMATION LABEL OF AN INTERMEDIATE MANUFACTURER

Contents

15. (1) An intermediate manufacturer must apply to every heavy-duty incomplete vehicle that it manufactures, immediately beside the information label of the previous manufacturer, either the U.S. emission control information label referred to in paragraph 60(*d*) or an information label that sets out the following information:

(*a*) a statement, in both official languages, that the vehicle is a heavy-duty incomplete vehicle;

(*b*) its name;

(*c*) a statement, in both official languages, that it is an intermediate manufacturer; and

(*d*) the month and year in which the intermediate manufacturer performed its last manufacturing operation on the heavy-duty incomplete vehicle.

National emissions mark

(2) The national emissions mark must be applied on

(*a*) the U.S. emission control information label;

(*b*) the information label referred to in subsection (1); or

(*c*) a label applied to the vehicle, immediately beside either one of the labels referred to in paragraphs (*a*) and (*b*).

Increase of GVWR

(3) If an intermediate manufacturer increases the GVWR above the value referred to in paragraph 12(1)(*d*), it must ensure that the new weight rating is displayed on the information label referred to in subsection (1).

FINAL-STAGE MANUFACTURER

Requirements

16. (1) A final-stage manufacturer must select a date of manufacture for a heavy-duty completed vehicle that may be no earlier than the date referred to in paragraph 12(1)(*b*) but no later than the day on which manufacturing operations on the vehicle are completed by the final-stage manufacturer and must

(*a*) complete the heavy-duty incomplete vehicle in such a manner that the heavy-duty completed vehicle conforms to the standards prescribed for the applicable type of vehicle referred to in subparagraphs 25(3)(*a*)(ii) to (xiv) as of the date chosen by the final-stage manufacturer;

(*b*) apply to the heavy-duty completed vehicle either the U.S. emission control information label or the compliance label referred to in section 9; and

(*c*) apply the national emissions mark set out in Schedule 2 to the *On-Road Vehicle and Engine Emission Regulations* in accordance with section 8 of those Regulations in the case of a vehicle manufactured in Canada for sale in Canada.

National emissions mark

(2) The national emissions mark may also be displayed on one of the labels referred to in paragraph (1)(*b*).

Increase of GVWR

(3) The GVWR applied by the previous manufacturer must be set out on one of the labels referred to in paragraph (1)(*b*) and if a final-stage manufacturer increases the GVWR above the value referred to in paragraph 12(1)(*d*) and subsection 15(3) or new weight ratings have been displayed on an intermediate manufacturer's information label, the final-stage manufacturer must display the new weight ratings on one of the labels referred to in paragraph (1)(*b*) for the heavy-duty completed vehicle.

Addendum

17. (1) A final-stage manufacturer must make an addendum to the heavy-duty incomplete vehicle document by adding the following information:

(*a*) its name and mailing address;

(*b*) a precise description of all the changes it has made to the heavy-duty incomplete vehicle;

(*c*) if any of those changes affect the validity of a statement made by a previous manufacturer in accordance with paragraph 12(1)(*f*) or 14(2)(*c*), an indication of the amendments that must be made to those statements to reflect the changes made by the final-stage manufacturer;

(*d*) if a previous manufacturer has not included the heavy-duty incomplete vehicle in a fleet referred to in section 25 for the purpose of participation in the CO_2 emission credit system, an indication as to whether the vehicle has been included in a fleet by the final-stage manufacturer and, if applicable, the CO_2 family emission limit that must be respected for this vehicle, corresponding to the emission rate represented by the variable B in paragraph 41(1)(*b*) in the case of an incomplete vocational vehicle or in paragraph 41(1)(*c*) in the case of an incomplete tractor, expressed in grams of CO_2 per ton-mile, and identified by the words "CO_2 FAMILY EMISSION LIMIT" and "LIMITE D'ÉMISSIONS DE

LA FAMILLE APPLICABLE AU CO_2"; and

(*e*) if applicable, a statement that the heavy-duty incomplete vehicle is exempted under section 24.

Retention

(2) A final-stage manufacturer must retain and make available to the Minister, on request, the heavy-duty incomplete vehicle document referred to in subsection (1) and sections 12 and 14, for a period of at least eight years after the day on which it completes its last manufacturing operation on the vehicle.

ALTERED VEHICLES

Requirements

18. (1) If a company alters a vocational vehicle or a tractor that was in conformity to these Regulations — other than an incomplete vocational vehicle or incomplete tractor referred to in sections 11 to 17 — in such a manner that its stated type of vehicle referred to in subparagraphs 25(3)(*a*)(ii) to (xiv) is no longer accurate, or if the company changes an engine configuration in a way that may affect emissions, or changes any of the components on the vehicle that may alter the value of a parameter used in the GEM computer simulation model, the company must

(*a*) ensure that the U.S. emission control information label referred to in paragraph 60(*d*), the compliance label, the information label or the national emissions mark, as the case may be, remains applied to the vehicle;

(*b*) in respect of the work carried out by the company to alter the vehicle, ensure that the vehicle conforms to all applicable standards;

(*c*) subject to subsection (2), apply to the vehicle an additional label that sets out the following information:

(i) the words "THIS VEHICLE WAS ALTERED BY / CE VÉHICULE A ÉTÉ MODIFIÉ PAR", followed by the name of the company that altered the vehicle,

(ii) the month and year during which the alteration was made to the vehicle,

(iii) the national emissions mark set out in Schedule 2 to the *On-Road Vehicle and Engine Emission Regulations* applied in accordance with section 8 of those Regulations,

(iv) the new GVWR of the altered vehicle, if it differs from the GVWR shown on the compliance label or the U.S. emission control information label, as the case may be, and

(v) the type of vehicle referred to in subparagraphs 25(3)(*a*)(ii) to (xiv), if it differs from the type shown on the compliance label or the U.S. emission control information label, as the case may be; and

(*d*) obtain and produce the evidence of conformity referred to in section 61 for the altered vehicle in a form and manner that is satisfactory to the Minister before the vehicle leaves its possession or control.

National emissions mark

(2) The national emissions mark referred to in subparagraph (1)(*c*)(iii) may also be displayed on a label applied to the vehicle immediately beside the U.S. emission control information label or the compliance label, as the case may be.

Non-participation in credit system

(3) A company that alters a vehicle in accordance with this section must not participate in the CO_2 emission credit system.

GREENHOUSE GAS EMISSION STANDARDS

GENERAL

Heavy-duty Vehicles of the 2014 Model Year

Exemption

19. Sections 23, 27, 28, 33 and 34 do not apply to heavy-duty vehicles of the 2014 model year that have a date of manufacture that is before January 1, 2014.

Heavy-duty Vehicles and Engines Covered by an EPA Certificate

Conforming to EPA certificate

20. (1) Subject to subsections (2) and (3), a heavy-duty vehicle or a heavy-duty engine of a given model year that is covered by an EPA certificate and that is sold concurrently in Canada and the United States must conform to the certification and in-use standards referred to in the EPA certificate — instead of the standards referred to in sections 21 and 22 — and the following standards, whichever apply:

(*a*) section 23 and subsection 27(1) for Class 2B and Class 3 heavy-duty vehicles and heavy-duty incomplete vehicles, excluding those referred to in the definition "vocational vehicle" in subsection 1(1);

(*b*) subsection 33(1) for vocational vehicles and incomplete vocational vehicles;

(*c*) section 23 and subsection 34(1) for tractors and incomplete tractors; and

(*d*) subsection 35(1) and, as the case may be, section 36 or subsection 37(1) or (2) for heavy-duty engines.

Fleets — vehicles

(2) A company that manufactures or imports a vocational vehicle, an incomplete vocational vehicle, a tractor or an incomplete tractor that is sold to the first retail purchaser, that is covered by an EPA certificate and conforms to a CO_2 family emission limit that is greater than the CO_2 emission standard applicable to the model year of that vehicle must group all its vehicles into fleets in accordance with section 25 and must participate in the CO_2 emission credit system set out in sections 40 to 53.

Fleets — engines

(3) A company that manufactures or imports an engine that is covered by an EPA certificate must group all its engines into fleets in accordance with section 25 and must participate in the CO_2 emission credit system set out in sections 40 to 53 if the following conditions are met:

(*a*) the number of engines sold in Canada by the company exceeds the number of engines sold in the United States that are covered by the same EPA certificate; and

(*b*) the engine conforms to a CO_2 family certification level that is greater than the CO_2 emission standard applicable to the model year of that engine.

Subsection 153(3) of the Act

(4) For the purposes of subsection 153(3) of the Act, the provisions of the CFR that apply to a vehicle or an engine referred to in subsection (1) under the EPA certificate correspond to the certification and in-use standards referred to in subsection (1).

EPA

(5) For the purposes of subsection 153(3) of the Act, the EPA is the prescribed agency.

Emission Control Systems

On-Road Vehicle and Engine Emission Regulations

21. (1) An emission control system that is installed in a heavy-duty vehicle or a heavy-duty engine for the purpose of conforming to the standards set out in these Regulations must comply with subsection 11(1) of the *On-Road Vehicle and Engine Emission Regulations*.

Defeat device

(2) A heavy-duty vehicle or a heavy-duty engine must not be equipped with a defeat device.

Test procedures

(3) Subsections 11(3) and (4) of the *On-Road Vehicle and Engine Emission Regulations* apply except that the test procedures in question are the ones set out in these Regulations.

Adjustable Parameters

Definition

22. (1) In this section, "adjustable parameter" means a device, system or element of design that is capable of being adjusted to affect the emissions or performance of a heavy-duty vehicle or a heavy-duty engine during emission testing or normal in-use operation, but does not include a device, system or element of design that is permanently sealed by the vehicle or engine manufacturer or that is inaccessible using ordinary tools.

Compliance with standards

(2) A heavy-duty vehicle or a heavy-duty engine that is equipped with adjustable parameters must comply with the applicable standards under these Regulations for any specification within the adjustable range.

Adjustable roof fairing

(3) The adjustable roof fairing of a tractor is not an adjustable parameter for the purposes of this section.

Air Conditioning Systems

HFC134a refrigerant

23. (1) Subject to subsections (2) and (3), in the case of a heavy-duty vehicle or a heavy-duty incomplete vehicle — other than a vocational vehicle or an incomplete vocational vehicle — that is equipped with an air conditioning system that uses HFC134a as a refrigerant, the percent leakage rate, rounded to the nearest one-hundredth of a percent, must not exceed 1.5% per year and is determined by the formula

$$\frac{\text{total leakage rate}}{\text{total refrigerant capacity}} \times 100\,\%$$

where

total leakage rate

is determined using the test procedure set out in section 166 of Title 40, chapter I, subchapter C, part 86, subpart B, of the CFR, expressed in grams per year; and

total refrigerant capacity

is the mass of the HFC134a refrigerant recommended by the heavy-duty vehicle manufacturer as representing a full charge, expressed in grams.

Refrigerant other than HFC134a

(2) Subject to subsection (3), in the case of a heavy-duty vehicle referred to in subsection (1) that is equipped with an air conditioning system that uses a refrigerant other than HFC134a, the adjusted percent leakage rate of that refrigerant, rounded to the nearest one-hundredth of a percent, must not exceed 1.5% per year and is determined by the formula

$$\frac{\text{percent leakage rate} \times \text{GWP}}{1430}$$

where

percent leakage rate

is the value calculated using the formula set out in subsection (1);

GWP

is the global warming potential of the refrigerant determined using the method set out in section 1866 of Title 40, chapter I, subchapter C, part 86, subpart S, of the CFR; and

1430

is the global warming potential of the HFC134a refrigerant.

Total refrigerant capacity less than 734 grams

(3) For the purposes of subsections (2) and (3), if the total refrigerant capacity is less than 734 grams, the percent leakage rate referred to in subsection (1) or the adjusted percent leakage rate referred to in subsection (2), as the case may be, may exceed 1.5% per year if the total leakage rate does not exceed 11.0 grams per year.

Small Volume Companies — Tractors and Vocational Vehicles

Exemption

24. (1) A company may elect, for a given model year, to not comply with the CO_2 emission standards set out in subsection 33(1) or 34(1), as the case may be, for its tractors and vocational vehicles and, in the case of tractors and vocational vehicles covered by an EPA certificate, the company may elect to not comply with subsection 20(2), if the following conditions are met:

(*a*) the company manufactured or imported for sale in Canada in total less than 100 tractors and vocational vehicles of the 2011 model year;

(*b*) its average number of tractors and vocational vehicles manufactured or imported for sale in Canada for the three most recent consecutive model years preceding the model year in question is less than 100;

(*c*) in the case of vehicles not covered by an EPA certificate, the company determines the CO_2 emission rate in accordance with subsection 33(2) or 34(2), as the case may be, and sets out that rate on the label referred to in subparagraph 9(1)(*i*)(ii); and

(*d*) the company reports this election in its end of model year report in accordance with section 55.

No credits or deficits

(2) A company that makes the election referred to in subsection (1) must not participate in the CO_2 emission credit system set out in sections 40 to 53.

Merger

(3) If a company merges with one or more companies after the day on which these Regulations come into force, the company that results from the merger may make an election under subsection (1) and report that election in its first end of model year report if the total number of vocational vehicles and of tractors of the 2011 model year referred to in subsection (1) is equal to the total number of vocational vehicles and of tractors manufactured or imported for sale in Canada by the merged companies for the 2011 model year.

Acquisition

(4) If a company acquires one or more companies after the day on which these Regulations come into force, it must,

(*a*) in the case where the company made an election under subsection (1) before the acquisition, recalculate its number of vocational vehicles and of tractors of the 2011 model year manufactured or imported for sale in Canada by adding to that number the number of tractors and vocational vehicles of the 2011 model year of each of the acquired companies and report it in its first end of model year report following the acquisition; or

(*b*) in the case where the company makes an election under subsection (1) after the acquisition, calculate its number of vocational vehicles and of tractors of the 2011 model year manufactured or imported for sale in Canada by adding to that number the number of tractors and vocational vehicles of the 2011 model year of each of the acquired companies.

