

*The Administrator of the Environmental Protection Agency, Andrew Wheeler, signed the following Proposed Rulemaking on December 23, 2020, and we are submitting it for publication in the Federal Register. While we have taken steps to ensure the accuracy of this Internet version of the Rulemaking, it is not the official version. Please refer to the official version in a forthcoming Federal Register publication, which will appear on the Government Printing Office's FDSys website ([www.gpo.gov/fdsys/search/home.action](http://www.gpo.gov/fdsys/search/home.action)) and on Regulations.gov (<http://www.regulations.gov>) in Docket ID No. EPA-HQ-OAR-2019-0307. Once the official version of this document is published in the Federal Register, this version will be removed from the Internet and replaced with a link to the official version.*

6560-50-P

## **ENVIRONMENTAL PROTECTION AGENCY**

### **40 CFR Parts 1036 and 1037**

**[EPA-HQ-OAR-2019-0307; FRL-10018-51-OAR]**

### **Improvements for Heavy-Duty Engine and Vehicle Test Procedures**

**AGENCY:** Environmental Protection Agency (EPA).

**ACTION:** Notice of proposed rulemaking; further amendments.

**SUMMARY:** This notice of proposed rulemaking includes corrections, clarifications, additional flexibilities, and adjustment factors to improve the Greenhouse gas Emissions Model (GEM) compliance tool for heavy-duty vehicles while more closely matching the outputs produced by the original GEM version 3.0 that was used to establish the CO<sub>2</sub> standards for Model Years 2021 and later in the 2016 Heavy-duty Phase 2 final rule. This notice supplements the proposed rule published on May 12, 2020 (85 FR 28153), which included a larger set of proposed revisions to modify and improve GEM. Most of the proposed revisions from that notice of proposed rulemaking are addressed in a final rulemaking published in the Final Rule's section of today's Federal Register, titled "Improvements for Heavy-Duty Engine and Vehicle Test Procedures, and other Technical Amendments," docket number EPA-HQ-OAR-2019-0307; FRL-10018-52-OAR. Given the nature of this proposal, there will be neither significant environmental impacts nor significant economic impacts for any sector.

**DATES:** *Comments:* Comments must be received on or before [INSERT DATE 60 DAYS AFTER PUBLICATION IN THE FEDERAL REGISTER]. *Public Hearing:* If anyone contacts us requesting a public hearing on or before [INSERT DATE 7 DAYS AFTER PUBLICATION IN THE FEDERAL REGISTER], we will hold an online hearing at 10 am Eastern Standard Time on [INSERT DATE 15 DAYS AFTER PUBLICATION IN THE FEDERAL REGISTER].

**ADDRESSES:** *Comments:* Submit your comments, identified by Docket ID No. EPA-HQ-OAR-2019-0307, at <http://www.regulations.gov>. For detailed instructions on sending comments and additional information on the rulemaking process, see the "PUBLIC PARTICIPATION" section of this document.

*Docket:* EPA has established a docket for this action under Docket ID No. EPA-HQ-OAR-2019-0307. Publicly available docket materials are available either electronically at <http://www.regulations.gov> or in hard copy at Air and Radiation Docket and Information Center, EPA Docket Center, EPA/DC, EPA WJC West Building, 1301 Constitution Ave., N.W., Room 3334, Washington, DC. Out of an abundance of caution for members of the public and our staff, the EPA Docket Center and Reading Room was closed to public visitors on March 31, 2020, to reduce the risk of transmitting COVID-19. Our Docket Center staff will continue to provide remote customer service via email, phone, and webform. We encourage the public to submit comments via <https://www.regulations.gov> or email, as there is a temporary suspension of mail delivery to EPA, and no hand deliveries are currently accepted. For further information on EPA Docket Center services and the current status, please visit us online at <https://www.epa.gov/dockets>.

*Public Hearing:* Individuals are invited to notify EPA of interest in a public hearing; see FOR FURTHER INFORMATION CONTACT.

**PUBLIC PARTICIPATION:** *Comments:* All submissions received must include the Docket ID No. EPA-HQ-OAR-2019-0307 for this rulemaking. Follow the online instructions for submitting comments. Once submitted, comments received may be posted without change to <https://www.regulations.gov/>, including any personal information provided, and cannot be edited or removed from Regulations.gov. The EPA may publish any comment received to its public docket. Do not submit electronically any information you consider to be Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Multimedia submissions (audio, video, etc.) must be accompanied by a written comment. The written comment is considered the official comment and should include discussion of all points you wish to make. The EPA will generally not consider comments or comment contents located outside of the primary submission (i.e., on the web, cloud, or other file sharing system). For additional submission methods, the full EPA public comment policy, information about CBI or multimedia submissions, and general guidance on making effective comments, please visit <http://www2.epa.gov/dockets/commenting-epa-dockets>.

