

**WRITTEN COMMENTS OF THE
MANUFACTURERS OF EMISSION CONTROLS ASSOCIATION
ON CALIFORNIA AIR RESOURCES BOARD'S
PROPOSED HEAVY-DUTY INSPECTION
AND MAINTENANCE REGULATION**

November 26, 2021

The Manufacturers of Emission Controls Association (MECA) is pleased to respond to the California Air Resources Board's request for public comments on its proposed Heavy-Duty Inspection and Maintenance Regulation. We support CARB's ongoing leadership in the effort to reduce the environmental footprint of transportation to meet the state's SIP, climate and environmental justice community goals. MECA supports that the proposed in-use compliance regulation's pathways to ensure that in-use heavy-duty vehicles remain clean throughout their full useful lives.

MECA is a trade association of the world's leading manufacturers of emission control technology for mobile sources. Our members have over 50 years of experience in developing and manufacturing emission control, CO₂ reduction and electric vehicle technology for a wide variety of on-road and off-road vehicles and equipment in all world markets. These technologies include catalysts, filters, as well as exhaust system packaging for original equipment (OEM) and aftermarket manufacturers. In addition, our members develop and manufacture the sensors and OBD control units that provide integral data to a vehicle's on-board diagnostics (OBD) system, which are critical to this regulation. Our industry continues to play an important role in the emissions success story associated with mobile sources, and MECA has continually supported efforts to develop innovative, performance-based incentives and regulations to meet air quality and climate goals.

We support this heavy-duty vehicle inspection and maintenance (HD I/M) proposal to ensure that all engine and exhaust emission controls are working properly over the full useful life of every HD diesel vehicle. MECA commends CARB for improving its current in-use HD vehicle programs and encourages CARB staff to continue these efforts in order to ensure that California is achieving the full emissions benefits of its mobile source regulations. MECA also thanks staff for their extensive SB210 Pilot Program and feasibility studies of I/M in-use field data and remote sensing technologies to establish a variety of vehicle identification, diagnostic and reporting options, including telematic and periodic plug-in test devices for OBD-equipped trucks. In addition, staff has further refined opacity measurement and correlation protocols and limits to effectively screen in-use HD vehicles that are not equipped with OBD. We believe that the proposed I/M regulation will result in a cleaner truck fleet as vehicle operators are able to more readily detect engine and emission control issues before they arise and repair issues quickly once discovered. In addition, MECA believes California's HD I/M program and experience will encourage other states to adopt equivalent programs so that all trucks driving on our nation's highways are as clean as possible.

Diesel Emission Controls are Proven Effective and Durable

There is widespread acceptance of diesel oxidation catalyst (DOC), wall-flow diesel particulate filter (DPF) and urea-selective catalytic reduction (SCR) technologies around the world as best available control technology (BACT) for heavy-duty highway trucks. This fact speaks to the performance and

durability of these technologies. There are currently approximately four million Class 4 through 8 trucks sold since 2010 (<https://www.statista.com/statistics/261416/class-3-8-truck-sales-in-the-united-states/>) in the United States that are equipped with DOC/DPF/SCR emission control technologies. In addition, over 250,000 retrofit DPFs have been installed on both on-highway and off-road vehicles and equipment.

As has been shown on a wide variety of diesel engines and applications, DPFs are extremely efficient in reducing particulate emissions (PM_{2.5}) by more than 95% over a wide range of particle sizes, including reducing emissions of the smallest, ultrafine particles emitted by a diesel engine. In addition, when combined with catalysts, DPF systems have been shown to reduce HC emissions, polycyclic-aromatic hydrocarbons (PAHs), dioxins and other toxics by 80 percent or more from their engine-out levels. DPFs have also provided important co-benefits on climate change due to the large reductions in black carbon emissions (an ARB funded study, released in June 2013, highlighted the significant climate benefit of reducing black carbon emissions from diesel engines). These facts on the effectiveness of DPFs can be found in the reports from the Advanced Collaborative Emission Study (ACES) that was conducted at Southwest Research Institute (<https://www.healtheffects.org/publication/executive-summary-advanced-collaborative-emissions-study-aces>).