Composition of Fleets

Definition of "fleet"

25. (1) In these Regulations, "fleet" refers to the heavy-duty vehicles and heavy-duty engines that a company manufactures in Canada or imports into Canada for the purpose of sale to the first retail purchaser and that are grouped in accordance with this section for the purpose of conforming to sections 28 to 30 or for the purpose of participation in the CO_2 emission credit system set out in sections 40 to 53.

Exclusion

(2) A company may elect to exclude from its fleets

(*a*) the heavy-duty vehicles and heavy-duty engines that it manufactures and that will be used in Canada solely for the purposes of exhibition, demonstration, evaluation or testing, if it reports that election in its end of model year report; and

(*b*) the heavy-duty vehicles and heavy-duty engines that it imports solely for the purposes of exhibition, demonstration, evaluation or testing, if it makes a declaration in accordance with section 65 and it reports that election in its end of model year report.

Fleet composition

(3) A company may group together heavy-duty vehicles and heavy-duty engines of the same model year into more than one fleet as follows:

(*a*) in the case of heavy-duty vehicles and subject to subsections (4) to (6), each fleet is composed solely of the vehicles referred to in one of the following subparagraphs:

(i) subject to section 32 and subsection 33(6), Class 2B and Class 3 heavy-duty vehicles and heavy-duty incomplete vehicles, excluding those referred to in the definition "vocational vehicle" in subsection 1(1),

(ii) Class 2B, Class 3, Class 4 and Class 5 vocational vehicles and incomplete vocational vehicles,

(iii) Class 6 and Class 7 vocational vehicles and incomplete vocational vehicles, excluding vocational tractors,

(iv) Class 8 vocational vehicles and incomplete vocational vehicles, excluding vocational tractors,

(v) Class 7 low-roof tractors and incomplete tractors,

(vi) Class 7 mid-roof tractors and incomplete tractors,

(vii) Class 7 high-roof tractors and incomplete tractors,

(viii) Class 8 low-roof day cab tractors and incomplete tractors,

(ix) Class 8 low-roof sleeper cab tractors and incomplete tractors,

(x) Class 8 mid-roof day cab tractors and incomplete tractors,

(xi) Class 8 mid-roof sleeper cab tractors and incomplete tractors,

(xii) Class 8 high-roof day cab tractors and incomplete tractors,

(xiii) Class 8 high-roof sleeper cab tractors and incomplete tractors, and

(xiv) vocational tractors; and

(*b*) in the case of heavy-duty engines and subject to subsections (7) to (9), each fleet is composed solely of the engines referred to in one of the following subparagraphs:

(i) spark-ignition engines,

(ii) light heavy-duty engines that are compression-ignition engines and that are designed to be used in vocational vehicles and incomplete vocational vehicles,

(iii) medium heavy-duty engines that are compression-ignition engines and that are designed to be used in vocational vehicles and incomplete vocational vehicles,

(iv) heavy heavy-duty engines that are compression-ignition engines and that are designed to be used in vocational vehicles and incomplete vocational vehicles,

(v) medium heavy-duty engines that are compression-ignition engines and that are designed to be used in tractors and incomplete tractors, and

(vi) heavy heavy-duty engines that are compression-ignition engines and that are designed to be used in tractors and incomplete tractors.

Class 2B and Class 3 heavy-duty vehicles

(4) For the purposes of subparagraph (3)(*a*)(i), the following heavy-duty vehicles must be grouped together into one separate fleet of Class 2B and Class 3 heavy-duty vehicles:

(*a*) hybrid vehicles with regenerative braking;

(*b*) vehicles equipped with Rankine-cycle waste heat recovery engines;

(*c*) electric vehicles;

(*d*) fuel cell vehicles; and

(*e*) vehicles that are manufactured with innovative technologies.

Vocational vehicles and tractors

(5) For the purposes of subparagraphs (3)(*a*)(ii) to (xiv), all heavy-duty vehicles of a fleet must

(*a*) if applicable, be either hybrid vehicles with regenerative braking, vehicles equipped with Rankine-cycle waste heat recovery engines, electric vehicles, fuel cell vehicles or vehicles manufactured with innovative technologies;

(*b*) be grouped together into subfleets that include vehicles with identical CO_2 family emission limits if the vehicles in the fleet have more than one family emission limit; and

(*c*) have the same vehicle configuration.

Roof heights, cab types and GVWR

(6) If a vocational vehicle, incomplete vocational vehicle, tractor or incomplete tractor model straddles a roof height, cab type or GVWR division, a company may elect to group all those vehicles into the same fleet if they conform to the most stringent standards applicable to a vehicle in the fleet.

Heavy-duty engines

(7) For the purposes of paragraph (3)(*b*), all heavy-duty engines of a fleet may be grouped together into subfleets that have similar engine hardware and emission characteristics throughout their useful life in accordance with section 24 of Title 40, chapter I, subchapter C, part 86, subpart A, of the CFR.

Hybrid engines and hybrid powertrains

(8) The engines referred to in paragraph (3)(*b*) that are hybrid engines or that are equipped with hybrid powertrains must be grouped into a fleet of hybrid engines.

Heavy-duty engines — vocational vehicles and tractors

(9) In the case of medium heavy-duty engines that are compression-ignition engines and heavy heavy-duty engines that are compression-ignition engines and that are designed to be used in both tractors and vocational vehicles, each engine must be grouped into the type of fleet set out in paragraph (3)(*b*) that corresponds to the vehicle in which it is installed.

Grouping into Fleets

Election applicable to all vehicles and engines

26. If a company makes an election under subsection 29(4), 33(7) or 34(9) or under section 39 for a fleet of heavy-duty vehicles and heavy-duty engines that it manufactures or imports, that election applies to all the vehicles and engines of that fleet.

CLASS 2B AND CLASS 3 HEAVY-DUTY VEHICLES

N_2O and CH_4 Emissions

Standards

27. (1) Class 2B and Class 3 heavy-duty vehicles and heavy-duty incomplete vehicles of the 2014 and subsequent model years — excluding those referred to in the definition "vocational vehicle" in subsection 1(1) — must have N_2O and CH_4 emission values that do not exceed 0.05 g/mile for N_2O and 0.05 g/mile for CH_4 for the applicable useful life of the vehicle.

Calculation

(2) The N_2O and CH_4 emission values must be calculated in accordance with section 31 and be rounded to the nearest 0.001 g/mile.

Fleet calculation

(3) Subject to subsection (6), a company that manufactures or imports the vehicles referred to in subsection (1) that exceed any of the standards set out in that subsection must group all its vehicles of a given model year into a fleet in accordance with section 25 and must determine any N_2O and CH_4 emission deficit for that fleet, expressed in megagrams of CO_2 and rounded to the nearest megagram, using the formula

$$\frac{[(A - B) \times C \times D \times E]}{1\,000\,000}$$

where

A is 0.05 g/mile for N_2O and 0.05 g/mile for CH_4;

B is the average N_2O or CH_4 emission value for the fleet of vehicles, rounded to the nearest 0.01 g/mile, and is determined by the formula

$$\frac{\sum (W \times Y)}{Z}$$

where

W is the N_2O or CH_4 family emission limit, corresponding to the N_2O or CH_4 emission value calculated in accordance with section 31, taking into account subsection (5) for each vehicle configuration,

Y is the number of vehicles of the vehicle configuration in question in the fleet, and

Z is the number of vehicles in the fleet;

C is the number of vehicles in the fleet;

D is the useful life of the vehicle, namely, 120,000 miles; and

E is the global warming potential and is equal to the following number of credits needed to offset a N_2O and CH_4 deficit:

(*a*) an emission credit of 298 Mg of CO_2 to offset a deficit of 1 Mg of N_2O; and

(*b*) an emission credit of 25 Mg of CO_2 to offset a deficit of 1 Mg of CH_4.

Family emission limit

(4) For the purposes of subsection (3), every vehicle within the fleet must conform to the CH_4 or N_2O family emission limit, as the case may be, for the vehicle configuration and corresponding to the emission value determined for W in subsection (3).

Representative data

(5) When a company calculates the N_2O or CH_4 emission value for a vehicle configuration in accordance with subsection (3), it must use the data and values from one or more vehicle subconfigurations in the calculation of that value that represent at least 90% of its total number of vehicles for the vehicle configuration.

Offsetting deficit

(6) When a company incurs a deficit calculated under subsection (3), it must offset it by using the CO_2 emission credits obtained in accordance with sections 40 to 53 for the averaging set in which the fleet is included.

CO_2 Emissions

Average standard

28. (1) A company must group all its Class 2B and Class 3 heavy-duty vehicles and heavy-duty incomplete vehicles of the 2014 and subsequent model years — excluding those referred to in the definition "vocational vehicle" in subsection 1(1) — into a fleet based on model year in accordance with section 25 and must ensure that the fleet average CO_2 emission value calculated in accordance with section 30 for that fleet does not exceed the applicable fleet average CO_2 emission standard calculated in accordance with section 29 for that fleet for the model year in question.

Offsetting deficit

(2) When a company incurs a deficit calculated under subsection (1), it must offset the deficit by using the CO_2 emission credits obtained in accordance with sections 40 to 53 for the averaging set in which the fleet is included.

Calculation of average standard

29. (1) Subject to subsection (6), a company must determine the fleet average CO_2 emission standard for a given model year, expressed in grams of CO_2 per mile and rounded to the nearest 0.1 gram of CO_2 per mile, for its fleet of Class 2B and Class 3 heavy-duty vehicles and heavy-duty incomplete vehicles — excluding those referred to in the definition "vocational vehicle" in subsection 1(1) — using the formula

$$\frac{\sum(A \times B)}{C}$$

where

A is the CO_2 emission target value calculated for each vehicle subconfiguration in the fleet using the applicable formula set out in subsection (2) and rounded to the nearest 0.1 gram of CO_2 per mile;

B is the number of vehicles of the vehicle subconfiguration in question in the fleet; and

C is the number of vehicles in the fleet.

Vehicle subconfiguration

(2) Subject to subsection (4), the CO_2 emission target value for each vehicle subconfiguration in a fleet must be calculated using the formula set out in one of the following paragraphs, whichever applies:

(*a*) for vehicles equipped with a spark-ignition engine:

$$(0.0440 \times WF) + 339$$

where

WF is the work factor for each vehicle sub-configuration, calculated using the formula set out in subsection (3) and rounded to the nearest pound value; and

(*b*) for vehicles equipped with a compression-ignition engine and vehicles that operate without an internal combustion engine:

$$(0.0416 \times WF) + 320$$

where

WF is the work factor for each vehicle subconfiguration, calculated using the formula set out in subsection (3) and rounded to the nearest pound value.

Work factor

(3) The work factor for each vehicle subconfiguration is determined by the formula

$$0.75 \times (GVWR - \text{curb weight} + xwd) + 0.25 \times (GCWR - GVWR)$$

where

GVWR

is the gross vehicle weight rating as defined in subsection 1(1);

curb weight

is the curb weight as defined in subsection 1(1);

xwd

is 500 pounds if the vehicle has four-wheel drive or all-wheel drive and is 0 pounds for all other vehicles; and

GCWR

is the gross combined weight rating as defined in subsection 1(1).

Alternative target value calculation for the 2014 to 2018 model years

(4) A company may elect to use the CO_2 emission target values set out in the table of one of the following paragraphs instead of the emission target value calculated in accordance with subsection (2):

(*a*) for the 2014 to 2017 model years:

Item	Column 1 Model Year	Column 2 Engine Cycle	Column 3 Alternate CO_2 Emission Target (grams per mile)
1.	2014	Spark-ignition engine	(0.0482 × WF) + 371
		Compression-ignition engine	(0.0478 × WF) + 368
2.	2015	Spark-ignition engine	(0.0479 × WF) + 369
		Compression-ignition engine	(0.0474 × WF) + 366
3.	2016	Spark-ignition engine	(0.0469 × WF) + 362
		Compression-ignition engine	(0.0460 × WF) + 354
4.	2017	Spark-ignition engine	(0.0460 × WF) + 354
		Compression-ignition engine	(0.0445 × WF) + 343

(*b*) for the 2014 to 2018 model years:

Item	Column 1 Model Year	Column 2 Engine Cycle	Column 3 Alternate CO_2 Emission Target (grams per mile)
1.	2014	Spark-ignition engine	(0.0482 × WF) + 371
		Compression-ignition engine	(0.0478 × WF) + 368
2.	2015	Spark-ignition engine	(0.0479 × WF) + 369

		Compression-ignition engine	(0.0474 × WF) + 366
3.	2016 to 2018	Spark-ignition engine	(0.0456 × WF) + 352
		Compression-ignition engine	(0.0440 × WF) + 339

Choice

(5) If a company elects to use the CO_2 emission target values set out in paragraph (4)(*a*) or (*b*), the applicable targets continue to apply for all the model years referred to in that paragraph, unless it elects to comply with subsection (2) for the remaining model years.

Grouping subconfigurations into configurations

(6) A company may group vehicle subconfigurations of Class 2B and Class 3 heavy-duty vehicles and heavy-duty incomplete vehicles — excluding those referred to in the definition "vocational vehicle" in subsection 1(1) — within a vehicle configuration for the purpose of calculating the fleet average CO_2 emission standard if

(*a*) the vehicles of each subconfiguration have the same test weight, GVWR and GCWR, and the work factor and target value are calculated assuming a curb weight equal to two times the test weight minus the GVWR; or

(*b*) the lowest target value of a vehicle subconfiguration is used for all vehicle subconfigurations.

Calculation of average values

30. (1) A company must calculate the fleet average CO_2 emission value for a given model year, expressed in grams of CO_2 per mile and rounded to the nearest 0.1 gram of CO_2 per mile, for its fleet of Class 2B and Class 3 heavy-duty vehicles and heavy-duty incomplete vehicles — excluding those referred to in the definition "vocational vehicle" in subsection 1(1) — by using the formula

$$\frac{\sum(A \times B)}{C}$$

where

A is the CO_2 emission value for each vehicle configuration calculated in accordance with section 31 and taking into account subsection (2), rounded to the nearest 0.01 gram of CO_2 per mile;

B is the number of vehicles of the vehicle configuration in question in the fleet; and

C is the number of vehicles in the fleet.