Out of an abundance of caution for members of the public and our staff, the EPA Docket Center and Reading Room was closed to public visitors on March 31, 2020, to reduce the risk of transmitting COVID-19. Our Docket Center staff will continue to provide remote customer service via email, phone, and webform. We encourage the public to submit comments via <https://www.regulations.gov> or email, as there is a temporary suspension of mail delivery to EPA, and no hand deliveries are currently accepted. For further information on EPA Docket Center services and the current status, please visit us online at <https://www.epa.gov/>

EPA continues to carefully and continuously monitor information from the Centers for Disease Control and Prevention, local area health departments, and our Federal partners so we can respond rapidly as conditions change regarding COVID-19.

*Docket:* All documents in the docket are listed on the [www.regulations.gov](http://www.regulations.gov) web site. Although listed in the index, some information is not publicly available, e.g., CBI or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, is not placed on the Internet and will be publicly available only in hard copy form through the EPA Docket Center at the location listed in the ADDRESSES section of this document.

*Public Hearing:* If we hold a public hearing, we will announce detailed information about the hearing on our website <https://www.epa.gov/regulations-emissions-vehicles-and-engines/supplemental-rule-improvements-heavy-duty-engine-and>. Send requests for a hearing and questions about the status of a hearing to the contact identified in FOR FURTHER INFORMATION CONTACT.

**FOR FURTHER INFORMATION CONTACT:** Amy Kopin, Office of Transportation and Air Quality, Assessment and Standards Division, Environmental Protection Agency, 2000 Traverwood Drive, Ann Arbor, MI 48105; telephone number: (734) 214-4173; email address: [kopin.amy@epa.gov](mailto:kopin.amy@epa.gov).

**SUPPLEMENTARY INFORMATION:**

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**I. General Information**

*Does this Action Apply to Me?*

This action relates to companies that manufacture or sell new heavy-duty engines and vehicles as defined under EPA’s CAA regulations.<sup>1</sup> Regulated categories and entities include the following:

NAICS Codes <sup>A</sup>	NAICS Titles	Examples of Potentially Regulated Entities
333618, 336111, 336112, 336120, 336211, 336999	Other Engine Equipment Manufacturing, Automobile Manufacturing, Light Truck and Utility Vehicle Manufacturing, Heavy Duty Truck Manufacturing, Motor Vehicle Body Manufacturing, All Other Transportation Equipment Manufacturing	Motor vehicle manufacturers and engine manufacturers

<sup>A</sup> North American Industry Classification System (NAICS)

This list is not intended to be exhaustive, but rather provides a guide for readers regarding entities likely to be regulated by this action. If you have questions regarding the applicability of this action to a particular entity, consult the person listed in the FOR FURTHER INFORMATION CONTACT section.

*What Action Is the Agency Taking?*

This action proposes to amend the regulations that implement our air pollutant emission standards for heavy-duty engines and vehicles. The amendments in this notice of proposed rulemaking include corrections, clarifications, additional flexibilities, and adjustment factors to

<sup>1</sup> “Heavy-duty engine” and “heavy-duty vehicle” are defined in 40 CFR 1037.801.

the Greenhouse gas Emissions Model (GEM) compliance tool for heavy-duty vehicles. These amendments would modify the existing test procedure for heavy-duty highway engines and vehicles and apply to the measurement of CO<sub>2</sub> emissions. EPA published a proposed rule on May 12, 2020 (85 FR 28153) (“Technical Amendments proposed rule”). EPA is issuing a final rulemaking (“Technical Amendments final rule”) relating to most revisions proposed in the Technical Amendments proposed rule, published in the Final Rule’s section of today’s Federal Register, titled “Improvements for Heavy-Duty Engine and Vehicle Test Procedures, and other technical amendments,” docket number EPA–HQ–OAR–2019–0307; FRL-10018-52-OAR.

