POLICY UPDATE

JUNE 2017

PROPOSED SECOND-PHASE GREENHOUSE GAS EMISSION STANDARDS FOR HEAVY-DUTY ENGINES AND VEHICLES IN CANADA

ICCT **POLICY UPDATES** SUMMARIZE REGULATORY AND OTHER DEVELOPMENTS RELATED TO CLEAN TRANSPORTATION WORLDWIDE.

On March 4, 2017, Canada published proposed standards to reduce greenhouse gas (GHG) emissions from new on-road heavy-duty vehicles (Environment and Climate Change Canada [ECCC], 2017). As proposed, the new regulation would apply to model year (MY) 2018 to 2027 vehicles. The ECCC Phase 2 regulation would follow the Phase 1 regulation, which was finalized in 2013 and affected commercial vehicles between MY 2014 and 2017. ECCC's Phase 2 regulation is designed to align closely with the U.S. national standards, which were finalized in October 2016 by the U.S. Environmental Protection Agency (U.S. EPA) and the U.S. Department of Transportation's National Highway Traffic Safety Administration.

The publication of the proposal initiated a 75-day comment period, and ECCC is reviewing all stakeholder feedback as part of the process to update and finalize the regulation. ECCC held a consultation meeting in Toronto on April 11, 2017, to discuss various aspects of the Phase 2 proposal and solicit input on several issues. At the consultation session, ECCC indicated that, as with the Phase 1 regulatory development timeline, they aim to finalize the Phase 2 regulation within approximately 1 year of the proposal's publication. Thus, we are expecting the rule to be finalized by the spring of 2018.

The regulatory design of the Phase 2 regulation mirrors the U.S. program and is best understood as four separate standards linked to specific provisions for (a) tractor trucks, (b) vocational vehicles, (c) heavy-duty pickup trucks and vans, and (d) commercial trailers, (a newly added equipment category in both the final Phase 2 standards in the U.S. and the proposed regulation in Canada). In addition, as in Phase 1, there are separate dynamometer-based standards for the engines that power tractor trucks and vocational vehicles. For reference, more details of the Phase 2 regulation can be found in our policy update summarizing the U.S. national program (International Council on Clean Transportation, 2016).

The regulation for certain types of trailers begins in 2018, and for all other regulatory subcategories, 2021 is the first compliance year. The stringency levels of the proposed standards for Canada vary according to vehicle categories that are based on weight

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classes and vehicle attributes. The estimated per-vehicle percent reductions in MY 2027 versus the MY 2017 baseline and the associated incremental vehicle costs are shown in Table 1.[1]

Table 1: Summary of GHG reductions and the estimated incremental costs (2015 Canadian dollars [CAD]) in MY 2027 for each vehicle category

Regulatory category	GHG reduction in MY 2027 versus MY 2017 baseline*	Incremental cost of MY 2027 vehicles versus MY 2017 baseline
Tractor trucks	15% to 27%	$11,322
Vocational vehicles	10% to 24%	$4,369
Heavy-duty pickup trucks and vans	16%	$1,324
Commercial trailers	5% to 9%	$1,237

* The percentage reduction values in this column are based on the U.S. rule and are not explicitly stated in the ECCC proposed regulation. The ECCC regulatory limit values for tractors, vocational vehicles, and trailers are in terms of grams CO2 per short ton-mile (short ton = 2,000 lbs. = 907.2 kg). For heavy-duty pickups and vans, the limit values are in terms of grams CO2 per mile.

Tractor trucks, which represent the largest share of fuel use and GHG emissions, have required GHG reductions between 15% and 27% depending on the regulatory subcategories, which are organized by gross vehicle weight (GVW), roof height, and cabin configuration (i.e., day cab or sleeper cab). The projected technology packages to achieve these GHG reductions will result in additional costs of roughly $11,300 CAD per tractor, on average. For vocational vehicles, GHG reductions in MY 2027 range from 10% to 24% are estimated to increase vehicle costs by an average of $4,400. Class 2B and 3 pickup trucks and vans are expected to achieve annual GHG reductions of 2.5%, which results in total savings of 16% by MY 2027. The forecasted technologies needed to reach these efficiency levels by 2027 will represent an added expense of approximately $1,300 for pickup trucks and vans. Finally, in harmonization with the U.S., ECCC has proposed to add commercial trailers as a new regulatory category. The CO_2 reductions associated with trailers between 2018 and 2027 range from 5% to 9% depending on the type of trailer, and the technologies needed to achieve these improvements—primarily aerodynamic and tire-related technologies—will increase the cost of the average trailer by approximately $1,200.