Representative data

(2) When a company calculates the CO_2 emission value for a vehicle configuration in accordance with this section, the data and values from one or more vehicle subconfigurations that are used in the calculation of that value must represent at least 90% of its total number of vehicles for the vehicle configuration.

Test Methods and Calculations

General

31. (1) The N_2O, CH_4 and CO_2 emission values for Class 2B and Class 3 heavy-duty vehicles and heavy-duty incomplete vehicles — excluding those referred to in the definition "vocational vehicle" in subsection 1(1) and the vehicles referred to in subsection (2) — must be determined in accordance with subsection (3) or (4), as the case may be, and

(*a*) using

(i) the test procedures, fuels and calculation methods set out for the FTP-based city test and the HFET-based highway test, and

(ii) the adjusted loaded vehicle weight and the deterioration factors determined using the durability procedures and method prescribed in section 1823(m) of Title 40, chapter I, subchapter C, part 86, subpart S, of the CFR; and

(*b*) taking into account

(i) section 104(d)(5) of Title 40, chapter I, subchapter U, part 1037, subpart B, of the CFR, and

(ii) the altitude testing conditions set out in section 1865(h)(3) of Title 40, chapter I, subchapter C, part 86, subpart S, of the CFR.

Electric vehicles and fuel cell vehicles

(2) In the case of Class 2B and Class 3 heavy-duty vehicles and heavy-duty incomplete vehicles — excluding those referred to in the definition "vocational vehicle" in subsection 1(1) — that are electric vehicles or fuel cell vehicles, the N_2O, CH_4 and CO_2 emission values are considered to be 0 grams per mile.

Multi-fuel

(3) In the case of Class 2B or Class 3 heavy-duty vehicles and heavy-duty incomplete vehicles — excluding those referred to in the definition "vocational vehicle" in subsection 1(1) — that are designed to operate on two or more different fuel types, either separately or simultaneously, the N_2O, CH_4 and CO_2 emission values for a given vehicle or vehicle configuration, as the case may be, must be determined using

(*a*) in the case of N_2O and CH_4 emissions, the highest of the following averages:

(i) the arithmetic average of the FTP-based city test and HFET-based highway test emission values, determined in accordance with this section, for the vehicle configuration in question, weighted 0.55 and 0.45 respectively, tested on gasoline or diesel fuel, and

(ii) the arithmetic average of the FTP-based city test and HFET-based highway test emission values, determined in accordance with this section, for the vehicle configuration in question, weighted 0.55 and 0.45 respectively, tested on the alternative fuel; and

(*b*) in the case of CO_2 emissions, the formula

$$(F \times A) + ((1 - F) \times B)$$

where

F is 0.00 unless the company provides the Minister with evidence demonstrating that an alternative value determined for F is more representative for the vehicle configuration in question,

A is the arithmetic average of the FTP-based city test and HFET-based highway test emission values, determined in accordance with this section, for the vehicle configuration in question, weighted 0.55 and 0.45 respectively, tested on the alternative fuel, and

B is the arithmetic average of the FTP-based city test and HFET-based highway test emission values, determined in accordance with this section, for the vehicle configuration in question, weighted 0.55 and 0.45 respectively, tested on gasoline or diesel fuel.

Other cases

(4) In the case of other Class 2B and Class 3 heavy-duty vehicles and heavy-duty incomplete vehicles — excluding those referred to in the definition "vocational vehicle" in subsection 1(1) — the N_2O, CH_4 and CO_2 emission values must be determined as follows:

(*a*) in the case of N_2O and CH_4 emissions, by calculating the arithmetic average of the FTP-based city test and HFET-based highway test emission values, weighted 0.55 and 0.45 respectively; and

(*b*) in the case of CO_2 emissions,

(i) by making the calculation set out in paragraph (*a*), or

(ii) by calculating the CO_2 emission rate in accordance with section 104(g) of Title 40, chapter I, subchapter U, part 1037, subpart B, of the CFR.

Alternative Standards

Spark-ignition engines

32. A company may elect to include spark-ignition engines in a fleet of Class 2B and Class 3 heavy-duty vehicles and heavy-duty incomplete vehicles — excluding those referred to in the definition "vocational vehicle" in subsection 1(1) — if the following conditions are met:

(*a*) the fleet is composed of vehicles equipped with engines of the same model year, design and hardware;

(*b*) the engines that are not installed in vehicles in the fleet represent not more than 10% of the total number of engines — whether they are installed in vehicles or not — that are of the same model year, design and hardware in the fleet;

(*c*) instead of conforming to sections 35 and 36, the engines that are not installed in the vehicles must conform to

(i) the N_2O and CH_4 emission standards and the calculations of the emission values referred to in section 27, and

(ii) the CO_2 emission target value and test result determined in accordance with section 150(m)(6) of Title 40, chapter I, subchapter U, part 1037, subpart B, of the CFR;

(*d*) the company must not obtain CO_2 emission credits in accordance with the CO_2 emission credit system set out in sections 40 to 53 for the engines that are not installed in vehicles; and

(*e*) the company reports its election in its end of model year report.

VOCATIONAL VEHICLES

CO_2 emission standards

33. (1) Subject to subsections (3) and (5) to (7), every vocational vehicle and incomplete vocational vehicle of the 2014 and subsequent model years must have a CO_2 emission rate that does not exceed the applicable CO_2 emission standard set out in the following table for the model year in question for its applicable useful life:

Item	Column 1 Class of Vocational Vehicle	Column 2 CO_2 Emission Standard (grams of CO_2 per ton-mile) for the 2014 to 2016 Model Years	Column 3 CO_2 Emission Standard (grams of CO_2 per ton-mile) for the 2017 and Subsequent Model Years
1.	Classes 2B, 3, 4 and 5	388	373
2.	Classes 6 and 7	234	225
3.	Class 8	226	222

Modelling CO_2 emissions to demonstrate compliance

(2) Conformity to subsection (1) must be demonstrated using the GEM computer simulation model with the following parameters:

(*a*) the "regulatory subcategory" referred to in the GEM computer simulation model corresponds to a type of vocational vehicle referred to in subparagraphs 25(3)(*a*)(ii) to (iv) and (xiv), whichever applies to the vocational vehicle being modelled and, in the case of a Class 2B and Class 3 heavy-duty vehicle and a heavy-duty incomplete vehicle referred to in the definition "vocational vehicle" in subsection 1(1), to the "Light Heavy-Duty – Vocational Truck (Class 2B – 5)" regulatory subcategory; and

(*b*) the steer tire rolling resistance level and the drive tire rolling resistance level measured for each tire configuration in accordance with section 520(c) of Title 40, chapter I, subchapter U, part 1037, subpart F, of the CFR.

Exemption for certain vocational vehicles

(3) The vocational vehicles and incomplete vocational vehicles referred to in subsection (1) do not include those that are designed for off-road use and either

(*a*) have tires with a maximum speed rating at or below 88 km/h (55 miles per hour); or

(*b*) are designed to work in an off-road environment or to operate at low speeds that are unsuitable for normal highway operation and meet one of the following criteria:

(i) have an axle that has a GAWR of 13 154 kg (29,000 pounds) or more,

(ii) attain a speed of less than 53 km/h (33 miles per hour) over 3.2 km (2 miles), or

(iii) attain a speed of less than 72 km/h (45 miles per hour) over 3.2 km (2 miles), have an unloaded vehicle weight that is not less than 95 percent of its GVWR, and have no capacity to carry occupants other than the driver and operating crew.

Non-eligible vehicles

(4) The vehicles referred to in subsection (3) are not eligible for participation in the CO_2 emission credit system set out in sections 40 to 53.

Option to conform to a higher vehicle service class

(5) For any given vehicle referred to in subsection (1), a company may elect to conform to the emission standards and useful life applicable to a higher vehicle service class, in which case the vehicle is not eligible for participation in the CO_2 emission credit system set out in sections 40 to 53.

Alternative standards

(6) In the case of a vocational vehicle or a cab-complete vocational vehicle equipped with a spark-ignition engine, a company may elect to comply with the standards referred to in sections 28 to 30 applicable to Class 2B and Class 3 heavy-duty vehicles instead of complying with subsection (1) and sections 35 and 36 if the following conditions are met:

(*a*) all vehicles are grouped into the fleet referred to in subparagraph 25(3)(*a*)(i);

(*b*) the company participates in the CO_2 emission credit system set out in sections 40 to 53; and

(*c*) the company reports its election in its end of model year report.

Calculation using fleets and subfleets

(7) A company may elect to comply with subsection (1) by grouping all its vocational vehicles and incomplete vocational vehicles of a given model year into fleets and subfleets, as the case may be, in accordance with section 25 and participating in the CO_2 emission credit system set out in sections 40 to 53.

Family emission limit

(8) For the purposes of subsection (7), every vocational vehicle and incomplete vocational vehicle within a fleet or subfleet, as the case may be, must conform to the CO_2 family emission limit provided by the company for the fleet or subfleet of the vehicle, as the case may be, and corresponding to the value determined for B in paragraph 41(1)(*b*) in respect of the emission rate.

TRACTORS

CO_2 emission standards

34. (1) Subject to subsections (8) and (9), every tractor and incomplete tractor of the 2014 and subsequent model years must have a CO_2 emission rate that does not exceed the applicable CO_2 emission standard set out in the following table for the model year in question for the applicable useful life of the tractor:

Item	Column 1 Class of Tractor	Column 2 Characteristics	Column 3 CO_2 Emission Standard (grams of CO_2 per ton-mile) for the 2014 to 2016 Model Years	Column 4 CO_2 Emission Standard (grams of CO_2 per ton-mile) for the 2017 and Subsequent Model Years

1.	Class 7	Low-roof (all cab styles)	107	104
2.		Mid-roof (all cab styles)	119	115
3.		High-roof (all cab styles)	124	120
4.	Class 8	Low-roof day cab	81	80
5.		Low-roof sleeper cab	68	66
6.		Mid-roof day cab	88	86
7.		Mid-roof sleeper cab	76	73
8.		High-roof day cab	92	89
9.		High-roof sleeper cab	75	72

Modelling CO_2 emissions to demonstrate compliance

(2) Conformity to subsection (1) must be demonstrated using the GEM computer simulation model with the following parameters:

(*a*) the "regulatory subcategory" referred to in the GEM computer simulation model corresponds to a type of tractor referred to in subparagraphs 25(3)(*a*)(v) to (xiii), whichever applies to the tractor being modelled;

(*b*) the coefficient of aerodynamic drag determined in accordance with subsection (4);

(*c*) the steer tire rolling resistance level and the drive tire rolling resistance level measured for each tire configuration in accordance with section 520(c) of Title 40, chapter I, subchapter U, part 1037, subpart F, of the CFR;

(*d*) in the case of a tractor equipped with a vehicle speed limiter, the maximum speed, expressed in miles per hour and rounded to the nearest 0.1 mile per hour, to which the tractor is limited, determined in accordance with section 640 of Title 40, chapter I, subchapter U, part 1037, subpart G, of the CFR;

(*e*) the weight reduction value, calculated by adding the applicable values set out in the tables in the following subparagraphs:

(i) in the case of tires and wheels, the weight reduction value corresponds tothe sum of the applicable weight reduction value set out in column 3 and the number of the tractor's wheels:

	Column 1	Column 2	Column 3
Item	Tire Type	Wheel Type	Weight Reduction Value (pounds per wheel)
1.	Single-wide drive tire	Steel wheel	84
2.		Aluminum wheel	139
3.		Light-weight aluminum wheel (weighs at least 9.5 kg (21 pounds) less than a similar steel wheel)	147
4.	Steer tire or dual -wide drive tire	High-strength steel wheel (steel with tensile strength of 350 MPa or more)	8
5.		Aluminum wheel	21
6.		Light-weight aluminum wheel (weighs at least 9.5 kg (21 pounds) less than a similar steel wheel)	30

(ii) in the case of the following components, the weight reduction value corresponds to the sum of the applicable weight reduction values set out in the following table:

	Column 1	Column 2	Column 3
Item	Component	Aluminum Weight Reduction Value (pounds)	High-strength Steel (steel with tensile strength of 350 MPa or more) Weight Reduction Value (pounds)
1.	Door	20	6
2.	Roof	60	18

3.	Cab rear wall	49	16
4.	Cab floor	56	18
5.	Hood support structure	15	3
6.	Fairing support structure system	35	6
7.	Instrument panel support structure	5	1
8.	Brake drums – drive (4 units)	140	11
9.	Brake drums – non-drive (2 units)	60	8
10.	Frame rails	440	87
11.	Crossmember – cab	15	5
12.	Crossmember – suspension	25	6
13.	Crossmember – non-suspension (3 units)	15	5
14.	Fifth wheel	100	25
15.	Radiator support	20	6
16.	Fuel tank support structure	40	12
17.	Steps	35	6
18.	Bumper	33	10
19.	Shackles	10	3

20.	Front axle	60	15
21.	Suspension brackets and hangers	100	30
22.	Transmission case	50	12
23.	Clutch housing	40	10
24.	Drive axle hubs (8 units)	160	4
25.	Non-drive front hubs (2 units)	40	5
26.	Driveshaft	20	5
27.	Transmission and clutch shift levers	20	4

(*f*) in the case of a Class 8 sleeper cab, if the tractor is equipped with idle reduction technology that conforms to section 660 of Title 40, chapter I, subchapter U, part 1037, subpart G, of the CFR, and that automatically shuts off the main engine after 300 seconds or less, the corresponding value is 5 grams of CO_2 per ton-mile.

Weight reduction technologies

(3) For greater certainty, CO_2 emission credits for weight reduction technologies that are not referred to in paragraph (2)(*e*) may be obtained under section 47.

