



May 16, 2022

The Honorable Michael S. Regan  
Administrator  
United States Environmental Protection Agency  
Office of the Administrator  
1200 Pennsylvania Avenue, NW  
Washington, D.C. 20460

**Re: Notice of Proposed Rulemaking: Control of Air Pollution from New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards EPA-HQ-OAR-2019-0055; FRL-7165-03-OAR**

Dear Administrator Regan:

The Alliance for Vehicle Efficiency (AVE) respectfully submits these comments in response to the U.S. Environmental Protection Agency's (EPA) Notice of Proposed Rulemaking: Control of Air Pollution from New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards EPA-HQ-OAR-2019-0055; FRL-7165-03-OAR (the Proposal).

AVE represents leading automotive technology providers. Our members work with every automotive manufacturer in the world on all manner of propulsion and emission control technologies. AVE members employ over 40,000 Americans across the United States and have invested billions of dollars in new technologies aimed at improving vehicle performance and reducing emissions.

AVE supports EPA's effort to reduce emissions, specifically nitrogen oxides (NO<sub>x</sub>), and particulate matter (PM) from this important segment of the transportation sector. The automotive supplier community provides solutions to develop cost-effective technologies to meet today's, and tomorrow's, emissions standards. AVE members appreciate the continued partnership with EPA in advancing vehicle technologies through meaningful standards that make a difference to the country's environmental goals, innovation, and economy.

**Overview of AVE's Comments on EPA's Proposed Rule**

- A. AVE supports EPA's proposed Option 1 standard, with a modification of the proposed full useful life timelines and warranty requirements and additional modifications (outlined below).
- B. AVE asks EPA to consider the proven capabilities of the cost-effective technologies that exist today to meet EPA's proposed Option 1 and the most stringent standards.
- C. AVE supports harmonization of future national standards.
- D. AVE opposes technology mandates, including Zero Emission Vehicle (ZEV) mandates.
- E. AVE urges EPA to move beyond tailpipe only definitions for ZEVs and integrate lifecycle analysis for future standards.

- F. AVE opposes the use of credits for battery electric vehicles (BEVs) and fuel cell electric vehicles (FCEVs) for low-NO<sub>x</sub> compliance and urges EPA to tighten the family emission limit (FEL) to 0.05 g/bhp-hr, down from the current proposal of 0.15 g/bhp-hr.
- G. AVE recommends EPA conduct compliance modeling based on different credit and flexibility scenarios to avoid backsliding of Internal Combustion Engine (ICE) technology.
- H. AVE supports EPA's proposal to expand Onboard Refueling Vapor Recovery (ORVR) to incomplete heavy-duty vehicles rated over 14,000 lbs.
- I. AVE supports incentives to accelerate the adoption of technologies that lower NO<sub>x</sub> and PM to bring better air quality to at-risk communities.

**A. AVE supports EPA's proposed Option 1 standard, with a modification of the proposed full useful life timelines and warranty requirements, as the best option for driving more rapid adoption of advanced engine and emission control technologies.**

In 2020 at the commencement of this rulemaking, AVE urged EPA to use this last in a generation opportunity to vastly improve air quality across the country.<sup>1</sup> Since EPA's prior rulemaking in 2001 for NO<sub>x</sub> emissions for heavy-duty (HD) vehicles, automotive suppliers have continued investing in new engine and emission control technology to improve performance and emissions.

Today, new engine architecture and advanced emission control technologies are available as cost-effective options for manufacturers to reduce NO<sub>x</sub> emissions by over 90% from current standards. Since January of 2020, data has emerged that confirms the readiness of technology to meet the most aggressive low-NO<sub>x</sub> standards.

