



## **ENVIRONMENTAL PROTECTION AGENCY**

**[EPA–HQ–OAR–2023–0303; FR-11052-01-OAR]**

### **Alternative Methods for Calculating Off-Cycle Credits under the Light-Duty Vehicle**

### **Greenhouse Gas Emissions Program: Applications from Ford Motor Company**

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

**ACTION:** Notice.

**SUMMARY:** The Environmental Protection Agency (EPA) is requesting comment on applications from Ford Motor Company (“Ford”) for off-cycle carbon dioxide (CO<sub>2</sub>) credits under EPA’s light-duty vehicle greenhouse gas emissions standards. “Off-cycle” emission reductions can be achieved by employing technologies that result in real-world benefits, but where that benefit is not adequately captured on the test procedures used by manufacturers to demonstrate compliance with emission standards. EPA’s light-duty vehicle greenhouse gas program acknowledges these benefits by giving automobile manufacturers several options for generating “off-cycle” CO<sub>2</sub> credits. Under the regulations, a manufacturer may apply for CO<sub>2</sub> credits for off-cycle technologies that result in off-cycle benefits. In these cases, a manufacturer must provide EPA with a proposed methodology for determining the real-world off-cycle benefit. Ford has submitted applications that describe methodologies for determining off-cycle credits from technologies described in their applications. Pursuant to applicable regulations, EPA is making these off-cycle credit calculation methodologies available for public comment.

**DATES:** Comments must be received on or before **[INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**.

**ADDRESSES:** Submit your comments referencing Docket ID No. EPA–HQ–OAR–2023–0303 online using [www.regulations.gov](https://www.regulations.gov) (our preferred method), by email to [a-and-r-Docket@epa.gov](mailto:a-and-r-Docket@epa.gov) or by mail to: EPA Docket Center, Environmental Protection Agency, Mailcode 28221T, 1200 Pennsylvania Ave., NW., Washington, DC 20460.

EPA's policy is that all comments received will be included in the public docket without change including any personal information provided, unless the comment includes profanity, threats, information claimed to be Confidential Business Information (CBI) or other information whose disclosure is restricted by statute.

**FOR FURTHER INFORMATION CONTACT:** Linc Wehrly, Director, Light Duty Vehicle Center, Compliance Division, Office of Transportation and Air Quality, U.S. Environmental Protection Agency, 2000 Traverwood Drive, Ann Arbor, MI 48105. Telephone: (734) 214-4286. Fax:(734) 214-4053. Email address:wehrly.linc@epa.gov.

**SUPPLEMENTARY INFORMATION:**

**I. Background**

EPA's light-duty vehicle greenhouse gas (GHG) program provides three pathways by which a manufacturer may accrue off-cycle carbon dioxide (CO<sub>2</sub>) credits for those technologies that achieve CO<sub>2</sub> reductions in the real world but where those reductions are not adequately captured on the test used to determine compliance with the CO<sub>2</sub> standards, and which are not otherwise reflected in the standards' stringency. The first pathway is a predetermined list of credit values for specific off-cycle technologies that may be used beginning in model year 2014.<sup>1</sup> This pathway allows manufacturers to use conservative credit values established by EPA for a wide range of technologies, with minimal data submittal or testing requirements, if the technologies meet EPA regulatory definitions. In cases where the off-cycle technology is not on the menu but additional laboratory testing can demonstrate emission benefits, a second pathway allows manufacturers to use a broader array of emission tests (known as "5-cycle" testing because the methodology uses five different testing procedures) to demonstrate and justify off-cycle CO<sub>2</sub> credits.<sup>2</sup> The additional emission tests allow emission benefits to be demonstrated over some elements of real-world driving not adequately captured by the GHG compliance tests, including high speeds, hard accelerations, and cold temperatures. These first two methodologies were completely defined through notice and comment rulemaking and therefore no additional

process is necessary for manufacturers to use these methods. The third and last pathway allows manufacturers to seek EPA approval to use an alternative methodology for determining the off-cycle CO<sub>2</sub> credits.<sup>3</sup> This option is only available if the benefit of the technology cannot be adequately demonstrated using the 5-cycle methodology. Manufacturers may also use this option to demonstrate reductions that exceed those available via use of the predetermined list.

Under the regulations, a manufacturer seeking to demonstrate off-cycle credits with an alternative methodology (*i.e.*, under the third pathway described above) must describe a methodology that meets the following criteria:

- Use modeling, on-road testing, on-road data collection, or other approved analytical or engineering methods;
- Be robust, verifiable, and capable of demonstrating the real-world emissions benefit with strong statistical significance;
- Result in a demonstration of baseline and controlled emissions over a wide range of driving conditions and number of vehicles such that issues of data uncertainty are minimized;
- Result in data on a model type basis unless the manufacturer demonstrates that another basis is appropriate and adequate.