Over the lifetime of the vehicles affected by the proposed regulation (i.e., MY 2018 to 2029), ECCC estimates that the total GHG emissions reduction will be 41 million tonnes. For reference, the estimated GHG reductions of ECCC's Phase 1 regulation was 19.1 million tonnes. The total monetized value of the fuel savings, GHG reductions, and other environmental and economic benefits of the proposed regulation are estimated at $13.6 billion CAD compared to $4.8 billion in additional capital and operational costs associated with the development and deployment of efficiency technologies. The nearly $9 billion in net benefits for the Phase 2 proposal exceed the net benefits of the Phase 1 regulation by roughly a factor of 2.

1 Although the U.S. and Canadian standards are aligned in terms of carbon dioxide (CO_2) limit values, all of the per-vehicle percentage reduction values cited in this policy update are based on the U.S. rule and are not explicitly stated in the proposed ECCC regulation.

Though the Canada and U.S. programs are aligned in all key areas, there are some important Canada-specific elements of the regulation, which are summarized in the following section.

CANADA-SPECIFIC PROVISIONS

Averaging, banking, and trading. In terms of flexibility provisions, the regulation allows manufacturers and importers of heavy-duty vehicles and engines to meet the standards based on sales and averaging in the Canada market by participating in a CO_2 emission credit system. Canada-specific compliance and reporting allows for far more accurate accounting of how new vehicle performance standards translate into real-world emission benefits. A Canada-specific averaging, banking, and trading (ABT) program does not necessarily provide greater GHG reductions; however, Canada-specific ABT does provide critical assurances and help better establish a durable regulatory program with accurately quantifiable impacts. To minimize the administrative burden on manufacturers and importers, Environment Canada has developed streamlined reporting procedures that are coordinated with the U.S. EPA.

An important exception to these ABT provisions is the case for manufacturers and importers of engines certified by the U.S. EPA, which, as described in the following section, are not required to demonstrate compliance based on Canada-specific sales if they meet certain sale thresholds, which depend on a ratio of the number of engines sold in Canada and in the United States.

Concurrent sales. As in the Phase 1 regulation, the proposed Phase 2 regulation would allow engines that are certified by the U.S. EPA to be sold concurrently in Canada without demonstrating compliance based on Canada sales-weighted averaging. This provision is designed to reduce the compliance burden on industry and allows engine manufacturers and importers to sell a certain number of higher-emitting engines without these sales impacting their Canada-specific sales-weighted average. However, a key stipulation to protect against the potential for gaming is that the higher-emitting engines must be sold in greater quantities in the U.S. than in Canada. An engine model certified at CO_2 levels higher than the standard must participate in the emissions-accounting system based on sales-weighted averaging if sales of that model in Canada are (a) more than 1,000 and exceed the number of engines of the same engine family that are sold in the U.S. or (b) between 101 and 1,000 and are more than twice the number of engines sold in the United States. This provision prevents the development of high-emitting niche engines for the Canada market. For context, the U.S. heavy-duty sales market is roughly 10 times greater than that of Canada.

Additional flexibility provisions. To minimize the regulatory burden on industry, ECCC has proposed a number of flexibility provisions, including:

- Exemption for manufacturers or importers that sell less than 200 combined tractors and vocational vehicles in a given model year
- Additional exemptions from CO_2 limits and reporting requirements for the engines sold in the exempted tractors and vocational vehicles
- One-year temporary exemption for small volume manufacturers or importers that sell less than 100 trailers in Canada in 2018

» Transitional flexibility for MY 2018 to 2026: all trailer manufacturers or importers can choose to exempt 20% of their trailers sold from the regulation. This 20% value is capped at less than 25 for box trailers and less than 20 for non-box trailers.