**AVE asks EPA to modify the proposed full useful life timelines and warranty requirements.**

Currently, suppliers are not provided the necessary data (and certain data may not exist) nor information to design for a reasonable warranty and to determine if the proposed full useful life (FUL) timelines are feasible. Suppliers lack the data necessary, beyond the current goals to extended distance, time-in-service and beyond the first owner/user of vehicle, to make accurate assessments about the durability of many products. More research on engine wear and use patterns that result in degradation is needed before proposing longer warranties and extending FUL timelines. As such, AVE recommends several changes to EPA's proposed warranty requirements and FUL timelines:

- Engine-related warranty regulations apply only when a vehicle has full maintenance records of required servicing and shows no sign of abusive use;
- Exclude from a longer warranty standard parts that will be replaced by routine maintenance and identify which vehicle systems and/or specific parts should be covered by longer warranties; and
- Consider re-evaluating the FUL timeline once more engine test data is available.

The proposed longer warranties for new vehicles are intended to protect consumers and ensure emission systems work properly throughout the life of new heavy-duty trucks. Due to unknown risks to suppliers and manufacturers, these extended warranties, as proposed, will add extensive, unknown costs to vehicles. This added cost could disincentivize new vehicle purchases, thereby undermining the goals of the Proposal.

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<sup>1</sup> See <https://www.regulations.gov/comment/EPA-HQ-OAR-2019-0055-0460>

**AVE supports additional modifications to Option 1 to provide the best opportunity for driving more rapid adoption of advanced engine and emission control technologies.** These additional modifications include:

- Adoption of a lower limit of a Low Load Cycle (LLC) for engine certification.
- Alignment of the EPA proposed standard with California’s Omnibus rule by adding an intermediate useful life standard for MY2027 to 2030 engines up to 435,000 miles.
- Considering a tighter than proposed in-use compliance standard to meet a lower LLC limit.
- Tightening the family emission limit (FEL) to 0.05 g/bhp-hr, down from the current proposal of 0.15 g/bhp-hr.
- Considering a stricter PM standard than what is being proposed to prevent backsliding under the proposed lower NOx limits.

**B. AVE asks EPA to consider the proven capabilities of the cost-effective technologies that exist today to meet EPA’s proposed Option 1 and the most stringent standards.**

More than two-years ago, EPA began extensive research to analyze the performance of available technologies to meet more stringent emission standards. Since then, ongoing, and recently published data confirms that a 0.02 g/bhp-hr NOx standard can be met by manufacturers. Examples of available technologies include.

- **Advanced Engine Architecture:** The 10.6L heavy-duty opposed piston diesel engine has been tested in a demonstration project supported by the California Air Resources Board, the South Coast Air Quality Management District, the San Joaquin Valley Air Pollution Control District, and other organizations.<sup>2</sup>
- **Advanced Aftertreatment:** Since 2010, emission control systems have advanced greatly. Today’s applications are significantly smaller, lighter, and less expensive. By 2027, further improvements in aftertreatment technologies, engine calibration and thermal management are expected to help meet the 0.02 g/bhp-hr NOx standard over the FTP and also meet the NOx standards for the Low-Load Cycle.<sup>3</sup>
- **Active thermal management:** To assist with cold-start emissions, active thermal management technologies such as fuel burner and electric heaters have been developed and can be deployed to further help meet the 2027 standards.
- **Cylinder Deactivation:** Data shows cylinder deactivation is a technology able to reduce fuel consumption and increase exhaust temperature to facilitate improved NOx conversion. Combined with close-coupled selective catalytic reduction, this will further help with low-NOx compliance.<sup>4</sup>
- **Particulate Filters:** Existing diesel applications which use diesel particulate filters (DPFs) provide sufficient margin for meeting the lowered PM limit. The EPA should, however, consider a filter-enforcing particulate standard for Medium Duty gasoline vehicles. This will help the U.S. implement best available technology as done today in China and Europe, where the PM/PN standards require OEMs to add filters.