This action supplements the Technical Amendments proposed rule for only certain specific aspects of revising GEM by proposing several amendments to the model, after consideration of comments solicited and received on the Technical Amendments proposed rule, including a proposed revision to address concerns raised regarding potential stringency impacts that may result from changes to GEM.

### *What are the Incremental Costs and Benefits of this Action?*

This action is limited in scope and does not have significant economic or environmental impacts. EPA has therefore not estimated the potential costs or benefits of this notice of proposed rulemaking.

## **II. Greenhouse Gas Emissions Model (GEM) Background**

GEM is a computer application that estimates the greenhouse gas (GHG) emissions and fuel efficiency performance of specific aspects of heavy-duty vehicles. GEM uses several vehicle-specific inputs, such as engine fuel maps, aerodynamic drag coefficients, and vehicle weight ratings, to simulate vehicle and engine operation and model the amount of CO<sub>2</sub> emitted over multiple duty cycles for tractors and vocational vehicles. The resulting CO<sub>2</sub> values over these cycles are weighted by GEM to provide a composite GEM score. GEM version 3.0 was used to set standards in the Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles-Phase 2 (“Phase 2”) rulemaking (81 FR 73478). For purposes of determining compliance, composite GEM scores are compared to the applicable Phase 2 vehicle standard.

In the Technical Amendments proposed rule, we proposed several amendments to GEM 3.0, including corrections, clarifications, and additional flexibilities in a revised version of the model, GEM 3.5 (85 FR 28145). EPA also requested comment on whether any differences in GEM output values resulting from changes to the model would impact the effective stringency of the program and, if so, whether EPA should revise the GEM model itself or address such impacts via regulations (see 85 FR 28145).

Comments received in response to the NRPM supported most of the proposed updates to GEM and requested additional revisions to further improve the model.<sup>2</sup> The California Air Resources Board (CARB) provided comment on this topic, stating the importance of GEM results being consistent with the current program standards to avoid affecting program stringency. CARB recommended that EPA revise GEM to ensure stringency is maintained.<sup>3</sup>

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<sup>2</sup> See “Improvements for Heavy-Duty Engine and Vehicle Test Procedures, and other Technical Amendments Response to Comments”, Publication Number: EPA-420-R-20-026, December 2020. Chapter 2 of the Response to Comments provides additional details on the amendments, clarifications requested by commenters, and our responses to most of the comments to the NPRM.

<sup>3</sup> California Air Resources Board, Docket number EPA-HQ-OAR-2019-0207-0030.

After considering the comments received, EPA applied further potential changes to GEM 3.5 and released a new development version of GEM, GEM 3.7, to the public for download and review by stakeholders to evaluate and assess the performance of this revised model. GEM 3.7 incorporated some corrections and improvements relative to the proposed version GEM 3.5, as noted in the corresponding memorandum in the rulemaking docket.<sup>4</sup>

While evaluating GEM 3.7, we found differences in the output values for some tractor and vocational vehicles compared to the output values from GEM 3.0 used to set the Phase 2 CO<sub>2</sub> standards. To understand the differences between GEM 3.0 and GEM 3.7, we recreated the process used in 2016 to determine the numerical level of the Phase 2 standards. Without an adjustment to the resulting GEM output value, these differences in GEM output values when compared to the Phase 2 final rule could be considered an effective change in stringency. In light of GEM 3.7 output differences and considering CARB's comment, we identified adjustment factors in that same docketed memo that could be applied to the unrounded GEM 3.7 output to better ensure effective stringency of the standards is maintained.<sup>5</sup>

The Truck and Engine Manufacturers Association (EMA) requested additional time for its members to review the potential updates to the model in GEM 3.7 and evaluate the impact of the adjustment factors made available.<sup>6</sup>

As described in the Technical Amendments final rule, EPA released a revised version of GEM (i.e., GEM 3.5.1) that corrected three errors in GEM 3.5 and finalized provisions to specify GEM 3.5.1 without adjustment factors as the compliance tool for meeting Phase 2 standards.<sup>7</sup> GEM 3.5.1 includes the following updates to GEM 3.5:

- Corrected duty cycle weighting factors for vocational vehicles in the Heavy Heavy-Duty Multipurpose subcategory.
- Corrected an idle map error when the cycle average engine fuel mapping procedure is used for all three drive cycles.
- Corrected a functional error that unnecessarily required manufacturers to include transmission power loss data when using the option to enter a unique (instead of default) k-factor for the torque converter.

