



## Alliance for Automotive Innovation

### Comments to U.S. Environmental Protection Agency Re: Notice of Alternative Method for Calculating Off-Cycle Credits Under the Light-Duty Vehicle Greenhouse Gas Emissions Program: Applications From Nissan North America, Inc.

Docket ID No.  
EPA-HQ-OAR-2019-0588

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#### Attention

David Wright, U.S. Environmental Protection Agency  
James Tamm, National Highway Traffic Safety Administration  
Michael McCarthy, California Air Resources Board

#### Introduction

The Alliance for Automotive Innovation (“Auto Innovators”)<sup>1</sup> hereby submits comment in response to the U.S. Environmental Protection Agency (“EPA”) Notice “Alternative Method for Calculating Off-Cycle Credits Under the Light-Duty Vehicle Greenhouse Gas Emissions Program: Applications From Nissan North America, Inc.” (the “Notice”)<sup>2</sup> and the subject “Application for Alternative Methodology Off-Cycle GHG Credits Related to Use of Low-Power-Consumption Compressor Clutch Technology for 2017 and Subsequent Model Years” (the “Nissan Application”).<sup>3</sup> The Nissan Application appears to meet the requirements of the alternative methodology off-cycle credit

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<sup>1</sup> Formed in 2020, the Alliance for Automotive Innovation is the singular, authoritative and respected voice of the automotive industry. Focused on creating a safe and transformative path for sustainable industry growth, the Alliance for Automotive Innovation represents the manufacturers producing nearly 99 percent of cars and light trucks sold in the U.S. The newly established organization, a combination of the Association of Global Automakers and the Alliance of Automobile Manufacturers, is directly involved in regulatory and policy matters impacting the light-duty vehicle market across the country. Members include motor vehicle manufacturers, original equipment suppliers, as well as technology and other automotive-related companies. The Alliance for Automotive Innovation is headquartered in Washington, DC, with offices in Detroit, MI and Sacramento, CA. For more information, visit our website <http://www.autosinnovate.org>.

<sup>2</sup> U.S. Environmental Protection Agency, “Alternative Method for Calculating Off-Cycle Credits Under the Light-Duty Vehicle Greenhouse Gas Emissions Program: Applications From Nissan North America, Inc., Notice,” 86 Fed. Reg. 8,631 (February 8, 2021), hereinafter “Notice.”

<sup>3</sup> Nissan North America, Inc., “Application for Alternative Methodology Off-Cycle GHG Credits Related to Use of Low-Power-Consumption Compressor Clutch Technology for 2017 and Subsequent Model Years” (April 24, 2020), hereinafter “Nissan Application.”

program,<sup>4</sup> and credit should be granted in a timely manner. These comments provide additional technical detail regarding industry practices for assessing air conditioning (“A/C”) efficiency improvements, and address process and regulatory interpretation concerns with the off-cycle credit program’s execution.

### Technical Comments

#### *The Nissan Application*

The Denso low-power-consumption technology (“LE40”) variable displacement compressor clutch uses less electrical power to maintain the torque needed by the compressor to compress refrigerant. In support of the Nissan Application, Denso conducted bench testing to determine the A to B power savings of the LE40 clutch over the baseline clutch. The power savings is 13 watts. Applying the electric load reduction formula for technologies given by EPA<sup>5</sup> and adjusting by the Life-Cycle Climate Performance (“LCCP”) model derived A/C clutch usage factor yields a value of 0.287 grams CO<sub>2</sub> per mile benefit.

The choice of an engineering analysis and modeling is appropriate. The following technical comments describe some of the strengths and weaknesses of various full-vehicle test methods and analytical modeling related to measuring A/C system-related emissions.

#### *Direct Emissions Measurements-AC17 Testing*

The many different environmental conditions heating, ventilation, and air conditioning (“HVAC”) systems experience make the direct determination of related GHG emissions in an emissions test chamber difficult. Variables such as customer usage patterns, solar loading, geography, weather, and annual season changes must all be accounted for.

The AC17 test, used to estimate HVAC-related emissions, simulates operation on a sunny day at a warm temperature and comfortable humidity level. The specific test conditions are a temperature of 77 °F, ambient humidity of 69 grains (roughly 50% relative humidity), and a solar load of 850 W/m<sup>2</sup>. The vehicle is run on a drive cycle with and without the HVAC system functioning to determine an estimate of emissions related to total HVAC system operation.