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<sup>2</sup> <https://achatespower.com/wp-content/uploads/2021/04/Achates-Power-HD-Demo-Technical-Review-1.pdf>

<sup>3</sup> MECA Technology Feasibility for Heavy-Duty Diesel Trucks in Achieving 90% Lower NOx Standards in 2027

<sup>4</sup> Matheaus, A., Neely, G., Sharp, C., Hopkins, J. et al., “Fast Diesel Aftertreatment Heat-up Using CDA and an Electrical Heater,” SAE Technical Paper 2021-01-0211, 2021, doi:10.4271/2021-01-0211.

**Numerous pathways exist to meet stringent standards:** Supporting all pathways gives the U.S. an opportunity to reach its environmental goals faster while supporting the automotive industry. The chart below outlines available technologies to greatly reduce NOx and PM emissions from HD trucks.

Engine	+ Added SCR	+ Heat
Engine calibration	Increase SCR volume and catalyst loadings	Late & multiple injections
Cylinder deactivation	Added cc-SCR w/ twin dosing	Heated urea dosing
EGR pump, cooled EGR, and EGR Bypass	+ cc-DOC for NO <sub>2</sub>	Catalyzed DEF solution
eTurbo	SCR on filter	Electrically heated catalyst
Opposed piston	Model based A/T controls	Fuel injection/burner
Hybridization		
High-pressure FIE		

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### C. AVE Supports harmonization of future national standards.

In July 2021, AVE, South Coast Air Quality Management District, and other stakeholders wrote to EPA seeking for harmonization of EPA’s low-NOx rulemaking with California’s Omnibus regulations.<sup>6</sup> A unified national program will enable heavy vehicle manufacturers and suppliers to streamline the engine and aftertreatment integration to simultaneously meet GHG and criteria pollutant standards.

Harmonization is also a top priority of President Biden. On August 5, 2021, the President explicitly instructed EPA to coordinate its Heavy-duty NOx standards with California.

*(c) Given the significant expertise and historical leadership demonstrated by the State of California with respect to establishing emissions standards for light-, medium-, and heavy-duty vehicles, the Administrator of the EPA shall coordinate the agency’s activities pursuant to sections 2 through 4 of this order, as appropriate and consistent with applicable law, with the State of California as well as other States that are leading the way in reducing vehicle emissions, including by adopting California’s standards.<sup>7</sup>*

Alignment in MY2027 and MY2030 would provide a national heavy-duty regulation that is important to automotive vehicle suppliers. Suppliers have invested significant resources in research and development for new engine and emission control technologies so that new heavy-duty trucks meet future lower NOx standards. Harmonization with California’s Omnibus standards will provide suppliers with the necessary certainty to keep investing in the next generation of vehicle technologies. Regarding FUL, EPA could consider reevaluating its standard based on new data once it becomes available.

### D. AVE opposes technology mandates, including Zero Emission Vehicle (ZEV) mandates.

AVE consistently urges regulators develop technology neutral standards. Standards based on performance are more likely to encourage broader investments into innovative technologies. A ZEV mandate signals to manufacturers that there is little incentive to invest in new engine technologies to meet future standards.

<sup>5</sup> Joshi, A., “Review of Vehicle Engine Efficiency and Emissions,” SAE Technical Paper 2022-01-0540, 2022, doi:10.4271/2022-01-0540

<sup>6</sup> See Control of Air Pollution from New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards

<sup>7</sup> <https://www.whitehouse.gov/briefing-room/presidential-actions/2021/08/05/executive-order-on-strengthening-american-leadership-in-clean-cars-and-trucks/>

Without continual developments in ICE technology, the U.S. could miss out on environmental gains that could significantly advance our nation’s climate goals. ICE engine advancements can help make faster, impactful improvements, particularly for at-risk communities.