ECCC's analysis indicates that these additional flexibilities will not significantly affect the final positive outcome of the regulation. Per the regulatory flexibility analysis (see Table 16 in the proposed regulation (ECCC, 2017)):

> *Relative to the initial option, the flexible option [for all engine and vehicle categories] is expected to result in a slight decrease in GHG emission reductions, as well as a loss of information related to emission performance for some heavy-duty engines and trailers in end of model year reports submitted to the Department. However, any additional risk introduced by the flexible option is anticipated to be low and manageable.*

Mandatory standards for tractors great than or equal to 120,000 pounds gross combined vehicle weight (GCVW). Whereas the large majority of tractor-trailers in the United States have a GCVW of 80,000 lbs. or less, Canada has a much larger percentage of heavy tractor-trailers that have a GCVW of 140,000 lbs. or more. As such, ECCC is proposing additional requirements for these tractor trucks that are designed for very heavy loads.

Although the U.S. regulation has optional standards for tractors rated for 120,000 lbs. GCVW or more, ECCC has proposed mandatory CO_2 limits for two categories of heavy tractors:

» Heavy line haul tractors: 120,000 lbs. ≤ GCVW < 140,000 lbs.

» Heavy-haul tractors: ≥ 140,000 lbs. GCVW

The CO_2 limit values for heavy line haul and heavy-haul tractors in the ECCC proposal are shown in Table 2. For tractors less than 120,000 lbs., the ECCC proposal is identical to the U.S. regulation in terms of limit values and assumed technology penetration. For heavy line haul tractors (i.e., tractors between 120,000 and 140,000 lbs.), there are six regulatory subcategories based on roof height and cab type (i.e., day or sleeper cab). Because these heavy line haul tractors are used in similar ways as tractors less than 120,000 lbs., the same set of technologies are assumed to provide cost-effective benefits in this segment. However, for certain technology areas such as aerodynamics, low rolling resistance tires, and 6x2 axles, ECCC has assumed less aggressive market penetration for setting the CO_2 limit values. For the heaviest group of tractors larger than 140,000 lbs., ECCC has proposed mandatory limits of 52.4, 50.2, and 48.3 grams CO_2 per ton-mile in 2021, 2024, and 2027, respectively.

Table 2: Summary of tractor regulatory subcategories and CO_2 limit values in the U.S. and Canada

Class	Type	GVW	Baseline MY 2017	US final rule MY 2027		Canada proposal MY 2027	
			g CO_2 / ton-mile	g CO_2 / ton-mile	Percent change 2017–2027	g CO_2 / ton-mile	Percent change 2017–2027
Class 7 tractor	Low roof	Up to 120,000 lbs.	119.1	96.2	–19%	Same limits as in the U.S. final rule	
	Mid roof		127.2	103.4	–19%		
	High roof		129.7	100.0	–23%		
Class 8 tractor (day)	Low roof		91.3	73.4	–20%		
	Mid roof		96.6	78.0	–19%		
	High roof		98.2	75.7	–23%		
Class 8 tractor (sleeper)	Low roof		84.0	64.1	–24%		
	Mid roof		90.2	69.6	–23%		
	High roof		87.8	64.3	–27%		
Class 8 heavy line haul tractor (day)*	Low roof	120,000 to 140,000 lbs.	Baseline data pending finalization of regulation	In the U.S. final rule, tractors over 120,000 lbs. GVW can meet the optional heavy haul standard shown below.		47.0	To be determined
	Mid roof					49.1	
	High roof					48.0	
Class 8 heavy line haul tractor (sleeper)*	Low roof					40.6	
	Mid roof					43.0	
	High roof					40.6	
Heavy haul tractor		140,000 lbs. and greater	57	48.3 (optional)	–15%	48.3	–15%

* In the ECCC proposal, tractor trucks between 120,000 and 140,000 GVW are called "heavy line haul," and these six regulatory subcategories are unique to ECCC's proposed rulemaking.

REFERENCES

Environment and Climate Change Canada (2017). Proposed Regulations Amending the Heavy-duty Vehicle and Engine Greenhouse Gas Emission Regulations. Vol. 151, No. 9. Ottawa, ON, Canada Gazette, Part 1. Retrieved from http://www.gazette.gc.ca/rp-pr/p1/2017/2017-03-04/html/reg1-eng.php

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