Calculation of coefficient of aerodynamic drag

(4) Subject to subsections (5) and (6), the coefficient of aerodynamic drag (C_D) is determined by

(*a*) measuring the drag area (C_DA) in accordance with the coastdown testing referred to in subpart F of Title 40, chapter I, subchapter U, part 1037, of the CFR, rounded to two decimal places and taking into account the following criteria:

(i) high-roof tractors must be tested with the standard trailer referred to in section 501(g) of Title 40, chapter I, subchapter U, part 1037, subpart F, of the CFR, and low-roof and mid-roof tractors must be tested without a trailer, unless they are tested with a trailer that is manufactured with innovative technologies, and

(ii) except in the case of steer tires, the tractors or standard trailers referred to in section 501(g) of Title 40, chapter I, subchapter U, part 1037, subpart F, of the CFR must be equipped with tires that are mounted on steel rims in a dual configuration that

(A) are SmartWay-verified or have a tire rolling resistance level of less

than 5.1 kg/ton,

(B) have accumulated at least 3 500 km (2,175 miles) of prior use but have no less than 50 percent of their original tread depth,

(C) are not retreaded tires or have any apparent signs of chunking or uneven wear, and

(D) are of size 295/75R22.5 or 275/80R22.5; and

(*b*) determining the tractor's coefficient of aerodynamic drag (C_D) set out in column 3 and the bin level set out in column 4 of the following table by identifying in column 2 the tractor's drag area (C_DA) calculated in paragraph (*a*):

	Column 1	Column 2	Column 3	Column 4
Item	Cab Type	Drag Area (C_DA, in m^2)	Coefficient of Aerodynamic Drag (C_D)	Corresponding Bin Level
1.	High-roof day cabs	≥8.0	0.79	Bin I
2.		≥7.1 and <8.0	0.72	Bin II
3.		≥6.2 and <7.1	0.63	Bin III
4.		≥5.6 and <6.2	0.56	Bin IV
5.		<5.6	0.51	Bin V
6.	High-roof sleeper cabs	≥7.6	0.75	Bin I
7.		≥6.7 and <7.6	0.68	Bin II
8.		≥5.8 and <6.7	0.60	Bin III
9.		≥5.2 and <5.8	0.52	Bin IV
10.		<5.2	0.47	Bin V
11.	Low-roof day and sleeper cabs	≥5.1	0.77	Bin I
12.		<5.1	0.71	Bin II

13.	Mid-roof day	≥5.6	0.87	Bin I
14.	and sleeper cabs	<5.6	0.82	Bin II

Alternative drag area

(5) For low-roof and mid-roof tractors, the drag area bin may be determined using the drag area bin of an equivalent high-roof tractor as follows:

(*a*) if the equivalent high-roof tractor is in Bin I or Bin II, the low-roof and mid-roof tractors must be in Bin I; or

(*b*) if the equivalent high-roof tractor is in Bin III, Bin IV or Bin V, the low-roof and mid-roof tractors must be in Bin II.

Alternative method for measuring the drag area

(6) Instead of the method referred to in paragraph (4)(*a*), a company may elect to measure the tractor's drag area (C_DA) in accordance with any other method described in subpart F of Title 40, chapter I, subchapter U, part 1037, of the CFR, if,

(*a*) in the case of a tractor that is covered by an EPA certificate, the election has been approved by the EPA for that tractor, under section 521(c) of Title 40, chapter I, subchapter U, part 1037, subpart F, of the CFR, and the company provides the Minister with evidence of the EPA approval; and

(*b*) in the case of a tractor that is not covered by an EPA certificate, the company provides the Minister with evidence demonstrating that the alternative method for measuring the tractor's drag area referred to in this subsection is representative of that tractor's drag area.

Vocational tractors — limitation

(7) A company that manufactures or imports vocational tractors for sale in Canada to the first retail purchaser may elect to conform to the emission standards applicable to vocational vehicles instead of tractors for a maximum of 2 100 Class 7 or Class 8 vocational tractors that it manufactures or imports in any period of three consecutive model years.

Option to conform to a higher vehicle service class

(8) For any given vehicle referred to in subsection (1), a company may elect to conform to the emission standards and useful life applicable to a higher vehicle service class if the vehicle is not eligible for participation in the CO_2 emission credit system set out in sections 40 to 53.

Calculation using fleets and subfleets

(9) A company may elect to comply with subsection (1) by grouping all its tractors and incomplete tractors of a given model year into fleets and subfleets, as the case may be, in accordance with section 25 and participating in the CO_2 emission credit system set out in sections 40 to 53.

Family emission limit

(10) For the purposes of subsection (9), every tractor and incomplete tractor within a fleet or subfleet, as the case may be, must conform to the CO_2 family emission limit determined by the company for the fleet or subfleet of the vehicle, as the case may be, and that corresponds to the emission rate determined for B in paragraph 41(1)(*c*).

HEAVY-DUTY ENGINES

N_2O and CH_4 Emissions

Standards

35. (1) Every heavy-duty engine that is a compression-ignition engine of the 2014 and subsequent model years and heavy-duty engine that is a spark-ignition engine of the 2016 and subsequent model years must have N_2O and CH_4 emission values that do not exceed an emission standard of 0.10 g/BHP-hr for N_2O and 0.10 g/BHP-hr for CH_4 for the applicable useful life of the engine.

Values

(2) The N_2O and CH_4 emission values for the engines referred to in subsection (1) must be measured in accordance with the transient duty cycle, taking into account sections 108(d) to (f) and 150(g) of subpart B, sections 235(b) and 241(c) and (d) of subpart C and subparts E and F of part 1036, Title 40, chapter I, subchapter U, of the CFR.

Fleet calculation

(3) Subject to subsection (5), a company that manufactures or imports engines referred to in subsection (1) that exceed the standards set out in that subsection must group all its engines of a given model year into a fleet in accordance with section 25 and must calculate any N_2O and CH_4 emission deficits for that fleet by adding the results for all its subfleets, if applicable, expressed in megagrams of CO_2 and rounded to the nearest megagram of CO_2, determined for each subfleet by the formula

$$\frac{[(A - B) \times C \times D \times E \times F]}{1\,000\,000}$$

where

A is 0.10 g/BHP-hr for N_2O and 0.10 g/BHP-hr for CH_4;

B is the N_2O or CH_4 family emission limit, as the case may be, and corresponds to the N_2O or CH_4 deteriorated emission level value of the engine configuration with the highest criteria air contaminant emission levels in the fleet or subfleet, as the case may be, as determined in accordance with subsection (2) and rounded to the nearest 0.01 g/BHP-hr;

C is the number of engines in the fleet or subfleet, as the case may be;

D is a transient cycle conversion factor calculated by dividing the engine energy obtained during the transient duty cycle testing, expressed in BHP-hr, by 6.3 miles for spark-ignition engines and 6.5 miles for compression-ignition engines;

E is the useful life of the engine, as follows:

(*a*) 110,000 miles for a spark-ignition engine; and

(*b*) the following number of miles for a compression-ignition engine:

(i) 110,000 miles for a light heavy-duty engine,

(ii) 185,000 miles for a medium heavy-duty engine, and

(iii) 435,000 miles for a heavy heavy-duty engine; and

F is the global warming potential and is equal to the following number of credits needed to offset a N_2O and CH_4 deficit:

(*a*) an emission credit of 298 Mg of CO_2 to offset a deficit of 1 Mg of N_2O; and

(*b*) an emission credit of 25 Mg of CO_2 to offset a deficit of 1 Mg of CH_4.

Family emission limit

(4) For the purposes of subsection (3), every heavy-duty engine within a fleet or subfleet, as the case may be, must conform to the N_2O or CH_4 family emission limit determined by the company for the engine configuration with the highest criteria air contaminant emission levels in that fleet or subfleet, as the case may be, that corresponds to the deteriorated emission level value determined for B in subsection (3).

Offsetting fleet emission deficit

(5) When a company incurs a deficit calculated under subsection (3), it must offset it by using the CO_2 emission credits obtained in accordance with sections 40 to 53 for the averaging set in which the fleet is included.

CO_2 emission credits for low N_2O emissions

(6) If a company's heavy-duty engines from a fleet or subfleet of the 2014, 2015 or 2016 model year conform to an N_2O family emission limit that is less than 0.04 g/BHP-hr, the company may generate CO_2 emission credits, expressed in megagrams of CO_2 and rounded to the nearest megagram of CO_2, using the following formula for each fleet or subfleet, as the case may be:

$$\frac{[(A - B) \times C \times D \times E \times F]}{1\,000\,000}$$

where

A is 0.04 g/BHP-hr for N_2O;

B is the N_2O family emission limit and corresponds to the N_2O deteriorated emission level value of the engine configuration with the highest criteria air contaminant emission levels in the fleet or subfleet, as the case may be, determined in accordance with subsection (2) and rounded to the nearest 0.01 g/BHP-hr;

C is the number of engines in the fleet or subfleet, as the case may be;

D is a transient cycle conversion factor calculated by dividing the engine energy obtained during the transient duty cycle testing, expressed in BHP-hr, by 6.3 miles for spark-ignition engines and 6.5 miles for compression-ignition engines;

E is the useful life of the engine, as follows:

(*a*) 110,000 miles for a spark-ignition engine; and

(*b*) the following number of miles for a compression-ignition engine:

(i) 110,000 miles for a light heavy-duty engine,

(ii) 185,000 miles for a medium heavy-duty engine, and

(iii) 435,000 miles for a heavy heavy-duty engine; and

F is the global warming potential and is equal to 298 Mg of CO_2.

CO_2 Emissions

Standards

36. Subject to sections 37 and 39, every heavy-duty engine must have a CO_2 emission value that does not exceed the following emission standard for the applicable useful life of the engine:

(*a*) for a spark-ignition engine of the 2016 and subsequent model years, a CO_2 emission standard of 627 g/BHP-hr; and

(*b*) for any other engine of the 2014 and subsequent model years, the applicable CO_2 emission standard set out in the following table:

Item	Column 1 Model Year	Column 2 Light Heavy-duty Engines (g/BHP-hr)	Column 3 Medium Heavy-duty Engines Designed to be Used in Vocational Vehicles (g/BHP-hr)	Column 4 Heavy Heavy-duty Engines Designed to be Used in Vocational Vehicles (g/BHP-hr)	Column 5 Medium Heavy-duty Engines Designed to be Used in Tractors (g/BHP-hr)	Column 6 Heavy Heavy-duty Engines Designed to be Used in Tractors (g/BHP-hr)
1.	2014 to 2016	600	600	567	502	475
2.	2017 and subsequent model years	576	576	555	487	460

Alternative emission standards — model years 2014 to 2016

37. (1) Heavy-duty engines that are compression-ignition engines of the 2014 to 2016 model years may conform to the CO_2 emission standards referred to in section 620 of Title 40, chapter I, subchapter U, part 1036, subpart G, of the CFR, instead of the standards set out in paragraph 36 (*b*) if the averaging set of those engines does not have any remaining credits under section 48 for the model years in question.

Alternative emission standards — model years 2013 to 2016

(2) Heavy-duty engines that are compression-ignition engines of the 2013 to 2016 model years may conform to the CO_2 emission standards referred to in section 150(e) of Title 40, chapter I, subchapter U, part 1036, subpart B, of the CFR, instead of the standards set out in paragraph 36 (*b*) or in subsection (1).

No early action credits

(3) The engines referred to in subsection (2) are not eligible for early action credits in accordance with section 53.

Election to comply with subsection (2)

(4) A company that elects to conform to the alternative CO_2 emission standards referred to in subsection (2) must continue to comply with that subsection for the other model years referred to in that subsection.

Values

38. The CO_2 emission values, rounded to the nearest 0.1 g/BHP-hr, for the following heavy-duty engines must be measured in accordance with the following duty cycles, taking into account sections 108(d) to (f) and 150(g) of subpart B, sections 235(b) and 241(c) and (d) of subpart C and subparts E and F of part 1036, Title 40, chapter I, subchapter U, of the CFR:

(*a*) for medium heavy-duty engines and heavy heavy-duty engines that are compression-ignition engines designed to be used in tractors or incomplete tractors, the steady state duty cycle;

(*b*) for medium heavy-duty engines and heavy heavy-duty engines that are compression-ignition engines designed to be used in both vocational vehicles or incomplete vocational vehicles and tractors or incomplete tractors, the steady state duty cycle and transient duty cycle; and

(*c*) for engines other than those referred to in paragraphs (*a*) and (*b*), the transient duty cycle.

Fleet calculation

39. (1) A company may elect to comply with section 36 or with subsection 37(1) or (2) by grouping all its heavy-duty engines of a given model year into fleets in accordance with section 25 and participating in the CO_2 emission credit system set out in sections 40 to 53.

CO_2 family certification level

(2) For the purposes of subsection (1), every heavy-duty engine within a fleet or subfleet, as the case may be, must conform to the CO_2 family certification level for the engine configuration with the highest criteria air contaminant emission levels from that engine fleet or subfleet that corresponds to the deteriorated emission level value determined for B in paragraph 41(1)(*d*).

CO_2 EMISSION CREDIT SYSTEM

Calculation of Credits and Deficits

Credits

40. (1) For the purposes of subparagraph 162(1)(*b*)(i) of the Act, a company obtains CO_2 emission credits if the CO_2 emissions for a fleet or subfleet, as the case may be, of heavy-duty vehicles or heavy-duty engines of a given model year are lower than the CO_2 emission standard applicable to that fleet or subfleet, as the case may be, and model year, and the company reports the credits in its end of model year report in accordance with section 55.

Deficits

(2) A company incurs deficits if the CO_2 emissions for a fleet or subfleet, as the case may be, of heavy-duty vehicles or heavy-duty engines of a given model year are higher than the CO_2 emission standard applicable to that fleet or subfleet, as the case may be, and model year, and the company reports the deficits in its end of model year report in accordance with section 55.