AVE urges EPA to adopt a true “all-of-the-above” strategy that fosters all types of automotive innovation. In 2012, EPA contended that at times it is “...worthwhile to forego modest additional emissions reductions in the near term in order to lay the foundation for the potential for much larger “game-changing” GHG emissions and oil reductions in the longer term.”<sup>8</sup> We believe such a trade-off can actually stifle innovation and could easily lead to technology backsliding. Supporting improvements to ICE vehicles will also benefit technologies being manufactured in the U.S. that provide hundreds of thousands of direct jobs, making it the nation’s largest sector of manufacturing jobs with employees in all 50 states.<sup>9</sup>

#### **E. AVE urges EPA to move beyond tailpipe only definitions for ZEVs and integrate lifecycle analysis for future standards.**

Defining ZEVs only at the tailpipe distorts the environmental gains of vehicles with known upstream emissions. Relying on the current definition of ZEVs serves as a barrier to automotive technologies that can deliver significant real-world emission reductions. For example, hydrogen combustion engines can deliver significant emission reductions, and when compared to other vehicles on a lifecycle basis, can match the environmental impact of vehicles currently defined as ZEVs.

Continuing to focus solely on tailpipe emissions for future standards also ignores President Biden’s January 25, 2021, Executive Order, in which he stressed the need for environmental standards to account for all greenhouse gas emissions.

*“Sec. 5. Accounting for the Benefits of Reducing Climate Pollution. (a) It is essential that agencies capture the full costs of greenhouse gas emissions as accurately as possible, including by taking global damages into account. Doing so facilitates sound decision-making, recognizes the breadth of climate impacts, and supports the international leadership of the United States on climate issues.”<sup>10</sup>*

Congress is also encouraging EPA to assess lifecycle emissions when setting future vehicle standards:

*Vehicle Emissions Lifecycle Analysis. — The Committee believes it is essential that when setting future standards for reducing greenhouse gas emissions, the Agency fully evaluate emission impacts of vehicle technologies and transportation fuels (including electricity used as a fuel) from well to wheel, and the vehicle cycle through material recovery and vehicle disposal in order to capture the full impacts of greenhouse gas emissions as accurately as possible. **The Committee encourages the Agency to develop standardized modeling to evaluate the full lifecycle of vehicle technologies and transportation fuels, as new standards to reduce pollutants are being developed,** and to coordinate as necessary, with other federal agencies that are conducting similar models for vehicles in an effort to accurately determine the full impact of reducing greenhouse gas emissions when conducting cost-benefit analyses of regulatory and other actions.<sup>11</sup> (Emphasis added)*

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<sup>8</sup> See Federal Register / Vol. 77, No. 199 / October 15, 2012; Federal Register / Vol. 86, No. 151 / August 10, 2021

<sup>9</sup> U.S. Labor and Economic Impact of Vehicle Supplier Industry, MEMA and IHS Markit. February 2021.

<sup>10</sup> 7040 Federal Register / Vol. 86, No. 14 / Monday, January 25, 2021 / Presidential Documents

<sup>11</sup> See, H. Rept. 117-83 – Dept. of the Interior, Environment, & Related Agencies Appropriations Bill, 2022 at P. 84.



#### **F. AVE opposes the use of credits for battery electric vehicles (BEVs) or fuel cell electric vehicles (FCEVs) for low-NOx compliance.**

As proposed, the credits being offered to manufacturers for BEVs, and FCEVs will undermine the goals of EPA's proposal to reduce NOx and other pollutants from heavy-duty engines.

Cost-effective technologies exist that will ensure enormous emission reductions from heavy-duty engines. To achieve the goal of improving engine emissions, compliance credits should be generated for compliance with a standard, not a technology. As proposed, manufacturers can over deploy BEVs or FCEVs at volumes higher than predicted, and easily backslide on engine improvements or emission control technology changes on ICE vehicles. For this reason, AVE recommends that EPA tighten the family emission limit (FEL) to 0.05 g/bhp-hr, down from the current proposal of 0.15 g/bhp-hr. Without a lower FEL cap, the opportunity for significant NOx reduction from new ICE trucks will be lost and the higher NOx levels will negatively impact at-risk communities for decades.