The AC17 test has both strengths and weaknesses. The particular strength of the AC17 test is that it can provide a specific measurement of the entire HVAC system’s contribution to emissions. However, the test only considers a single set of conditions (and not other temperature and humidity conditions observed across the U.S.). Another weakness of the AC17 test is the challenge of isolating small incremental improvements associated with component-level changes (e.g., the LE40 clutch). Variability in the whole-vehicle AC17 test is about 2% of the total measured CO<sub>2</sub> emissions (e.g., 4 g/mile for a 200 grams g/mile vehicle), whereas the estimated benefit of the LE40 clutch is 0.3 g CO<sub>2</sub> / mile. Isolating such small differences from normal test-to-test variation at a statistically significant level is difficult at best.

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<sup>4</sup> *I.e.*, 40 C.F.R. § 86.1869-12(d).

<sup>5</sup> U.S. Environmental Protection Agency and National Highway Traffic Safety Administration, “Joint Technical Support Document: Final Rulemaking for 2017-2025 Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards” (August 2012), EPA-420-R-12-901, 5-69.

### *Analytical Emissions Estimates-Numerical Methods*

Emissions related to A/C system operation are most readily determined indirectly and analytically. The two commonly used methods for estimating emissions due to HVAC system operation are the FASTSim model (developed by the National Renewable Energy Laboratory) and the Life-Cycle Climate Performance (“LCCP”) model (SAE J2766).

#### *FASTSim*

FASTSim uses granular vehicle data based on motor vehicle registrations to control for vehicle type, geography, and annual weather behavior. FASTSim takes environmental loads for each vehicle, classifies the vehicle type, and determines the appropriate accessory loads to determine fuel usage. Many of the variables that are not represented in the AC17 test can be evaluated with FASTSim. Estimating the impact of technology changes is done by running the FASTSim model for a baseline technology and then again for the vehicle with a new technology of interest. The difference in the results are the fuel savings and can be converted to a gram per mile value.

FASTSim’s strength is that the registration data provides specific information for the vehicle in terms of its operating environment and the weather patterns it encounters, but the model is relatively new and relies on specific expertise is required to generate the input data and perform the analyses.

FASTSim has previously been used in the off-cycle credit program to estimate emission benefits in several applications.<sup>6</sup>

#### *Life-Cycle Climate Performance Model - SAE J2766*

The LCCP analysis is another accurate and suitable tool for estimating emissions benefits related to improved MAC components.

The LCCP model was developed in 1999, building on the work done by Oak Ridge National Laboratory in developing the Total Equivalent Warming Impact (“TEWI”) metric. The model was jointly developed for mobile air conditioning (“MAC”) use by GM, SAE, EPA, and the Japanese Automobile Manufacturers Association (“JAMA”) to become the Global Refrigerants Energy and Environmental-Mobile Air Conditioning-Life Cycle Climate Performance (“GREEN-MAC-LCCP”). GREEN-MAC-LCCP is a spreadsheet-based emissions estimator that accounts for climate data from around the USA and A/C system performance and efficiency data of comparative systems per SAE J2765. SAE developed the J2766 standard that the auto industry uses to estimate MAC emissions today.

The LCCP model considers the variables influencing AC system operation on an aggregate level, focusing on population centers across the country. Emissions levels are determined by averaging conditions and distribution of vehicles across the country. A key benefit of the LCCP model is that it considers factors influencing HVAC operation similar to FASTSim and can be run from a spreadsheet. Special expertise is not needed, and the SAE specification walks the user through the inputs. A new version of the LCCP model, the IMAC-GHG-LCCP model, has also been developed which is easier to use and has updated climate and usage data and expanded system capability.

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<sup>6</sup> E.g., General Motors, “Request for GHG Credit for Active Climate Control Seat Technology” (September 29, 2017). Method approved under U.S. Environmental Protection Agency, “EPA Decision Document: Off-Cycle Credits for General Motors and Toyota Motor Corporation” (June 2018), EPA-420-R-18-014.

Vehicle testing associated with evaluations of Denso SAS compressor technology on the AC17 cycle shows that the LCCP and test values are in good agreement with each other for specific technologies that operate at the AC17 test conditions.

#### *Off-Cycle Credit Applications Relying on LCCP Methodology*

Multiple EPA-approved alternative off-cycle credit methodologies have relied on the LCCP. These include applications associated with Denso SAS high-efficiency compressors (which eventually formed the basis for EPA's standardized indirect air conditioning credit for high-efficiency compressors) and Toyota "S-Flow" technology.