Further, the regulations specify the following requirements regarding an application for off-cycle CO<sub>2</sub> credits:

- A manufacturer requesting off-cycle credits must develop a methodology for demonstrating and determining the benefit of the off-cycle technology and carry out any necessary testing and analysis required to support that methodology.
- A manufacturer requesting off-cycle credits must conduct testing and/or prepare engineering analyses that demonstrate the in-use durability of the technology for the full useful life of the vehicle.

- The application must contain a detailed description of the off-cycle technology and how it functions to reduce CO<sub>2</sub> emissions under conditions not represented on the compliance tests.
- The application must contain a list of the vehicle model(s) which will be equipped with the technology.
- The application must contain a detailed description of the test vehicles selected and an engineering analysis that supports the selection of those vehicles for testing.
- The application must contain all testing and/or simulation data required under the regulations, plus any other data the manufacturer has considered in the analysis.

Finally, the alternative methodology must be approved by EPA prior to the manufacturer using it to generate credits. As part of the review process defined by regulation, the alternative methodology submitted to EPA for consideration must be made available for public comment.<sup>4</sup> EPA will consider public comments as part of its final decision to approve or deny the request for off-cycle credits.

## **II. Off-Cycle Credit Applications**

### *A. Enhanced Window Anti-Fogging Strategy*

Ford is applying for off-cycle GHG credits for the use of an Enhanced Window Anti-Fogging Strategy (EWAFS). The EWAFS system uses an on-glass humidity sensor to calculate the fogging probability in mild ambient conditions. This technology improves the efficiency by allowing more accurate fogging prediction and less widespread A/C usage. The requested credit amount was confirmed by Ford through a series of AC17 tests with ambient temperatures from 5 to 25 degrees Celsius. Testing was done with and without the EWAFS system and an average difference in CO<sub>2</sub> was calculated. Ford also collected real-world customer usage data for 2020 MY vehicles equipped with EWAFS and 2019 MY vehicles without EWAFS to determine the percentage of time that the A/C compressor operated at each temperature. Ford is applying for a credit of 1.2 grams/mile for 2020 and later model years for light duty vehicles sold in the U.S.

and equipped with the EWAFS system. EPA considers this anti-fogging technology to be a technology that, if approved, will be subject to the maximum limits for an A/C system of 5.0 g/mi for passenger automobiles and 7.2 g/mi for light trucks specified in the regulations.<sup>5</sup> Details of the testing and analysis can be found in the manufacturer's application.

### *B. Brushless Engine Cooling Fan Technology*

Ford is applying for off-cycle GHG credits for the use of a Brushless Engine Cooling Fan Technology (BMECF). The brushless motor's increased efficiency reduces electrical load. Brushless motors improve efficiency by removing a source of friction at the brushes. While brushed motor cooling fans are typically 1 or 2 speed, brushless motors are inherently variable speed. This allows for a more efficient fan speed for a given set of vehicle conditions. Ford evaluated on-road fan usage collected through on-vehicle data loggers. Electrical power consumption was measured for 2-speed brushed, pulse-width modulated brushed, and brushless cooling fan types. Data was collected using several 2019 and 2020 vehicles and across various ambient temperatures. The electrical load reduction was converted to a CO<sub>2</sub> value using a load factor of 3.2 g/mi per 100 W. Ford is applying for a GHG credit of 0.5 g/mi for cars, and 1.3 g/mi for light duty trucks equipped with the brushless engine cooling fan technology. Details of the testing and analysis can be found in the manufacturer's application.

### **III. EPA Decision Process**

EPA has reviewed the applications for completeness and is now making the applications available for public review and comment as required by the regulations. The off-cycle credit applications submitted by the manufacturers (with confidential business information redacted) have been placed in the public docket (see **ADDRESSES** section above) and on EPA's website at <https://www.epa.gov/ve-certification/compliance-information-light-duty-greenhouse-gas-ghg-standards>.

EPA is providing a 30-day comment period on the applications for off-cycle credits described in this document, as specified by the regulations. The manufacturers may submit a

written rebuttal of comments for EPA’s consideration, or may revise an application in response to comments. After reviewing any public comments and any rebuttal of comments submitted by manufacturers, EPA will make a final decision regarding the credit requests. EPA will make its decision available to the public by placing a decision document (or multiple decision documents) in the docket and on EPA’s website at the same manufacturer-specific pages shown above.

While the broad methodologies used by these manufacturers could potentially be used for other vehicles and by other manufacturers, the vehicle specific data needed to demonstrate the off-cycle emissions reductions would likely be different. In such cases, a new application would be required, including an opportunity for public comment.

**Byron Bunker,**

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<sup>1</sup> See 40 CFR 86.1869–12(b).

<sup>2</sup> See 40 CFR 86.1869–12(c).

<sup>3</sup> See 40 CFR 86.1869–12(d).

<sup>4</sup> See 40 CFR 86.1869–12(d)(2).

<sup>5</sup> See 40 CFR 86.1868-12(b)(2).

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