AVE also recommends EPA consider minimizing the potential for credits to cause technology backsliding by setting a minimum offset of emission reductions from all heavy-duty trucks. AVE also supports a sunset date of MY 2030 for all Heavy-Duty-ZEV NOx credits and adopt other protections such as tightening the family emission limit (FEL) to 0.05 g/bhp-hr, down from the current proposal of 0.15 g/bhp-hr.

In the Proposal, EPA discusses "Other Flexibilities Under Consideration"<sup>12</sup> Here, EPA is considering providing additional flexibilities that will allow for the production of engines with much higher in-use emissions through the year 2032. These flexibilities would allow over 5% of heavy-duty trucks to emit NOx and PM at levels 10 times higher than what Option 1 proposes to take effect in 2031. This flexibility will unnecessarily subject the public, particularly those in high-risk areas, to additional decades of high NOx emissions and related adverse health effects. AVE asks EPA to reconsider the offering of these flexibilities.

#### **G. AVE recommends EPA conduct compliance modeling based on different credit and flexibility scenarios and avoid backsliding.**

Before adopting new flexibilities and credits, AVE recommends EPA provide modeling scenarios that outline possible compliance strategies manufacturers might deploy to meet future standards. The modeling would allow suppliers to better estimate the need for various advanced technologies to meet the future standards and to plan accordingly.

#### **H. AVE supports EPA's proposal to expand Onboard Refueling Vapor Recovery (ORVR) to incomplete heavy-duty vehicles rated over 14,000 lbs.**

AVE recommends EPA expand ORVR to incomplete heavy-duty vehicles rated over 14,000 pounds Gross Vehicle Weight Rating, with a refueling emission standard of 0.20 grams hydrocarbon per gallon of liquid fuel dispensed, applicable for a useful life of 15 years or 150,000 miles.

With regulatory developments since ORVR was first introduced in 1994, primary and secondary manufacturers have gained significant experience with ORVR technology on all categories of gasoline vehicles, including complete heavy-duty gasoline vehicles (HDGVs) and even incomplete light-heavy-duty gasoline vehicles (LHDGVs).

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<sup>12</sup> Federal Register / Vol. 87, No. 59 / Monday, March 28, 2022, at 17563

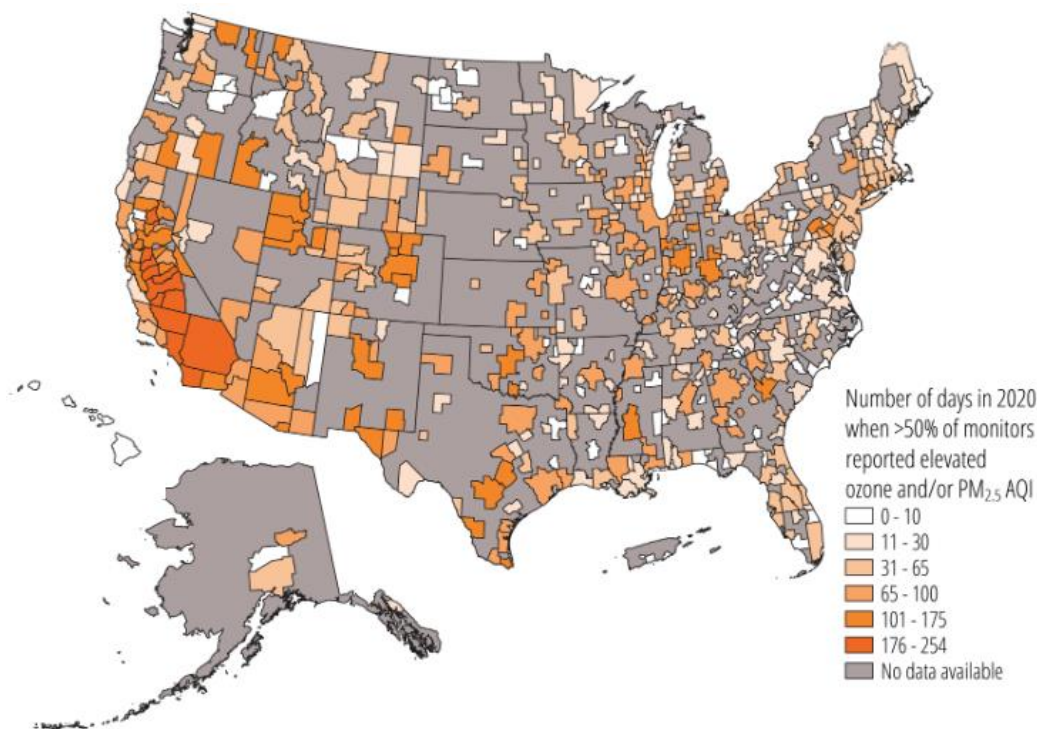
Cost-effective ORVR technology is available to control refueling emissions, supported by the EPA’s draft regulatory impact analysis for this proposed rule. ORVR is a proven technology to significantly reduce evaporative and refueling emissions, resulting in meaningful emission reductions of volatile organic compounds that lead to the formation of ozone and secondary particulate matter (PM<sub>2.5</sub>), as well as emissions of hazardous air pollutants.