### III. Proposed Updates to GEM

In this notice of proposed rulemaking, as detailed further in this section, we are proposing to revise GEM and to revise GEM's test procedures to include adjustment factors after consideration of comments solicited and received on the Technical Amendments proposed rule. We request comment only on these specific revisions and are not proposing changes to or seeking comment on any other amendments included in the Technical Amendments proposed or final rule.

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<sup>4</sup> Nelson, Brian. Memorandum to Docket EPA-HQ-OAR-2019-0307. "Development version of GEM and adjustment factors". October 23, 2020. Docket number EPA-HQ-OAR-2019-0307-0083. Also available online: <https://www3.epa.gov/otaq/gem-p2v3.7-release-memo-2020-10-23.pdf>.

<sup>5</sup> *Id.*

<sup>6</sup> Charmley, Bill. Memorandum to Docket EPA-HQ-OAR-2019-0307. "EPA discussions with the Truck and Engine Manufacturers Association, and with the California Air Resources Board, regarding Highway Heavy-Duty Technical Amendments." December 14, 2020. Docket Number EPA-HQ-OAR-2019-0307-0092.

<sup>7</sup> See the notice of final rulemaking for "Improvements for Heavy-Duty Engine and Vehicle Test Procedures, and other Technical Amendments" published in the Final Rule's section of today's Federal Register, titled "Improvements for Heavy-Duty Engine and Vehicle Test Procedures," docket number EPA-HQ-OAR-2019-0307; FRL-10018-52-OAR

We are releasing GEM version 3.8 for notice and comment.<sup>8</sup> The proposed GEM 3.8 allows additional compliance flexibilities and improves the vehicle simulation by incorporating the following improvements relative to GEM 3.5.1:

- Changed limits on engine input to allow small negative torque inputs.
- Corrected how GEM adjusts the idle fueling of the transient cycle by using the same idle duration time both for subtracting the idle fuel rate from the transient cycle average engine fuel map and for adding back in the simulated idle fuel rate.
- Added an option for vocational vehicles to input a value for neutral coasting in GEM and amend the related test procedure in 40 CFR 1037.520(j)(1).
- Corrected manual and automated manual transmissions to perform clutched upshifts for Heavy HDV.

We request comment on the revisions listed above.

As noted in a memorandum to the docket, the resulting standards generated using GEM 3.8 in place of GEM 3.0 were, on average, 0.58 percent lower for tractors and 0.20 percent higher for vocational vehicles, with the greatest difference (an increase of 1.3 percent) occurring in a few of the custom chassis standards.<sup>9</sup> To ensure that these changes to GEM do not change the effective stringency of the Phase 2 CO<sub>2</sub> standards, we propose a revision to the test procedures in 40 CFR 1037.520(o) to include a table of adjustment factors to be applied to the unrounded GEM 3.8 output to correct the differences. We request comment on this proposed revision to 40 CFR 1037.520(o). EPA also requests comment on whether EPA should incorporate the adjustment factors directly into the GEM model, if EPA is able to develop a version of the GEM model which properly incorporates the adjustment factors.

We are proposing to incorporate by reference into the regulations the revised version, GEM 3.8, for manufacturers to demonstrate compliance with the Phase 2 standards, including obtaining a certificate of conformity and submitting end-of-year reports. For MY 2021, we are proposing to allow use of GEM 3.5.1 under §1037.150(bb) as an interim provision, but to limit this optional use of GEM 3.5.1 for demonstrating compliance with the Phase 2 standards, including obtaining a certificate of conformity and submitting end-of-year reports, to MY 2021 vehicles only. A manufacturer who opts to use GEM 3.5.1 for MY 2021 is required to apply GEM 3.5.1 across its entire MY 2021 U.S.-directed production volume. We also propose to allow MY 2021 data based on the use of GEM 3.5.1 to be used for carryover requests for certificates of conformity for MY 2022 and future years for qualifying vehicles under §1037.235(d); however, manufacturers would still need to use GEM 3.8 for end-of-year reporting for MY 2022 and later. Under this proposal, GEM 3.8 would need to be used for all other certificates of conformity for MY 2022 and later. Due to the model improvements and flexibilities available in GEM 3.8 relative to GEM 3.5.1, we request comment on the appropriateness of requiring that GEM 3.8 be used for MY 2021 end-of-year reports even if MY 2021 certificates of conformity were obtained using GEM 3.5.1. Finally, we are proposing that if an engine fuel map was run on an engine using a cycle generated from GEM 3.5.1 for MY 2021 and the manufacturer of that engine applies for carryover certification for MY 2022 or later, the manufacturer would not need to rerun the engine fuel map. We request comment on these

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<sup>8</sup> Greenhouse gas Emissions Model (GEM) Phase 2, Version 3.8, December 2020. A working version of this software is also available for download at <https://www.epa.gov/regulations-emissions-vehicles-and-engines/greenhouse-gas-emissions-model-gem-medium-and-heavy-duty>.