Calculation

41. (1) A company must calculate the credits or deficits for each of its fleets or subfleets, as the case may be, using the equation set out in one of the following paragraphs, whichever applies:

(*a*) for Class 2B and Class 3 heavy-duty vehicles and heavy-duty incomplete vehicles, excluding those referred to in the definition "vocational vehicle" in subsection 1(1):

$$ECD = \frac{[(A - B) \times C \times D]}{1\,000\,000}$$

where

ECD is the number of credits, if the result is positive, or the number of deficits, if the result is negative, expressed in megagrams of CO_2 and rounded to the nearest megagram of CO_2,

A is the fleet average CO_2 emission standard calculated in accordance with section 29, expressed in grams of CO_2 per mile,

B is the fleet average CO_2 emission value calculated in accordance with section 30, expressed in grams of CO_2 per mile,

C is the number of vehicles in the fleet, and

D is the useful life of the vehicle, namely, 120,000 miles;

(*b*) for vocational vehicles and incomplete vocational vehicles and subject to subsection 44(2) and clause 47(1)(*b*)(ii)(A):

$$\text{ECD} = \frac{[(\text{A} - \text{B}) \times \text{C} \times \text{D} \times \text{E}]}{1\,000\,000}$$

where

ECD is the number of credits, if the result is positive, or the number of deficits, if the result is negative, expressed in megagrams of CO_2 and rounded to the nearest megagram of CO_2,

A is the CO_2 emission standard that applies to the subfleet of vehicles under subsection 33(1), expressed in grams of CO_2 per ton-mile,

B is the CO_2 family emission limit and corresponds to the CO_2 emission rate for the subfleet of vehicles, expressed in grams of CO_2 per ton-mile, determined in accordance with subsection 33(2),

C is the payload for each class of vehicles, as follows:

(i) 2.85 tons for Class 2B, Class 3, Class 4 and Class 5,

(ii) 5.6 tons for Class 6 and Class 7, and

(iii) 7.5 tons for Class 8,

D is the number of vehicles in the subfleet, and

E is the useful life of the class of vehicle, as follows:

(i) 110,000 miles for Class 2B, Class 3, Class 4 and Class 5,

(ii) 185,000 miles for Class 6 and Class 7, and

(iii) 435,000 miles for Class 8;

(*c*) for tractors and incomplete tractors and subject to subsection 44(2) and clause 47(1)(*b*)(ii)(B):

$$\text{ECD} = \frac{[(\text{A} - \text{B}) \times \text{C} \times \text{D} \times \text{E}]}{1\,000\,000}$$

where

ECD is the number of credits, if the result is positive, or the number of deficits, if the result is negative, expressed in megagrams of CO_2 and rounded to the nearest megagram of CO_2,

A is the CO_2 emission standard that applies to the subfleet of tractors and incomplete tractors under subsection 34(1), expressed in grams of CO_2 per ton-mile,

B is the CO_2 family emission limit and corresponds to the CO_2 emission rate for the subfleet of tractors and incomplete tractors, expressed in grams of CO_2 per ton-mile, determined in accordance with subsection 34(2),

C is the payload for each class of tractors and incomplete tractors, as follows:

(i) 12.5 tons for Class 7, and

(ii) 19 tons for Class 8,

D is the number of tractors and incomplete tractors in the subfleet, and

E is the useful life of the class of tractor or incomplete tractor, as the case may be, as follows:

(i) 185,000 miles for Class 7, and

(ii) 435,000 miles for Class 8; and

(*d*) for heavy-duty engines and subject to subparagraph 47(1)(*c*)(iii):

$$\text{ECD} = \frac{[(\text{A} - \text{B}) \times \text{C} \times \text{D} \times \text{E}]}{1\,000\,000}$$

where

ECD is the number of credits, if the result is positive, or the number of deficits, if the result is negative, expressed in megagrams of CO_2 and rounded to the nearest megagram of CO_2,

A is the CO_2 emission standard that applies to the fleet or subfleet of engines, as the case may be, under section 36 or subsection 37(1) or (2), as the case may be, expressed in grams per BHP-hr,

B is the CO_2 family certification level and corresponds to the CO_2 deteriorated emission level value of the engine configuration with the highest criteria air contaminant emission levels in the fleet or subfleet, as the case may be, calculated in accordance with section 38 and subject to subsection (3), expressed in grams of CO_2 per BHP-hr and rounded to the nearest 0.01 g/BHP-hr,

C is a transient cycle conversion factor calculated by dividing the engine energy obtained during the transient duty cycle testing, expressed in BHP-hr, by 6.3 miles for spark-ignition engines and 6.5 miles for compression-ignition engines,

D is the number of engines in the fleet or subfleet, as the case may be, and

E is the useful life of the engine, as follows:

(i) 110,000 miles for spark-ignition engines, and

(ii) for the following compression-ignition engines:

(A) 110,000 miles for light heavy-duty engines,

(B) 185,000 miles for medium heavy-duty engines, and

(C) 435,000 miles for heavy heavy-duty engines.

Fleets of vocational vehicles and tractors

(2) The credits or deficits for each fleet of vocational vehicles, incomplete vocational vehicles, tractors and incomplete tractors are determined by adding the credits and deficits for all subfleets of that fleet.

Duty cycle

(3) In the case of medium heavy-duty engines and heavy heavy-duty engines designed to be used in both vocational vehicles or incomplete vocational vehicles and in tractors or incomplete tractors, a company must select the duty cycle set out in paragraph 38(*b*) that corresponds to the vehicle in which the engine is installed for the purpose of calculating the value determined for B in paragraph (1)(*d*).

Additional Credits

Limitation

42. A company must not obtain additional credits in accordance with sections 44 to 47 more than once for a vehicle or an engine with regard to the same type of greenhouse gas emission reduction technology.

Credit multiplier — Class 2B and Class 3 vehicles

43. A company that obtains credits under paragraph 41(1)(*a*) for Class 2B and Class 3 heavy-duty vehicles and heavy-duty incomplete vehicles that are electric vehicles, fuel cell vehicles, hybrid vehicles or are equipped with a Rankine-cycle waste heat recovery engine, may multiply the number of credits obtained for those vehicles by 1.5 if the company does not use the early action credit multiplier referred to in subsection 53(4) for the same vehicles.

Equivalent conventional vehicle and footprint

44. (1) For the purpose of the calculation in subsection (2),

(*a*) "equivalent conventional vehicle" means a vocational vehicle, incomplete vocational vehicle, tractor or incomplete tractor that is being compared with a vocational vehicle, incomplete vocational vehicle, tractor or incomplete tractor that is an electric vehicle, a fuel cell vehicle, a hybrid vehicle, or that is equipped with a Rankine-cycle waste heat recovery engine that has, as a minimum, the same footprint, class, coefficient of aerodynamic drag, tires and wheels, and has the same number of power take-off circuits and the equivalent take-off power as the vehicle in question; and

(*b*) "footprint" means the result of the product of the average width, measured in inches and rounded to the nearest tenth of an inch, of the lateral distance between the centrelines of the front and rear base tires at ground level, multiplied by the longitudinal distance between the front and rear wheel centrelines, measured in inches and rounded to the nearest tenth of an inch, divided by 144 and rounded to the nearest tenth of a square foot.

Calculation — vocational vehicles and tractors

(2) In the case of vocational vehicles, incomplete vocational vehicles, tractors or incomplete tractors that are electric vehicles, fuel cell vehicles, hybrid vehicles or that are equipped with a Rankine-cycle waste heat recovery engine, a company may obtain additional credits by replacing the value determined for (A – B) in the equation set out in paragraph 41(1)(*b*) or (*c*), as the case

may be, with the following benefit to emission credits, expressed in grams of CO_2 per ton-mile and determined by the equation

(A – B) = improvement factor x modelling result

where

improvement factor is the value determined by the formula

$$\frac{\text{[emission rate A – emission rate B]}}{\text{emission rate A}}$$

where

emission rate A is the emission test result, expressed in grams of CO_2 per ton-mile, obtained by an equivalent conventional vehicle when tested using the duty cycle test set out in section 510 of Title 40, chapter I, subchapter U, part 1037, subpart F, of the CFR, taking into account section 501 of Title 40, chapter I, subchapter U, part 1037, subpart F, of the CFR; and

emission rate B is the emission test result, expressed in grams of CO_2 per ton-mile, obtained by the vehicle in question, as follows:

(*a*) for an electric vehicle, the result corresponds to 0 grams of CO_2 per ton-mile, and

(*b*) for any other vehicle, subject to subsection (3), the result obtained using the duty cycle test set out in section 510 of Title 40, chapter I, subchapter U, part 1037, subpart F, of the CFR, taking into account sections 501 and 525 of Title 40, chapter I, subchapter U, part 1037, subpart F, of the CFR; and

modelling result B is the CO_2 emission rate obtained for the vocational vehicle, incomplete vocational vehicle, tractor or incomplete tractor that is an electric vehicle, a fuel cell vehicle, a hybrid vehicle, or that is equipped with a Rankine-cycle waste heat recovery engine, when modelled in accordance with subsection 33(2) or subsection 34(2), as the case may be.

Emission rate B

(3) In the case of fuel cell vehicles, the company may use the alternative procedure referred to in section 615 of Title 40, chapter I, subchapter U, part 1037, subpart G, of the CFR to calculate emission rate B in the equation set out in subsection (2).

Credit multiplier — vocational vehicles and tractors

(4) The additional credits calculated in subsection (2) may be multiplied by 1.5 if the company does not use the early action credit multiplier referred to in subsection 53(4) for the same vehicles.

Definitions

45. (1) The following definitions apply in this section:

"post-transmission hybrid system"
« *système hybride post-transmission* »

"post-transmission hybrid system" means a powertrain that includes features that recover and store energy from braking but that cannot function as a hybrid system without the transmission.

"pre-transmission hybrid system"
« *système hybride pré-transmission* »

"pre-transmission hybrid system" means an engine system that includes features that recover and store energy during engine motoring operation but not from the vehicle wheels.

Calculation — post-transmission and pre-transmission hybrid systems

(2) In the case of vocational vehicles, incomplete vocational vehicles, tractors and incomplete tractors that are equipped with post-transmission hybrid systems or pre-transmission hybrid systems, a company may obtain additional credits, expressed in megagrams of CO_2, using the following formula:

$$\frac{A \times B \times C \times D}{1\,000\,000}$$

where

A is the grams of CO_2 per ton-mile benefit from A to B testing determined in accordance with,

(*a*) in the case of a post-transmission hybrid system, section 550 of Title 40, chapter I, subchapter U, part 1037, subpart F, of the CFR, and taking into account section 525 of Title 40, chapter I, subchapter U, part 1036, subpart F, of the CFR, and

(*b*) in the case of a pre-transmission hybrid system, part 1065 of Title 40, chapter I, subchapter U, of the CFR, or section 550 of Title 40, chapter I, subchapter U, part 1037, subpart F, of the CFR, and taking into account section 525 of Title 40, chapter I, subchapter U, part 1036, subpart F, of the CFR;

B is the payload for the class of vocational vehicles, incomplete vocational vehicles, tractors or incomplete tractors, as the case may be, as follows:

(*a*) 2.85 tons for Class 2B, Class 3, Class 4 and Class 5 vocational vehicles and incomplete vocational vehicles,

(*b*) 5.6 tons for Class 6 and Class 7 vocational vehicles and incomplete vocational vehicles,

(*c*) 7.5 tons for Class 8 vocational vehicles and incomplete vocational vehicles,

(*d*) 12.5 tons for Class 7 tractors and incomplete tractors, and

(*e*) 19 tons for Class 8 tractors and incomplete tractors;

C is the number of vehicles in the fleet or subfleet, as the case may be; and

D is the useful life of the class of vehicle, as follows:

(*a*) 110,000 miles for Class 2B, Class 3, Class 4 and Class 5,

(*b*) 185,000 miles for Class 6 and Class 7, and

(*c*) 435,000 miles for Class 8.

Credit multiplier

(3) The additional credits calculated in subsection (2) may be multiplied by 1.5 if the company does not use the early action credit multiplier referred to in subsection 53(4) for the same vehicles.

Calculation — Rankine-cycle engines

46. (1) In the case of heavy-duty engines equipped with a Rankine-cycle exhaust energy recovery system, a company may obtain additional credits, expressed in megagrams of CO_2, using the following formula:

$$\frac{A \times B \times C \times D}{1\,000\,000}$$

where

A is the benefit obtained from A to B testing, expressed in grams of CO_2 per BHP-hr, determined in accordance with subpart F of Title 40, chapter I, subchapter U, part 1037, of the CFR or using an alternative procedure if,

(*a*) in the case of an engine that is covered by an EPA certificate, the alternative procedure has been approved by the EPA for that technology and the company provides the Minister with evidence of the EPA approval, or

(*b*) in the case of an engine that is not covered by an EPA certificate, the company provides the Minister with evidence demonstrating that the alternative procedure provides a more representative benefit than A to B testing for that technology;

B is a transient cycle conversion factor calculated by dividing the engine energy obtained during the transient duty cycle testing, expressed in BHP-hr, by 6.3 miles for spark-ignition engines and 6.5 miles for compression-ignition engines;

C is the number of engines in the fleet or subfleet, as the case may be; and

D is the useful life of the engine, as follows:

(*a*) 110,000 miles for spark-ignition engines, and

(*b*) for the following compression-ignition engines:

(i) 110,000 miles for light heavy-duty engines,

(ii) 185,000 miles for medium heavy-duty engines, and

(iii) 435,000 miles for heavy heavy-duty engines.

Credit multiplier

(2) The additional credits calculated in subsection (1) may be multiplied by 1.5 if the company does not use the early action credit multiplier referred to in subsection 53(4) for the same engines.