### **I. AVE supports incentives to accelerate the adoption of technologies that lower NOx and PM to improve air quality for at-risk communities.**

On-road Heavy Duty trucks account for close to 60% of this country’s annual NOx emissions which serves as the leading factor of ozone. EPA has an opportunity to improve the air quality and reduce ground level ozone for millions of Americans living in projected Ozone Nonattainment areas.

As of December 2020, approximately 50% of all commercial diesel trucks in operation, nationwide, were purchased after MY 2010 or later, while 50% of the heavy-duty trucks now on the roads continue to operate without the benefit of NOx and PM emissions control technologies. New heavy-duty trucks will be operational for decades. Incentives for compliant trucks, not just ZEVs, purchased prior to the MY 2027 will bring tremendous health benefits to at-risk communities and the nation.

Although states are required to develop and follow pathways to comply with National Ambient Air Quality Standards (NAAQS), NOx emission from on-road heavy duty trucks is a national problem. As heavy-duty trucks travel long distances and often across state lines, a strong and robust federal emissions program is vital to meeting Ozone NAAQS while, at the same time, providing regulatory certainty to the industry and state air regulators across the country. As shown in the chart below, urban areas across the country suffer from significantly unhealthy levels of NOx and PM.



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<sup>13</sup> <https://floridapirg.org/reports/flf/trouble-air>

- 13.6 million Americans living in 11 large and small urban areas and rural counties experienced over 100 days of ozone pollution at levels above what the EPA considers “good” in 2020.
- An additional 57.3 million Americans living in 90 large and small urban areas and rural counties experienced between 31 and 100 days of elevated ozone pollution.
- Air pollution levels are uneven within cities, contributing to persistent health disparities between neighborhoods and population sub-groups. Highly spatially resolved information on pollution levels and disease rates is necessary to characterize inequities in air pollution exposure and related health risks.<sup>14</sup>

## Final Remarks

In setting new national standards, AVE supports EPA adopting the most stringent standards that are technically feasible and cost-effective. EPA’s Proposal provides an excellent opportunity to target the largest segment of NOx and PM emissions across the majority of the country for the first time in almost 20-years and to provide much needed, cost-effective relief to states facing daunting Ozone-attainment challenges.

The investments made over the last decade by automotive suppliers has made more stringent standards possible. We believe that a strong and feasible national standard provides the greatest public health benefits while providing the much-needed regulatory certainty for the industry to continue to innovate and invest.

Thank you for your consideration of these comments.

Sincerely,



Lee J. Janger  
Executive Director

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<sup>14</sup>[https://pubmed.ncbi.nlm.nih.gov/34765851/#:~:text=We%20find%20that%20PM2.5,\(between%202014%20and%202018\).](https://pubmed.ncbi.nlm.nih.gov/34765851/#:~:text=We%20find%20that%20PM2.5,(between%202014%20and%202018).)