<sup>9</sup> Sanchez, James, Memorandum to Docket EPA-HQ-OAR-2019-0307. Process of Using GEM to Set Vehicle Standards. December 4, 2020.

requirements, allowable uses, and limitations proposed for each of these revised GEM model versions, including the use of GEM 3.5.1 for MY 2021 and carryover applications.

#### **IV. Statutory Authority and Executive Order Reviews**

Additional information about these statutes and Executive Orders can be found at <http://www2.epa.gov/laws-regulations/laws-and-executive-orders>.

##### *A. Executive Order 12866: Regulatory Planning and Review and Executive Order 13563: Improving Regulation and Regulatory Review*

This action is not a significant regulatory action and was therefore not submitted to the Office of Management and Budget (OMB) for review.

##### *B. Executive Order 13771: Reducing Regulations and Controlling Regulatory Costs*

This action is not expected to be an Executive Order 13771 regulatory action because this action is not significant under Executive Order 12866.

##### *C. Paperwork Reduction Act (PRA)*

This action does not impose any new information collection burden under the PRA. OMB has previously approved the information collection activities contained in the existing regulations and has assigned OMB control numbers 2060-0678. This rule clarifies and simplifies procedures without affecting information collection requirements.

##### *D. Regulatory Flexibility Act (RFA)*

I certify that this action will not have a significant economic impact on a substantial number of small entities under the RFA. In making this determination, the impact of concern is any significant adverse economic impact on small entities. An agency may certify that a rule will not have a significant economic impact on a substantial number of small entities if the rule relieves regulatory burden, has no net burden or otherwise has a positive economic effect on the small entities subject to the rule. This action is designed to reduce testing burdens, increase compliance flexibility, and make various corrections and adjustments to compliance provisions; as a result, we anticipate no costs associated with this rule. We have therefore concluded that this action will have no net regulatory burden for directly regulated small entities.

##### *E. Unfunded Mandates Reform Act (UMRA)*

This action does not contain any unfunded mandate as described in UMRA, 2 U.S.C. 1531–1538, and does not significantly or uniquely affect small governments. This action imposes no enforceable duty on any state, local or tribal governments. Requirements for the private sector do not exceed \$100 million in any one year.

##### *F. Executive Order 13132: Federalism*

This action does not have federalism implications. It will not have substantial direct effects on the states, on the relationship between the national government and the states, or on the distribution of power and responsibilities among the various levels of government.

##### *G. Executive Order 13175: Consultation and Coordination with Indian Tribal Governments*

This action does not have tribal implications as specified in Executive Order 13175. This rule will be implemented at the Federal level and affects engine and vehicle manufacturers. Thus, Executive Order 13175 does not apply to this action.

*H. Executive Order 13045: Protection of Children from Environmental Health Risks and Safety Risks*

This action is not subject to Executive Order 13045 because it is not economically significant as defined in Executive Order 12866, and because the EPA does not believe the environmental health or safety risks addressed by this action present a disproportionate risk to children. There are no environmental health or safety risks created by this action that could present a disproportionate risk to children.

*I. Executive Order 13211: Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution or Use*

This action is not subject to Executive Order 13211, because it is not a significant regulatory action under Executive Order 12866.

*J. National Technology Transfer and Advancement Act (NTTAA) and 1 CFR Part 51*

Section 12(d) of the National Technology Transfer and Advancement Act of 1995 (“NTTAA”), Public Law 104–113, 12(d) (15 U.S.C. 272 note) directs EPA to use voluntary consensus standards in its regulatory activities unless to do so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (e.g., materials specifications, test methods, sampling procedures, and business practices) that are developed or adopted by voluntary consensus standards bodies. NTTAA directs agencies to provide Congress, through OMB, explanations when the Agency decides not to use available and applicable voluntary consensus standards. This action involves technical standards.