Innovative technologies

47. (1) A company may obtain additional credits for its fleet or subfleet, as the case may be, of heavy-duty vehicles or heavy-duty engines for the use of innovative technologies by

(*a*) in the case of Class 2B and Class 3 heavy-duty vehicles, excluding those referred to in the definition "vocational vehicle" in subsection 1(1), using the following formula:

$$\frac{A \times B \times C}{1\,000\,000}$$

where

A is the five-cycle credit value determined in accordance with section 1866(d)(2)(i) of Title 40, chapter I, subchapter C, part 86, subpart S, of the CFR, and expressed in grams of CO_2 per mile,

B is the number of vehicles manufactured with the innovative technology in question in the fleet, and

C is the useful life of the vehicle, namely, 120,000 miles;

(*b*) in the case of vocational vehicles, incomplete vocational vehicles, tractors and incomplete tractors, either

(i) by using the following formula:

$$\frac{[(A - B) \times C \times D \times E]}{1\,000\,000}$$

where

(A – B) is the difference between the in-use emission rate of the vehicle manufactured with the innovative technology and the in-use emission rate of the vehicle manufactured without the innovative technology and determined in accordance with section 610(c) of Title 40, chapter I, subchapter U, part 1037, subpart G, of the CFR, expressed in grams of CO_2 per ton-mile,

C is the number of vehicles manufactured with the innovative technology in question in the subfleet,

D is the payload for the class of vehicles, as follows:

(A) 2.85 tons for Class 2B, Class 3, Class 4 and Class 5 vocational vehicles and incomplete vocational vehicles,

(B) 5.6 tons for Class 6 and Class 7 vocational vehicles and incomplete vocational vehicles,

(C) 7.5 tons for Class 8 vocational vehicles and incomplete vocational vehicles,

(D) 12.5 tons for Class 7 tractors and incomplete tractors, and

(E) 19 tons for Class 8 tractors and incomplete tractors, and

E is the useful life of the class of vehicle, as follows:

(A) 110,000 miles for Class 2B, Class 3, Class 4 and Class 5,

(B) 185,000 miles for Class 6 and Class 7, and

(C) 435,000 miles for Class 8, or

(ii) by substituting the result obtained in accordance with paragraph 41(1)(*b*) or (*c*), as the case may be, with the result obtained in accordance with one of the following formulas, whichever applies:

(A) for vocational vehicles and incomplete vocational vehicles:

$$\frac{[(A - B) + (B \times C)] \times D \times E \times F}{1\,000\,000}$$

where

A is the CO_2 emission standard that applies to the subfleet of vocational vehicles and incomplete vocational vehicles under subsection 33(1), expressed in grams of CO_2 per ton-mile,

B is the CO_2 family emission limit and corresponds to the CO_2 emission rate for the subfleet of vocational vehicles and incomplete vocational vehicles, expressed in grams of CO_2 per ton-mile, determined in accordance with subsection 33(2),

C is the improvement factor determined in accordance with sections 610(b)(1) and (c) of Title 40, chapter I, subchapter U, part 1037, subpart G, of the CFR, for the subfleet of vocational vehicles and incomplete vocational vehicles,

D is the payload for the class of vocational vehicles and incomplete vocational vehicles, as follows:

(I) 2.85 tons for Class 2B, Class 3, Class 4 and Class 5,

(II) 5.6 tons for Class 6 and Class 7, and

(III) 7.5 tons for Class 8,

E is the number of vocational vehicles and incomplete vocational vehicles manufactured with the innovative technology in question in the subfleet, and

F is the useful life of the class of vocational vehicles and incomplete vocational vehicles, as follows:

(I) 110,000 miles for Class 2B, Class 3, Class 4 and Class 5,

(II) 185,000 miles for Class 6 and Class 7, and

(III) 435,000 miles for Class 8, or

(B) for tractors and incomplete tractors:

$$\frac{[(A - B) + (B \times C)] \times D \times E \times F}{1\,000\,000}$$

where

A is the CO_2 emission standard that applies to the subfleet of tractors and incomplete tractors under subsection 34(1), expressed in grams of CO_2 per ton-mile,

B is the CO_2 family emission limit and corresponds to the CO_2 emission rate for the subfleet of tractors and incomplete tractors, expressed in grams of CO_2 per ton-mile, determined in accordance with subsection 34(2),

C is the improvement factor determined in accordance with sections 610(b)(1) and (c) of Title 40, chapter I, subchapter U, part 1037, subpart G, of the CFR, for the subfleet of tractors and incomplete tractors,

D is the payload for the class of tractors or incomplete tractors, as the case may be, as follows:

(I) 12.5 tons for Class 7, and

(II) 19 tons for Class 8,

E is the number of tractors and incomplete tractors manufactured with the innovative technology in question in the subfleet, and

F is the useful life of the class of tractors or incomplete tractors, as the case may be, as follows:

(I) 185,000 miles for Class 7, and
(II) 435,000 miles for Class 8;

(*c*) in the case of heavy-duty engines,

(i) by using the following formula for engines tested on a chassis:

$$\frac{[(A - B) \times C \times D \times E]}{1\,000\,000}$$

where

(A – B) is the difference between the in-use emission rate of the engine manufactured with the innovative technology and the in-use emission rate of the engine manufactured without the innovative technology, determined in accordance with chassis A to B testing or in-use A to B testing of pairs of vehicles equipped with the engines differing only with respect to the innovative technology in question, and expressed in grams of CO_2 per ton-mile,

C is the number of vocational vehicles, incomplete vocational vehicles, tractors or incomplete tractors with engines manufactured with the innovative technology in the fleet or subfleet, as the case may be,

D is the payload, if applicable, for the class of vehicle, as follows:

(A) 2.85 tons for Class 2B, Class 3, Class 4 and Class 5 vocational vehicles and incomplete vocational vehicles,

(B) 5.6 tons for Class 6 and Class 7 vocational vehicles and incomplete vocational vehicles,

(C) 7.5 tons for Class 8 vocational vehicles and incomplete vocational vehicles,

(D) 12.5 tons for Class 7 tractors and incomplete tractors, and

(E) 19 tons for Class 8 tractors and incomplete tractors, and

E is the useful life of the class of vehicle, as follows:

(A) 110,000 miles for Class 2B, Class 3, Class 4 and Class 5,

(B) 185,000 miles for Class 6 and Class 7, and

(C) 435,000 miles for Class 8,

(ii) by using the following formula for engines tested on an engine dynamometer:

$$\frac{[(A - B) \times C \times D \times E]}{1\,000\,000}$$

where

(A – B) is the difference between the in-use emission rate of the engine manufactured with the innovative technology and the in-use emission rate of the engine manufactured without the innovative technology, determined in accordance with engine dynamometer A to B testing of pairs

of engines differing only with respect to the innovative technology in question, and expressed in grams of CO_2 per BHP-hr,

C is the transient cycle conversion factor calculated by dividing the engine energy obtained during the transient duty cycle testing, expressed in BHP-hr, by 6.3 miles for spark-ignition engines and 6.5 miles for compression-ignition engines,

D is the number of engines manufactured with the innovative technology in the fleet or subfleet, as the case may be,

E is the useful life of the engine, as follows:

(A) 110,000 miles for spark-ignition engines, and

(B) for the following compression-ignition engines:

(I) 110,000 miles for light heavy-duty engines,
(II) 185,000 miles for medium heavy-duty engines, and
(III) 435,000 miles for heavy heavy-duty engines, or

(iii) by substituting the result obtained in accordance with paragraph 41(1)(*d*) with the result determined in accordance with the following formula:

$$\frac{[(A - B) + (B \times C)] \times D \times E \times F}{1\,000\,000}$$

where

A is the CO_2 emission standard that applies to the fleet or subfleet of engines under section 36 or subsection 37(1) or (2), as the case may be, expressed in grams of CO_2 per BHP-hr,

B is the CO_2 family certification level and corresponds to the CO_2 deteriorated emission level value of the engine configuration with the highest criteria air contaminant emission levels in the fleet or subfleet, as the case may be, calculated in accordance with section 38 and subject to subsection 41(3), expressed in grams of CO_2 per BHP-hr and rounded to the nearest 0.01 gram of CO_2 per BHP-hr,

C is the improvement factor determined by establishing the ratio of in-use emissions of the engine manufactured with the innovative technology to the in-use emissions of the engine manufactured without the innovative technology based on results of engine dynamometer A to B testing, chassis A to B testing or in-use A to B testing of pairs of engines or of pairs of vehicles equipped with the engines in question, as the case may be, differing only with respect to the innovative technology in question,

D is the transient cycle conversion factor calculated by dividing the engine energy obtained during the transient duty cycle testing, expressed in BHP-hr, by 6.3 miles for spark-ignition engines and 6.5 miles for compression-ignition engines,

E is the number of engines manufactured with the innovative technology in the fleet or subfleet, as the case may be, and

F is the useful life of the engine, as follows:

(A) 110,000 miles for spark-ignition engines, and

(B) for the following compression-ignition engines:

(I) 110,000 miles for light heavy-duty engines,

(II) 185,000 miles for medium heavy-duty engines, and

(III) 435,000 miles for heavy heavy-duty engines.

Calculation — alternative procedure

(2) If the five-cycle credit value referred to in the description of A in paragraph (1)(*a*) cannot adequately measure the emission reduction attributable to an innovative technology, the company may calculate the five-cycle credit value in question using the alternative procedure set out in section 1866(d)(2)(ii) of Title 40, chapter I, subchapter C, part 86, of the CFR.

Averaging Sets

Calculation

48. The credits or deficits for each averaging set of heavy-duty vehicles or heavy-duty engines are determined by adding the credits obtained and deficits incurred for all fleets of that averaging set.

Date of credits or deficits

49. A company obtains credits or incurs deficits for an averaging set of heavy-duty vehicles or heavy-duty engines on the day on which the company submits the end of model year report for the model year in question.

Use of credits — time limit

50. Credits obtained for an averaging set of heavy-duty vehicles or heavy-duty engines of a given model year may be used for that same averaging set up to five model years after the model year for which the credits were obtained, after which the credits are no longer valid.

Deficits

51. (1) Subject to subsections (4) and (5), a company must use the credits obtained for an averaging set of heavy-duty vehicles or heavy-duty engines of a given model year to offset any outstanding deficits incurred for that same averaging set.

Remaining credits

(2) A company may bank any remaining credits to offset a future deficit for the same averaging set or it may transfer the remaining credits to another company.

Offsetting

(3) Subject to subsection (4), a company may offset a deficit that it incurs for an averaging set of heavy-duty vehicles or heavy-duty engines with an equivalent number of credits obtained in accordance with section 41 or transferred from another company for that same averaging set.

Transfer of credits

(4) Credits obtained in accordance with sections 44 to 46 may be used to offset a deficit incurred in accordance with any of paragraphs 41(1)(*a*) to (*d*) if the following conditions are met:

(*a*) the credits are applied to offset any deficits for other vehicles or engines in the same averaging set before applying them to other averaging sets; and

(*b*) not more than 6,000 Mg of CO_2 emission credits per model year are transferred within any of the following averaging sets:

(i) spark-ignition engines, light heavy-duty engines that are compression-ignition engines and light heavy-duty vehicles,

(ii) medium heavy-duty engines that are compression-ignition engines and medium -duty vehicles, or

(iii) heavy heavy-duty engines that are compression-ignition engines and heavy heavy-duty vehicles.

Offsetting deficits — time limit

(5) A company must offset a deficit incurred for an averaging set of heavy-duty vehicles or heavy-duty engines of a given model year no later than the day on which the company submits the end of model year report in accordance with section 55 for vehicles or engines of the third model year after the model year for which the company incurred the deficit.

Acquisition or merger

52. (1) A company that acquires another company or that results from a merger of companies must offset any outstanding deficit of the purchased or merged companies.

Ceasing activities

(2) If a company ceases to manufacture, import or sell heavy-duty vehicles or heavy-duty engines, it must offset all outstanding deficits for its averaging sets before submitting its last end of model year report.

Early Action Credits

Eligibility

53. (1) A company may obtain early action credits for an averaging set of heavy-duty vehicles or heavy-duty engines that are compression-ignition engines of the 2013 model year or for an averaging set of heavy-duty engines that are spark-ignition engines of the 2015 model year, if the number of credits calculated for that averaging set is greater than the number of deficits incurred for that model year and the company reports the credits in its 2014 end of model year report.

Electric vehicles

(2) A company may obtain early action credits for electric vehicles of the 2011 to 2013 model years by grouping those vehicles into the applicable averaging set and if the company reports the credits in its 2014 end of model year report.

Date

(3) A company obtains early action credits on the day on which the 2014 end of model year report is submitted.

Calculation

(4) Early action credits obtained or deficits incurred within each averaging set for a company's fleet of heavy-duty vehicles or heavy-duty engines of the 2013 model year and a company's fleet of electric vehicles of the 2011 to 2013 model years must be calculated in accordance with sections 41 to 47, as applicable, and may be multiplied by 1.5 if the company does not use the additional credit multiplier referred to in subsection 44(4), 45(3) or 46(2) for the same vehicles.

Credits — electric vehicles of the 2011 model year

(5) Early action credits obtained for an averaging set of electric vehicles of the 2011 model year may only be used to offset a deficit incurred for that same averaging set of the 2014 model year, after which the credits are no longer valid.

Time limit

(6) Early action credits obtained for the following averaging sets may be used as follows:

(*a*) in the case of an averaging set of heavyduty vehicles or heavy-duty engines that are compression-ignition engines of the 2013 model year, the credits may be used for the 2014 to 2019 model years;

(*b*) in the case of an averaging set of electric vehicles of the 2012 and 2013 model years, the credits may be used for the 2014 to 2019 model years; and

(*c*) in the case of an averaging set of heavy-duty engines that are spark-ignition engines of the 2015 model year, the credits may be used for the 2016 to 2021 model years.

Use

(7) The rules set out in sections 51 and 52 with respect to credits also apply to early action credits.

REPORTS

ANNUAL PRELIMINARY REPORT

Deadline

54. (1) A company must submit to the Minister a preliminary report, signed by a person who is authorized to act on behalf of the company, for its Class 2B and Class 3 heavy-duty vehicles and heavy-duty incomplete vehicles of the 2014 and subsequent model years — excluding those referred to in the definition "vocational vehicle" in subsection 1(1) — no later than December 1 of the calendar year preceding the calendar year that corresponds to the model year in question.

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(2) The preliminary report must indicate the model year for which the report is made and must contain the following information:

(*a*) a statement as to whether the company expects a credit or deficit in the end of model year report;

(*b*) projected sales to the first retail purchaser in Canada for each fleet; and

(*c*) the CO_2 emission value for each vehicle configuration in each fleet of Class 2B and Class 3 heavy-duty vehicles and heavy-duty incomplete vehicles — excluding those referred to in the definition "vocational vehicle" in subsection 1(1) — determined for B in paragraph 41(1)(*a*) and, if applicable, the N_2O and CH_4 emission values determined for B in subsection 27(3).