The Nissan Application relies on the LCCP to estimate a compressor clutch usage factor. This is an appropriate use of the LCCP.

#### Process and Policy Comments

The timing and content of the Notice raises a number of policy and process issues.

#### *Public Notice and Comment Process for Technologies Previously Approved Under 40 C.F.R. § 86.1869-12(d)*

The Notice states, "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."<sup>7</sup> In contrast to this position, the off-cycle credit regulations clearly provide the Administrator with discretionary authority to waive the notice and comment requirements for technologies when EPA has previously approved a methodology for determining credits, even in cases where manufacturer- or vehicle-specific test data, modeling, or credit calculations are required.<sup>8</sup> Furthermore, to the extent any interpretation of that waiver authority is needed, EPA already provided a plain-English reading of the regulation in the preamble of the rule in which the waiver authority was provided. There, EPA states, "Once a methodology is approved, other manufacturers may submit applications citing the approved methodology, but these manufacturers must provide their own necessary test data, modeling and calculations of credit value specific to their vehicles, and any other vehicle-specific details pursuant to that methodology, to assess an appropriate credit value . . . For future applications as long as the testing is conducted using the previously approved methodology, EPA will evaluate the credit application and issue a decision with no additional notice and comment, since the first application that established the methodology was subject to notice and comment."<sup>9</sup> In other words, the need for vehicle-specific data does not preclude a waiver of the notice and comment process.

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<sup>7</sup> Notice (supra note 2) at 8,633.

<sup>8</sup> 40 C.F.R. § 86.1869-12(d)(2)(ii); (d)(2)(ii)(B) and (C).

<sup>9</sup> U.S. Environmental Protection Agency and U.S. Department of Transportation National Highway Traffic Safety Administration, "The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks, Final Rule," 85 Fed. Reg. 24,174, 25,234 (columns 1 and 2) (April 30, 2020).

We acknowledge that this is not the case for the Nissan Application. Although EPA has published other applications for the same technology, it has not taken final action to approve those applications at this time.

### Timely Review, Publication, and Approval of Applications

Time is of the essence when a manufacturer submits an off-cycle credit application for review. Lengthy delays in processing applications and in reviews subsequent to the public notice and comment process introduce uncertainty into compliance planning and reporting for manufacturers. Delays also discourage further investments in such technology due to the uncertainty of when (or if) credit will ever be granted for an off-cycle technology.

The Nissan Application is but one example of the length and inconsistencies in the review and approval process. In April 2020, EPA received applications from both Toyota<sup>10</sup> and Nissan,<sup>11</sup> seeking approval of off-cycle credit for use of the Denso LE40 low-power-consumption air conditioning compressor clutch. The application from Toyota was published approximately six months after its receipt, but the Nissan Application took approximately ten months for publication. It is the understanding of Auto Innovators that there is at least one additional application from a third manufacturer regarding the same Denso LE40 clutch that has yet to be published, and additional applications for other technologies in similar situations.

Not only is the application review and publication process lengthy, the final approval process also takes a long time. In the case of the Toyota application for the Denso LE40 clutch technology, it has been over three months since the public comment period closed. Despite having received no negative comments on the application,<sup>12</sup> formal approval for credit has not been granted. Other applications that have already undergone the public notice and comment process are similarly waiting for further action.

Auto Innovators recognizes that such delays are likely a combination of COVID-related challenges and EPA resource issues as much as, or more than, issues related to technical concerns. While we cannot directly address non-technical issues that may be causing process delays, please feel free to cite our concerns as you seek to address them. To the extent technical concerns are causing delays in the review, publication, and approval of applications, it may be helpful if these concerns were more explicitly described by EPA.

### Closing

Thank you for your consideration of these comments. If you have any questions, please feel free to contact us. Further, if there is interest in collectively refining the process to improve its efficiency and efficacy, we are open to such discussions.

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<sup>10</sup> Toyota Motor North America, Inc., “Request for 2017-2020 MY and later Off-Cycle Credits related to application of the DENSO low power consumption compressor clutch LE40” (April 30, 2020).

<sup>11</sup> Nissan Application (supra note 3).

<sup>12</sup> See Regulations.gov, Docket ID No. EPA-HQ-OAR-2019-0333 (lack of any negative comment).