Except for the reference discussed below, the standards included in the regulatory text as incorporated by reference in 40 CFR part 1037 were all previously approved for IBR and no change is proposed in this action.

In accordance with the requirements of 1 CFR 51.5, we are proposing to incorporate by reference a new version of the Greenhouse gas Emissions Model (GEM), which we use for certifying heavy-duty highway vehicles to the greenhouse gas emission standards in 40 CFR part 1037. The model calculates emission rates for heavy-duty highway vehicles based on input values defined by the manufacturer. The model is available as noted in the amended regulations at 40 CFR 1037.810.

*K. Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*

The EPA believes this action does not have disproportionately high and adverse human health or environmental effects on minority populations, low-income populations or indigenous peoples, as specified in Executive Order 12898 (59 FR 7629, February 16, 1994). Due to the small environmental impact, this regulatory action will not have a disproportionate adverse effect on minority populations, low-income populations, or indigenous peoples.

**List of Subjects**  
40 CFR Part 1036

Administrative practice and procedure, Air pollution control, Confidential business information, Environmental protection, Greenhouse gases, Labeling, Motor vehicle pollution, Reporting and recordkeeping requirements, Warranties.

40 CFR Part 1037

Administrative practice and procedure, Air pollution control, Confidential business information, Environmental protection, Incorporation by reference, Labeling, Motor vehicle pollution, Reporting and recordkeeping requirements, Warranties.

Andrew Wheeler,  
Administrator.

For the reasons set out in the preamble, we propose to amend title 40, chapter I of the Code of Federal Regulations as set forth below.

**PART 1036--CONTROL OF EMISSIONS FROM NEW AND IN-USE HEAVY-DUTY HIGHWAY ENGINES**

1. The authority citation for part 1037 continues to read as follows:

Authority: 42 U.S.C. 7401 - 7671q.

2. Amend §1036.150 by adding paragraph (r) to read as follows:

**§1036.150 Interim provisions.**

\* \* \* \* \*

(r) Carryover fuel maps. You may use fuel maps from model year 2021 engines for certifying model year 2022 and later vehicles using carryover provisions in §1036.235(d), even if the specified version of the GEM simulation tool to generate duty cycles for fuel mapping changes for those later model years.

**PART 1037—CONTROL OF EMISSIONS FROM NEW HEAVY-DUTY MOTOR VEHICLES**

3. The authority citation for part 1037 continues to read as follows:

Authority: 42 U.S.C. 7401-7671q.

4. Amend §1037.150 by adding paragraph (bb) to read as follows:

**§1037.150 Interim provisions.**

\* \* \* \* \*

(bb) Transition to updated GEM. Vehicle manufacturers may demonstrate compliance with Phase 2 GHG standards in model year 2021 vehicles using GEM Phase 2, Version 3.5.1 (incorporated by reference in §1037.810). Each vehicle manufacturer must use a single version of GEM for all its model year 2021 families. Vehicle manufacturers may use GEM Phase 2, Version 3.5.1 for later model years only to certify vehicle families from model year 2021 that qualify for using carryover provisions in §1037.235(d).

5. Amend §1037.520 by revising the introductory text and paragraph (j)(1) and adding paragraph (o) to read as follows:

**§1037.520 Modeling CO<sub>2</sub> emissions to show compliance for vocational vehicles and tractors.**

This section describes how to use the Greenhouse gas Emissions Model (GEM) (incorporated by reference in §1037.810) to show compliance with the CO<sub>2</sub> standards of §§1037.105 and 1037.106 for vocational vehicles and tractors. Use GEM version 2.0.1 to demonstrate compliance with Phase 1 standards; use GEM Phase 2, Version 3.8 to demonstrate compliance with Phase 2 standards. Use good engineering judgment when demonstrating compliance using GEM. See §1037.515 for calculation procedures for demonstrating compliance with trailer standards.

\* \* \* \* \*

(j) \* \* \*

(1) Intelligent controls. Enter 2 for tractors with predictive cruise control. This includes any cruise control system that incorporates satellite-based global-positioning data for controlling operator demand. For tractors without predictive cruise control and for all vocational vehicles, enter 1.5 if they have neutral coasting, unless good engineering judgment indicates that a lower percentage should apply.