END OF MODEL YEAR REPORT

Deadline

55. (1) A company must submit to the Minister an end of model year report, signed by a person who is authorized to act on behalf of the company, for all heavy-duty vehicles and heavy-duty engines of the 2014 and subsequent model years that it imported into or manufactured in Canada, no later than May 15 of the calendar year following the calendar year that corresponds to the model year in question.

Statement

(2) The end of model year report must indicate the model year for which the report is made and must include any of the following statements from the company, whichever applies:

(*a*) that all its vehicles or engines of a given type referred to in subparagraphs 25(3)(*a*)(i) to (xiv) or (*b*)(i) to (vi), as the case may be,

(i) conform to all applicable standards, or

(ii) are covered by an EPA certificate, are sold concurrently in Canada and in the United States and conform to the emission standards referred to in the EPA certificate, or to a CO_2 family emission limit or to a CO_2 family certification level, as the case may be, that is lower than the CO_2 emission standard applicable to the model year of that vehicle or engine;

(*b*) that all its vehicles or engines — other than those referred to in paragraph (*a*) — are grouped into one or more fleets in accordance with section 25 for the purpose of participation in the CO_2 emission credit system, along with an indication of which averaging sets, fleets and subfleets they are grouped into; and

(*c*) that all its vocational vehicles and its tractors — other than those referred to in paragraphs (*a*) and (*b*) — are exempted under section 24.

Statement referred to in subparagraph (2)(*a*)(i)

(3) If an end of model year report contains the statement referred to in subparagraph (2)(*a*)(i) for a given model year, it must contain the number of heavy-duty vehicles or heavy-duty engines for each given type referred to in subparagraphs 25(3)(*a*)(i) to (xiv) or (*b*)(i) to (vi).

Statement referred to in subparagraph (2)(*a*)(ii)

(4) If an end of model year report contains the statement referred to in subparagraph (2)(*a*)(ii) for a given model year, it must contain the following information for each type of heavy-duty vehicle or heavy-duty engine:

(*a*) the number of vehicles or engines for each given type referred to in subparagraphs 25(3)(*a*)(i) to (xiv) or (*b*)(i) to (vi);

(*b*) in the case of vehicles, the CO_2 family emission limit and, in the case of engines, the CO_2 family certification level; and

(*c*) the number of vehicles or engines for each CO_2 family emission limit or CO_2 family certification level, as the case may be.

Statement referred to in paragraph (2)(*c*)

(5) If an end of model year report contains the statement referred to in paragraph (2)(*c*), it must contain the following information:

(*a*) the number of tractors and vocational vehicles of the 2011 model year that the company manufactured or imported for sale in Canada;

(*b*) the average number of tractors and vocational vehicles that the company manufactured or imported for sale in Canada for the three most recent consecutive model years preceding the model year in question;

(*c*) the number of tractors and vocational vehicles that the company manufactured or imported for sale in Canada for the model year in question;

(*d*) in the case of vehicles that are covered by an EPA certificate, the CO_2 family emission limit specified on the EPA certificate for each tractor and vocational vehicle; and

(*e*) in the case of vehicles that are not covered by an EPA certificate, the CO_2 emission rate for each tractor and vocational vehicle calculated in accordance with subsection 33 (2) or 34(2), as the case may be.

Engines — section 32

(6) If the company includes in a fleet, in accordance with section 32, heavy-duty engines that are not installed in vehicles, it must provide the number of those engines, along with the total number of engines in that vehicle fleet — whether they are installed into vehicles or not — that are of the same model year, design and hardware.

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(7) If an end of model year report contains the statement referred to in paragraph (2)(*b*) for a given model year, it must contain the following information for each averaging set:

(*a*) if applicable, a statement that the company has elected to exclude from its fleets heavy-duty vehicles or heavy-duty engines in accordance with subsection 25(2);

(*b*) if applicable, a statement that the company has elected to comply with the optional standards for vocational vehicles equipped with spark-ignition engines referred to in subsection 33(6);

(*c*) an identification of all fleets and subfleets referred to in section 25 within the averaging set;

(*d*) in relation to CO_2 emission standards and, if applicable, the N_2O and CH_4 emission standards:

(i) for Class 2B and Class 3 heavy-duty vehicles and heavy-duty incomplete vehicles, excluding those referred to in the definition "vocational vehicle" in subsection 1(1):

(A) the N_2O and CH_4 emission standards applicable to each fleet,

(B) the fleet average CO_2 emission standard, determined for A in paragraph 41(1)(*a*),

(C) the CO_2 emission target value for each vehicle subconfiguration of each fleet, determined for A in subsection 29(1),

(D) the work factor for each vehicle subconfiguration calculated in accordance with subsection 29(3), and

(E) the GVWR, curb weight, GCWR, type of transmission, axle ratio and type of engine for each vehicle configuration,

(ii) for vocational vehicles and incomplete vocational vehicles, the CO_2 emission standard that applies to each subfleet, determined for A in paragraph 41(1)(*b*) for the calculation of the number of credits or deficits,

(iii) for tractors and incomplete tractors, the CO_2 emission standard that applies to each subfleet, determined for A in paragraph 41(1)(*c*), and

(iv) for heavy-duty engines, the CO_2 emission standard and N_2O and CH_4 emission standards that apply to each fleet and subfleet;

(*e*) in relation to the CO_2 emission value, and if applicable, the N_2O and CH_4 emission values:

(i) for each fleet of Class 2B and Class 3 heavy-duty vehicles and heavy-duty incomplete vehicles — excluding those referred to in the definition "vocational vehicle" in subsection 1(1) — the following values:

(A) the fleet average CO_2 emission value, determined for B in paragraph 41(1)(*a*),

(B) the CO_2 emission value for each vehicle configuration, determined for B in subsection 30(1),

(C) if applicable, the fleet average N_2O and CH_4 emission values, determined for B in subsection 27(3), and

(D) if applicable, the N_2O and CH_4 emission values for each vehicle configuration, determined for W in subsection 27(3),

(ii) for each fleet of vocational vehicles and incomplete vocational vehicles:

(A) the CO_2 family emission limit for each subfleet, determined for B in paragraph 41(1)(*b*), and

(B) the GEM computer simulation model results, model inputs and a detailed description of how the results were derived for 10 vehicle configurations, including the vehicle configuration with the highest model result, the lowest model result and the highest projected sales in Canada,

(iii) for each fleet of tractors and incomplete tractors:

(A) the CO_2 family emission limit for each subfleet, determined for B in paragraph 41(1)(*c*), and

(B) the GEM computer simulation model results, model inputs and a detailed description of how the results were derived for 10 vehicle configurations, including the vehicle configuration with the highest model result, the lowest model result and the highest projected sales in Canada, and

(iv) for each fleet or subfleet of heavy-duty engines, as the case may be:

(A) the CO_2 family certification limit, determined for B in paragraph 41(1)(*d*), and

(B) if applicable, the N_2O and CH_4 family emission limits, determined for B in subsection 35(3);

(*f*) the number of heavy-duty vehicles or heavy-duty engines in each averaging set, fleet, subfleet and configuration and the number of vehicles in each vehicle subconfiguration;

(*g*) if applicable, the evidence of the variable F referred to in paragraph 31(3)(*b*);

(*h*) if applicable, the evidence of the EPA approval referred to in paragraph 34(6)(*a*);

(*i*) if applicable, the evidence referred to in paragraph 34(6)(*b*);

(*j*) if applicable, evidence of the EPA approval referred to in paragraph (*a*) of the description of A in subsection 46(1);

(*k*) if applicable, the evidence referred to in paragraph (*b*) of the description of A in subsection 46(1);

(*l*) if applicable, the number of CO_2 emission credits calculated in accordance with subsection 35(6) for an N_2O family emission limit that is less than 0.04 g/BHP-hr;

(*m*) the number of credits and deficits, calculated in accordance with section 41 for each fleet and subfleet, and the value of each variable — along with its description — used in calculating them;

(*n*) the number of additional credits, calculated in accordance with section 44 for each fleet, including the following values:

(i) the improvement factor,

(ii) emission rate A,

(iii) emission rate B,

(iv) modelling result B, along with the value and description of each parameter used in determining that result, and

(v) the values determined for C, D and E;

(*o*) the number of additional credits, calculated in accordance with section 45 for each fleet and subfleet, and the values determined for A, B, C and D;

(*p*) the number of additional credits, calculated in accordance with section 46, for each fleet and subfleet, and the values determined for A, B, C and D;

(*q*) the number of additional credits, calculated in accordance with section 47, for each fleet and subfleet, and the value of each applicable variable;

(*r*) an identification of every instance in each fleet or subfleet, as the case may be, when the 1.5 credit multiplier referred to in section 43 and subsections 44(4), 45(3) and 46(2) was used;

(*s*) the number of CO_2 emission credits and early action credits, if any, that are used to offset a deficit incurred for the model year in question or an outstanding deficit, and the averaging set and its model year for which the credits were obtained; and

(*t*) an accounting of the CO_2 emission credits, early action credits and deficits.

Additional information — emission credit transfers

(8) The end of model year report must also contain the following information for each CO_2 emission credit transfer and early action credit transfer to or from the company since the submission of the previous end of model year report:

(*a*) the name, street address and, if different, the mailing address of the company that transferred the credits and the model year for which that company obtained those credits;

(*b*) the name, street address and, if different, the mailing address of the company that received the credits;

(*c*) the date of the transfer; and

(*d*) the number of credits transferred, expressed in megagrams of CO_2.

EARLY ACTION CREDITS

Contents

56. (1) In order to obtain early action credits under section 53, a company must include in its 2014 end of model year report the following information for each averaging set of the 2011 to 2013 model years:

(*a*) for each fleet of Class 2B and Class 3 heavy-duty vehicles and heavy-duty incomplete vehicles, excluding those referred to in the definition "vocational vehicle" in subsection 1 (1):

(i) the number of credits or deficits calculated in accordance with paragraph 41(1)(*a*),

(ii) the N_2O and CH_4 emission standards applicable to each fleet,

(iii) the fleet average CO_2 emission standard, determined for A in paragraph 41(1)(*a*),

(iv) the CO_2 emission target value for each vehicle subconfiguration of each fleet, determined for A in subsection 29(1),

(v) the work factor for each vehicle subconfiguration calculated in accordance with subsection 29(3),

(vi) the GVWR, curb weight, GCWR, type of transmission, axle ratio and type of engine for each vehicle configuration,

(vii) the fleet average CO_2 emission value, determined for B in paragraph 41(1)(*a*),

(viii) the CO_2 emission value for each vehicle configuration and subconfiguration, determined for B in subsection 30(1),

(ix) if applicable, the fleet average N_2O and CH_4 emission values, determined for B in subsection 27(3),

(x) if applicable, the N_2O and CH_4 emission values for each vehicle configuration and subconfiguration, determined for W in subsection 27(3),

(xi) the number of vehicles of each vehicle configuration and subconfiguration,

(xii) the number of vehicles in each fleet, and

(xiii) the number of vehicles in the averaging set;

(b) for vocational vehicles and incomplete vocational vehicles:

(i) the number of credits or deficits for each fleet or subfleet, as the case may be, calculated in accordance with paragraph 41(1)(b),

(ii) the CO2 emission standard that applies to each fleet or subfleet, as the case may be, determined for A in paragraph 41(1)(b),

(iii) the CO2 family emission limit for each fleet or subfleet, as the case may be, determined for B in paragraph 41(1)(b),

(iv) the GEM computer simulation model results, model inputs and a detailed description of how the results were derived for 10 vehicle configurations, including the vehicle configuration with the highest model result, the lowest model result and the highest projected sales in Canada, and

(v) the number of those vehicles in each averaging set, fleet, subfleet and vehicle configuration;

(c) for tractors and incomplete tractors:

(i) the number of credits or deficits for each fleet or subfleet, as the case may be, calculated in accordance with paragraph 41(1)(c),

(ii) the CO2 emission standard that applies to each fleet or subfleet, as the case may be, determined for A in paragraph 41(1)(c),

(iii) the CO2 family emission limit for each fleet or subfleet, as the case may be, determined for B in paragraph 41(1)(c),

(iv) GEM computer simulation model results, model inputs and a detailed description of how the results were derived for 10 vehicle configurations, including the vehicle configuration with the highest model result, the lowest model result and the highest projected sales in Canada, and

(v) the number of tractors and incomplete tractors in each averaging set, fleet, subfleet and vehicle configuration;

(d) for heavy-duty engines:

(i) the number of credits or deficits for each fleet or subfleet, as the case may be, calculated in accordance with paragraph 41(1)(d),

(ii) the N2O and CH4 emission standards that apply to each fleet or subfleet, as the case may be,

(iii) the CO2 emission standard that applies to each fleet or subfleet, as the case may be, determined for A in paragraph 41(1)(d),

(iv) the CO2 deteriorated emission level value of the engine configuration with the highest criteria air contaminant emission levels for each fleet or subfleet, as the case may be, determined for B in paragraph 41(1)(d), and

(v) the number of engines in each averaging set, fleet, subfleet, if applicable, and engine configuration; and

(e) an identification of every instance in each fleet or subfleet, as the case may be, when the 1.5 credit multiplier was used in accordance with subsection 53(4).

Additional credits

(2) In order to obtain additional credits under section 53, a company must include in its 2014 end of model year report the values referred to in paragraphs 55(7)(*o*) to (*r*).

FORMAT OF REPORTS

Submission

57. Any report to be submitted under these Regulations must be submitted electronically in the format provided by the Minister, but the report must be submitted in writing if

(*a*) no such format is provided; or

(*b*) it is, owing to circumstances beyond the control of the person required to submit the report, impractical to submit the report electronically in the format provided.

INSTRUCTIONS

Engine installation

58. (1) A company that manufactures or imports a heavy-duty engine must ensure that every engine that is installed in a vehicle in Canada is accompanied with written instructions for installing the engine and emission control system or with the address of the place or the website where those instructions may be obtained.