Since 2010 the predominant technology to reduce tailpipe NO_x from diesel engines has been SCR, and each subsequent generation of SCR technology has led to improvements in catalyst conversion efficiency. Recent testing by CARB at Southwest Research Institute has demonstrated the ability of SCR technologies to achieve ultra-low NO_x emission levels in HD vehicles. In 2011, EPA adopted federal GHG standards for heavy-duty trucks that were implemented in 2014 through 2020. The Phase 2 regulation was adopted in 2016 to cover trucks from 2021 through 2027. Engine manufacturers quickly recognized SCR as a very effective technology option that has allowed them to meet the first phase of heavy-duty GHG standards while still achieving NO_x and PM reduction targets from the engine. OEMs have accomplished this by calibrating new engines to burn less fuel and rely on the SCR system to remediate the additional NO_x emissions that result from such calibrations.

Periodic inspection and maintenance (I/M) requirements are critical to ensure these benefits under a comprehensive vehicle emissions reduction strategy. The defined OBD and/or in-use opacity and visual inspections provide cost effective pathways to provide important maintenance diagnostic information to vehicle owners, as well as, address the minority of in-use trucks that have been responsible for significantly elevated emissions. Further, comprehensive I/M programs serve as an effective deterrent to those who would tamper with emission controls. As a result, I/M helps to ensure a level commercial playing field for the trucking industry.

For older non-OBD trucks, MECA agrees with CARB's selection of the 5% opacity threshold that was originally adopted under the 2012 diesel retrofit verification procedure amendments. Independent measurements made by MECA DPF retrofit manufacturers demonstrated that a 5% opacity limit can be easily and repeatably measured in the field. With MECA's participation, CARB funded a series of tests at the National Renewable Energy Laboratory (NREL) which showed that a properly functioning DPF yields opacity measurements of near zero. The NREL study also examined the opacity measured with a series of DPFs with various documented amounts of deterioration. These tests support that the 5% opacity limit is an appropriate enforcement limit and moreover, fleets have said that they are comfortable meeting the 5% limit (<http://www.ttnews.com/articles/carb-expected-ok-tougher-smoke-opacity-limits-may>).

The importance of proper engine maintenance cannot be overemphasized for the durability and long-term performance of diesel engine and emissions control systems. Regular maintenance is critical for DOC/DPF/SCR equipped vehicles because the presence of smoke in the exhaust can no longer be used as a visual indicator of engine problems. DPF-equipped vehicles capture the PM and mask any signs of high smoke that results from problems such as excessive oil consumption or other issues in need of repair. Therefore, MECA supports the use of HD I/M as a tool for fleets to proactively monitor and identify necessary maintenance to keep their equipment functioning within the engine manufacturer's recommended guidelines. This has the potential to minimize the chance of more significant repairs that would result in costly service interruptions.

MECA encourages CARB to continue to explore potential concepts for future comprehensive I/M programs that would complement Omnibus and future Tier 5 off-road standards. MECA supports the use of remote OBD (telematics), which provides accurate diagnostic information that can notify operators, service technicians, fleet managers and enforcement officials of the need to perform specific maintenance before more complex and costly problems arise. We encourage CARB to continue to work with the diesel engine and emission control manufacturers, and truck fleets to investigate real-world deterioration from a representative cross-section of vehicle ages, state of repair and ownership status. Such collaborative programs will be vital in the years leading up to and during the implementation of the Omnibus requirements.

In addition, MECA believes an important opportunity exists for CARB to work with manufacturers to incorporate basic in-use data from HD electric trucks (ZETs) to help inform CARB staff on how these vehicles are performing in the real world and obtain initial statistics on charging behavior and durability. This data transmitted via telematics to CARB and CEC could greatly help better plan for anticipated power generation and infrastructure developments as the population of HD ZETs grow in the coming years. MECA also recommends that state of health (SOH) monitoring should be included on HD ZETs.

In closing, MECA supports CARB's proposed Heavy-Duty Inspection and Maintenance Regulation that will effectively allow vehicle operators to more easily identify and repair high emitting vehicles. The use of sophisticated sensors that are part of current vehicle OBD systems will help enable the cleanest trucks operating on California's roads. Finally, MECA will continue to work with CARB staff to ensure the continued success of California's I/M program as ultra-low NOx engines achieve greater penetration into the fleet under the Omnibus and future Tier 5 off-road programs. We look forward to providing the same support for HD ZETs.

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