

EPA Decision Document:

**Off-Cycle Credits for Volkswagen Group
of America, Inc. for High-Efficiency
Alternators**

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Compliance Division
Office of Transportation and Air Quality
U.S. Environmental Protection Agency

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Introduction

EPA's light-duty vehicle greenhouse gas (GHG) rules include opportunities for manufacturers to generate CO₂ credits for technologies that provide CO₂ reductions not captured by the 2-cycle emissions test. There are three pathways by which manufacturers can generate off-cycle credits: (1) a pre-determined "menu" of technologies and credits that is available for 2014 and later model years, (2) a testing-based option, and (3) an alternative methodology that includes opportunity for public comment. These are described in more detail in Section II.

Pursuant to those rules, Volkswagen Group of America ("VW") submitted an application requesting off-cycle credits for implementation of a High-Efficiency Alternators using new technology to reduce the overall load on the engine yet continue to meet the electrical demands of the vehicle systems, resulting in lower fuel consumption and lower CO₂ emissions.

EPA published a notice in the *Federal Register* on October 23, 2020 announcing a 30-day public comment period for this application.¹ EPA received and has reviewed the comments regarding the methodologies presented for determining the credits sought by VW and is hereby approving the technologies, methodologies for determining credits, and credit levels as described in VW's application and in the *Federal Register*.

Section II of this document provides background on EPA's off-cycle credits program. Section III provides EPA's decision. This Decision Document applies to the application referenced herein. Future VW requests for credits for implementations of the same technology, same methodology and similar analysis in future model years for the same or new models may be considered, at EPA discretion, without additional public notice or comment periods. Decision Documents describing the approvals of any such subsequent credit requests will be created and made available publicly as these approvals are granted.

EPA's Off-cycle Credits Program

EPA's light-duty vehicle greenhouse gas (GHG) program provides three pathways by which a manufacturer may accrue off-cycle carbon dioxide (CO₂) credits for those off-cycle technologies that

¹ 85 FR 67535, October 23, 2020.

achieve CO₂ reductions in the real world but where those reductions are not adequately captured on the test procedure used to determine compliance with the CO₂ standards. The first is a predetermined list of credit values for specific off-cycle technologies that may be used beginning in model year 2014.² 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. In cases where additional laboratory testing can demonstrate emission benefits of an off-cycle technology, 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 CO₂ credits.³ The additional emission tests allow emission benefits to be demonstrated over some elements of real-world driving not captured by the GHG compliance tests, including high speeds, hard accelerations, and cold temperatures. Credits determined according to this methodology do not undergo additional public review. The third and last pathway allows manufacturers to seek EPA approval to use an alternative methodology for determining the off-cycle CO₂ credits.⁴ This option is only available if the benefit of the off-cycle 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 CO₂ 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.

² See 40 CFR 86.1869-12(b).

³ See 40 CFR 86.1869-12(c).

⁴ See 40 CFR 86.1869-12(d).

- 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 CO₂ 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.⁵ EPA will consider public comments as part of its final decision to approve or deny the request for off-cycle credits.

Although these credits are requested under regulatory provisions that don't explicitly require limitations, or caps, on credit values, EPA is stipulating here that credits for technologies for which there is a regulatory cap must be held to the applicable regulatory cap, if such credits are approved by EPA. For example, for reasons described in the implementing rulemaking documents and analyses, EPA established caps on thermal technology credits of 3.0 grams/mile for cars and 4.3 grams/mile for trucks. The rationale for these caps is applicable regardless of the off-cycle pathway being used to achieve such credits. EPA also established caps on technologies that improve the efficiency of air conditioning systems (5 grams/mile for cars and 7.2 grams per mile for trucks). Thus, credits approved in this Decision Document are being approved only to the extent that the regulatory caps on credits for certain technologies or categories of technologies are not exceeded.

EPA Decision on Off-cycle Credit Application

High-Efficiency Alternators

VW requested GHG credits for the use of High efficiency alternators to reduce the overall load on the engine resulting in lower fuel consumption and lower CO₂ emissions as compared to that of conventional alternators, for model years 2016, 2017, 2018 and 2019 model years. EPA has previously approved credits for high-efficiency alternators using this methodology for Ford Motor Company, General Motors Corporation, Fiat Chrysler Automobiles, Hyundai, Kia, and Toyota Motor Company. Details of the testing and analysis can be found in the manufacturer's applications. The VW application describes VW's implementation and provided test data and analysis to support and quantify the off-

⁵ See 40 CFR 86.1869-12(d)(2).

cycle credits requested. EPA reviewed the application for completeness and made it available for public review and comment as required by the regulations.

EPA received limited public comments on the VW application and has considered those in the context of the regulatory language and intent. EPA has evaluated the application and finds that the methodologies described therein are sound and appropriate. Therefore, EPA is approving the credits requested by VW for the 2016 and later model years and models as described in the application. All information necessary to determine the total Megagrams of credits must be included in the reporting to EPA as appropriate, and the total Megagrams for each fleet and model year should be included in a summary of credit averaging, banking, and trading as soon as practicable.