\* \* \* \* \*

(o) Adjusting results for updated GEM. Adjust composite results from GEM Phase 2, Version 3.8 using the following equation to account for modeling changes relative to GEM Phase 2, Version 3.0:

$$e_{CO_2 \text{ Adjusted}} = \frac{e_{CO_2}}{1 + AF}$$

Eq. 1037.520-1

Where:

$e_{CO_2}$  = FEL CO<sub>2</sub> Emissions from GEM.

AF = the adjustment factor from the following table:

Table 10 of §1037.520—

Adjustment Factors for Composite Results from GEM Phase 2, Version 3.8

Regulatory Subcategory	Adjustment Factor		
	MY 2022-2023	MY 2024-2026	MY 2027-and-later
Class 7 Day Cab Low Roof	-0.0104	-0.0090	-0.0094
Class 7 Day Cab Mid Roof	-0.0106	-0.0084	-0.0097
Class 7 Day Cab High Roof	-0.0088	-0.0084	-0.0090
Class 8 Day Cab Low Roof	-0.0062	-0.0079	-0.0068
Class 8 Sleeper Cab Low Roof	-0.0014	-0.0015	-0.0016
Class 8 Day Cab Mid Roof	-0.0059	-0.0062	-0.0064
Class 8 Sleeper Cab Mid Roof	-0.0013	0.0000	0.0000
Class 8 Day Cab High Roof	-0.0058	-0.0062	-0.0066
Class 8 Sleeper Cab High Roof	-0.0013	-0.0014	-0.0016
Class 8 Heavy Haul	-0.0076	-0.0080	-0.0062
Multi-Purpose Light HDV Compression-ignition	0.0000	-0.0029	0.0000
Regional Light HDV Compression-ignition	0.0000	0.0000	0.0000
Urban Light HDV Compression-ignition	0.0000	0.0000	0.0000
Multi-Purpose Medium HDV Compression-ignition	-0.0038	0.0000	0.0000
Regional Medium HDV Compression-ignition	0.0000	0.0000	0.0000
Urban Medium HDV Compression-ignition	-0.0034	-0.0037	0.0000

Multi-Purpose Heavy HDV Compression-ignition	0.0038	0.0041	0.0043
Regional Heavy HDV Compression-ignition	0.0000	0.0000	0.0000
Urban Heavy HDV Compression-ignition	0.0065	0.0071	0.0037
Multi-Purpose Light HDV Spark-ignition	0.0000	0.0000	-0.0027
Regional Light HDV Spark-ignition	0.0000	0.0000	0.0000
Urban Light HDV Spark-ignition	0.0000	0.0000	0.0000
Multi-Purpose Medium HDV Spark-ignition	0.0000	0.0000	0.0000
Regional Medium HDV Spark-ignition	0.0000	0.0000	0.0040
Urban Medium HDV Spark-ignition	0.0030	0.0032	0.0034
School bus	-0.0034	-0.0034	0.0000
Motor home	0.0000	0.0000	0.0000
Coach bus	0.0000	0.0000	0.0049
Other bus	0.0067	0.0067	0.0000
Refuse hauler	0.0096	0.0096	0.0034
Concrete mixer	0.0125	0.0125	0.0127
Mixed-use vehicle	0.0125	0.0125	0.0127
Emergency vehicle	0.0123	0.0123	0.0125

6. Amend §1037.810 by revising paragraph (c) to read as follows:

**§1037.810 Incorporation by reference.**

\* \* \* \* \*

(c) U.S. EPA, Office of Air and Radiation, 2565 Plymouth Road, Ann Arbor, MI 48105, [www.epa.gov](http://www.epa.gov).

(1) Greenhouse gas Emissions Model (GEM), Version 2.0.1, September 2012 (“GEM version 2.0.1”), IBR approved for §1037.520.

(2) Greenhouse gas Emissions Model (GEM) Phase 2, Version 3.5.1, November 2020 (“GEM Phase 2, Version 3.5.1”); IBR approved for §1037.150(bb).

(3) Greenhouse gas Emissions Model (GEM) Phase 2, Version 3.8, November 2020 (“GEM Phase 2, Version 3.8”); IBR approved for §1037.520.

(4) GEM’s MATLAB/Simulink Hardware-in-Loop model, Version 3.8, December 2020 (“GEM HIL model”); IBR approved for §1037.550(a).

(5) The computer code for these models is available as noted in paragraph (a) of this section. A working version of the software is also available for download at <https://www.epa.gov/regulations-emissions-vehicles-and-engines/greenhouse-gas-emissions-model-gem-medium-and-heavy-duty>.

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