Contents

(2) The instructions must contain the following information:

(*a*) detailed installation procedures for the exhaust system, emission control system, aftertreatment devices and their components;

(*b*) all necessary steps for installing any diagnostic system required under part 86 of Title 40, chapter I, subchapter C, of the CFR; and

(*c*) the limits on the types of use for the engine to ensure that the emission standards set out in these Regulations are complied with.

Language

(3) The instructions must be provided in English, French or both official languages, as requested by the installer.

Tire maintenance

59. (1) In the case of tractors and vocational vehicles, a company must ensure that written instructions respecting tire maintenance and replacement are provided to the first retail purchaser of every vehicle.

Language

(2) The instructions must be provided in English, French or both official languages, as requested by that purchaser.

RECORDS

EVIDENCE OF CONFORMITY

EPA certificate

60. For a heavy-duty vehicle or a heavy-duty engine that is covered by an EPA certificate and that is sold concurrently in Canada and the United States, evidence of conformity in respect of a company for the purposes of paragraph 153(1)(*b*) of the Act consists of

(*a*) a copy of the EPA certificate covering the vehicle or the engine and, if applicable, a copy of the evidence of the EPA approval concerning the vehicle or the engine as referred to in paragraph 34(6)(*a*) or subsection 46(1), as the case may be;

(*b*) a document demonstrating that the vehicle or the engine that is covered by the EPA certificate is sold concurrently in Canada and the United States;

(*c*) a copy of the records submitted to the EPA in support of the application or amended application for the EPA certificate in respect of the vehicle or the engine; and

(*d*) a U.S. emission control information label or, in the case of a heavy-duty engine, a U.S. engine information label that is permanently affixed to the vehicle or the engine in the form and location set out in

(i) section 35 of Title 40, chapter I, subchapter C, part 86, subpart A, of the CFR, and section 135 of Title 40, chapter I, subchapter U, part 1037, subpart B, of the CFR, for the applicable model year of the heavy-duty vehicle, and

(ii) section 35 of Title 40, chapter I, subchapter C, part 86, subpart A, of the CFR, and section 135 of Title 40, chapter I, subchapter U, part 1036, subpart B, of the CFR, for the applicable model year of the heavy-duty engine.

No EPA certificate

61. (1) For the purposes of paragraph 153(1)(*b*) of the Act, a company must obtain and produce evidence of conformity for a heavy-duty vehicle or a heavy-duty engine — other than one referred to in section 60 — in a form and manner satisfactory to the Minister instead of as specified in that section.

Time of submission

(2) For greater certainty, a company must submit the evidence of conformity to the Minister before importing a heavy-duty vehicle or a heavy-duty engine or applying a national emissions mark to it.

Subsection 153(2) of the Act

62. For greater certainty, a company that imports a heavy-duty vehicle or a heavy-duty engine or applies a national emissions mark to it under subsection 153(2) of the Act is not required to provide the Minister with the evidence of conformity referred to in subsection 61(1) before

importing it or applying a national emissions mark to it, but must provide that evidence in accordance with subsection 153(2) of the Act before the vehicle or the engine leaves the possession or control of the company and before it is presented for registration under the laws of a province or of an aboriginal government, whichever applies.

FLEET AVERAGE EMISSIONS

Contents

63. (1) A company that participates in the CO_2 emission credit system must maintain records containing the following information for each of its fleets:

(*a*) for each fleet of Class 2B and Class 3 heavy-duty vehicles and heavy-duty incomplete vehicles, excluding those referred to in the definition "vocational vehicle" in subsection 1 (1):

(i) the model year,

(ii) the fleet average CO_2 emission standard,

(iii) the fleet average CO_2 emission value and, if applicable, the fleet average N_2O and CH_4 emission values,

(iv) the values and data used in calculating the fleet average CO_2 emission standard and the fleet average CO_2 emission value and, if applicable, in calculating the fleet average N_2O and CH_4 emission values,

(v) the values and data used in calculating the number of CO_2 emission credits and, if applicable, the number of early action credits, and

(vi) the number of CO_2 emission credits used to offset a N_2O or CH_4 emission deficit, if applicable;

(*b*) for each fleet of vocational vehicles and incomplete vocational vehicles:

(i) the model year,

(ii) the CO_2 emission standard that applies to each subfleet,

(iii) the CO_2 emission rate for each subfleet,

(iv) the values and data used in calculating the CO_2 emission rate for each subfleet, and

(v) the values and data used in calculating the number of CO_2 emission credits and, if applicable, the number of early action credits, for each fleet and subfleet;

(*c*) for each fleet of tractors and incomplete tractors:

(i) the model year,

(ii) the CO_2 emission standard that applies to each subfleet,

(iii) the CO_2 emission rate for each subfleet,

(iv) the values and data used in calculating the CO_2 emission rate for each subfleet, and

(v) the values and data used in calculating the number of CO_2 emission credits and, if applicable, the number of early action credits, for each fleet and subfleet; and

(*d*) for each fleet of heavy-duty engines:

(i) the model year,

(ii) the CO_2 emission standard that applies to each fleet and subfleet,

(iii) the CO_2 deteriorated emission level value of the engine configuration with the highest criteria air contaminant emission levels for each fleet and subfleet, and

(iv) the values and data used in calculating the number of CO_2 emission credits and, if applicable, the number of early action credits.

Contents — heavy-duty vehicles

(2) A company must maintain records containing the following information for each heavy-duty vehicle in the fleets referred to in paragraphs (1)(*a*) to (*c*):

(*a*) the model year and vehicle configuration or subfleet of the vehicle, as the case may be;

(*b*) the CO_2 emission standard that applies to each fleet or subfleet, as the case may be;

(*c*) for a vehicle covered by an EPA certificate, the applicable test group described in subpart S of Title 40, chapter I, subchapter C, part 86, of the CFR;

(*d*) the name and street address of the plant where the vehicle was assembled;

(*e*) the vehicle identification number;

(*f*) the CO_2 emission value that applies to the fleet of the vehicle or the CO_2 emission rate that applies to the subfleet of the vehicle, as the case may be, and the values and data used in calculating that value or rate; and

(*g*) the name and the street or mailing address of the first retail purchaser of the vehicle in Canada.

Contents — engines

(3) A company must maintain records containing the following information for each heavy-duty engine in the fleets referred to in paragraph (1)(*d*):

(*a*) the model year, the engine configuration and, if applicable, the subfleet of the engine;

(*b*) the date of manufacture;

(*c*) the gross power;

(*d*) an identification of the emission control system;

(*e*) the CO_2 emission standard that applies to the fleet or subfleet of the engine, as the case may be;

(*f*) for an engine covered by an EPA certificate, the applicable engine family;

(*g*) the name of the engine manufacturer;

(*h*) the unique identification number of the engine;

(*i*) if the engine belongs to the engine configuration with the highest criteria air contaminant emission levels, the deterioration factor and whether it constitutes a multiplicative deterioration factor or an additive deterioration factor, and the values and data used in calculating that factor; and

(*j*) the name and the street or mailing address of the first retail purchaser of the engine in Canada.

MAINTENANCE AND SUBMISSION OF RECORDS

Maintenance of records

64. (1) For heavy-duty vehicles and heavy-duty engines of each model year, a company must maintain in writing or in a readily readable electronic or optical form

(*a*) a copy of the reports referred to in sections 54 to 56 for a period of at least eight years after the end of the calendar year that corresponds to the model year in question;

(*b*) the evidence of conformity and records referred to in sections 60 and 61 for a period of at least eight years after the day on which the main assembly of the vehicle or manufacture of the engine was completed; and

(*c*) the records referred to in section 63 for a period of at least eight years after the end of the calendar year that corresponds to the model year in question.

Records maintained on behalf of a company

(2) If the copy of the reports, the evidence of conformity and the records referred to in subsection (1) are maintained on behalf of a company, the company must keep a record of the name, street address and, if different, the mailing address of the person who maintains those records.

Time limits

(3) If the Minister makes a written request for the evidence of conformity or the records referred to in subsection (1), or a summary of any of them, the company must provide the Minister with the requested information, in either official language, within

(*a*) 40 days after the day on which the request is delivered to the company; or

(*b*) if the evidence of conformity or records referred to in section 60 or 61 must be translated from a language other than French or English, 60 days after the day on which the request is delivered to the company.

IMPORTATION DOCUMENT

Importation for exhibition, demonstration, evaluation or testing

65. The declaration referred to in paragraph 155(1)(*a*) of the Act must be made in accordance with section 41 of the *On-Road Vehicle and Engine Emission Regulations*.

RENTAL RATE

Rental rate

66. The annual rental rate to be paid to a company by the Minister under subsection 159(1) of the Act, prorated on a daily basis for each day that a vehicle or an engine is made available, is the rate prescribed in section 43 of the *On-Road Vehicle and Engine Emission Regulations*.

APPLICATION FOR EXEMPTION

Application

67. A company applying under section 156 of the Act for an exemption from conformity to any standard specified under these Regulations must submit in writing to the Minister the information set out in section 44 of the *On-Road Vehicle and Engine Emission Regulations*.

DEFECT INFORMATION

Notice of defect

68. (1) The notice of defect referred to in subsections 157(1) and (4) of the Act must be given in writing and must contain the information set out in subsection 45(1) of the *On-Road Vehicle and Engine Emission Regulations*.

Reports

(2) In respect of a notice of defect issued under these Regulations, a company must comply with subsections 45(2) and (3) of the *On-Road Vehicle and Engine Emission Regulations*.

Applicable standard

(3) For the application of section 157 of the Act, the CO_2 emission standard that applies

(*a*) to a Class 2B and Class 3 heavy-duty vehicle and heavy-duty incomplete vehicle — excluding those referred to in the definition "vocational vehicle" in subsection 1(1) — or to a spark-ignition engine of a Class 2B and Class 3 heavy-duty vehicle or heavy-duty incomplete vehicle that conforms to the alternative CO_2 emission standard referred to in section 32, is the product of 1.1 multiplied by the deteriorated emission level applicable for that vehicle, rounded to the nearest 0.1 gram per mile;

(*b*) to a vocational vehicle is the result of the GEM computer simulation model using the parameters specified in subsection 33(2);

(*c*) to a tractor — other than a low-roof or mid-roof tractor referred to in subsection 34(5) — is the result of the GEM computer simulation model using the parameters specified in subsection 34(2), except that the coefficient of aerodynamic drag may originate from a bin that is one level higher than that of the subject vehicle;

(*d*) to a low-roof or mid-roof tractor referred to in subsection 34(5), is the result of the GEM computer simulation model using the parameters specified in subsection 34(2);

(*e*) to a heavy-duty engine — other than an engine referred to in paragraphs (*f*) and (*g*) — is the product of 1.03 multiplied by the applicable standard set out in section 36 for that engine, rounded to the nearest 0.1 gram of CO_2 per BHP-hr or in the case of an engine that is grouped into a fleet or subfleet referred to in section 25, as the case may be, the product of 1.03 multiplied by the deteriorated emission level applicable to the

engine configuration from that fleet or subfleet, as the case may be, with the highest criteria air contaminant emission levels, rounded to the nearest 0.1 gram of CO_2 per BHP-hr;

(*f*) to a heavy-duty engine that conforms to the alternative CO_2 emission standard for engines of the 2014 to 2016 model years referred to in subsection 37(1), is the product of 1.03 multiplied by the applicable alternative CO_2 emission standard, rounded to the nearest 0.1 gram of CO_2 per BHP-hr; and

(*g*) to a heavy-duty engine that conforms to the alternative CO_2 emission standard for engines of the 2013 to 2016 model years referred to in subsection 37(2), is the product of 1.03 multiplied by the applicable alternative CO_2 emission standard, rounded to the nearest 0.1 gram of CO_2 per BHP-hr.

COMING INTO FORCE

Registration

69. These Regulations come into force on the day on which they are registered.

[15-1-o]

Footnote 1
Canada's Action on Climate Change, www.climatechange.gc.ca/default.asp?lang=En&n=036D9756-1.

Footnote 2
Canada's Greenhouse Gas Inventory, 2009, www.ec.gc.ca/ges-ghg/default.asp?lang=En&n=72E6D4E2-1.

Footnote 3
Industry Canada, at www.ic.gc.ca/eic/site/auto-auto.nsf/eng/am02311.html.

Footnote 4
All statistics from Industry Canada, at www.ic.gc.ca/cis-sic/cis-sic.nsf/IDE/cis-sic33612inte.html.

Footnote 5
Federal Register, Vol. 76, No. 179, p. 57108, September 15, 2011, www.epa.gov/otaq/climate/regulations.htm#1-2.

Footnote 6
Contact Environment Canada's Economic Analysis Directorate for any questions regarding methodology, rationale, or policy.

Footnote 7
U.S. Interagency Working Group paper on SCC: IWGSCC, 2010, "Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866," U.S. Government.

Footnote 8
The value of $26/tonne of CO2 in 2010 (in 2010 Canadian dollars) and its growth rate have been estimated using an arithmetic average of the three models PAGE, FUND, and DICE.

Footnote 9
"Fat-Tailed Uncertainty in the Economics of Climate Change," Review of Environmental Economic Policy, 5(2), pp. 275–292 (summer 2011).

Footnote 10
"Fat Tails, Thin Tails, and Climate Change Policy," Review of Environmental Economics and Policy, summer 2011.

Footnote 11
The value of $104/tonne of CO2 in 2010 (in 2010 Canadian dollars) and its growth rate have been estimated using an arithmetic average of the two models PAGE and DICE. The FUND model has been excluded in this estimate because it does not include low probability, high-cost climate damage.

Footnote 12
www.neb.gc.ca/clf-nsi/rnrgynfmtn/nrgyrprt/nrgyftr/2011/nrgsppldmndprjctn2035-eng.html#s2_1

Footnote 13
www.epa.gov/otaq/climate/documents/420r11901.pdf

Footnote 14
www.tc.gc.ca/media/documents/policy/report-final.pdf

Footnote 15
Canadian Industry Statistics, Industry Canada.

Footnote a
S.C. 2004, c. 15, s. 31

Footnote b
S.C. 1999, c. 33

Date Modified: 2012-04-13