WRITTEN COMMENTS OF THE
MANUFACTURERS OF EMISSION CONTROLS ASSOCIATION
ON CALIFORNIA AIR RESOURCES BOARD'S
PROPOSED REGULATION TO PROVIDE CERTIFICATION FLEXIBILITY FOR INNOVATIVE HEAVY-DUTY ENGINES AND CALIFORNIA CERTIFICATION AND INSTALLATION PROCEDURES FOR MEDIUM AND HEAVY-DUTY VEHICLE HYBRID CONVERSION SYSTEMS

October 17, 2016

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 Innovative Technology Regulation.

MECA is a non-profit association of the world's leading manufacturers of emission control and GHG reduction technology for mobile sources. Our members have over 40 years of experience and a proven track record in developing and manufacturing emission control and engine efficiency technology for a wide variety of on-road and off-road vehicles and equipment, including extensive experience in developing emission controls for gasoline and diesel engines and vehicles in all world markets. Our industry has played an important role in the emissions success story associated with mobile sources in the United States, and has continually supported efforts to develop innovative, technology-forcing, emissions and GHG reduction programs to deal with air quality problems.

MECA commends ARB on its efforts in developing creative policies designed to accelerate the advancement and penetration of innovative low emission engine technologies into the marketplace. The combination of incentive policies to accelerate introduction of new advanced technologies in combination with voluntary standards is an inventive way to achieve early emission reductions from mobile sources. As pointed out in the proposed rule, cutting emissions from heavy-duty trucks will aid California in reaching its air quality and climate change goals. This rule provides certification flexibility for manufacturers to certify low-emission engines and vehicles while balancing this with caps on the extent of flexibility offered as well as the number of eligible engines and vehicles. MECA believes that ARB has struck a good balance with this regulation that will achieve its goal of accelerating new technologies while avoiding erosion of current requirements designed to ensure proper engine operation and preventing backsliding on emission reductions. MECA members are committed to developing and commercializing the latest technologies that would enable certification of low-NOx engines and high efficiency, low greenhouse gas emitting engines.

Technologies to increase engine efficiency are already being incorporated on the latest certified engines for sale today. The heavy-duty greenhouse gas phase 2 standards that were just finalized this year will continue to drive efficiency technology innovation in the future. MECA believes that many of these technologies can be included in engine packages to meet the ITR's requirements and receive certification flexibility. These technologies include advanced turbochargers, state-of-the-art exhaust gas recirculation, new and improved fuel injector designs, powertrain electrification, and waste heat recovery strategies. In addition, modern catalyst

technology and exhaust system integration have allowed tighter control of criteria pollutant emissions without negatively affecting fuel economy.

With respect to ultra-low NOx emitting engines targeted by this rule for accelerated market penetration, technologies exist today to meet ultra-low NOx emission standards. Examples of advanced technologies that are available for further reductions of NOx emissions from heavy-duty diesel engines include advanced SCR catalyst systems and passive NOx adsorber catalysts. Recent technology advancements that are already demonstrating ability for further reductions in NOx emissions from heavy-duty diesel engines include SCR catalysts coated directly on diesel particulate filter (DPF) substrates, SCR catalysts with improved low temperature performance, passive lean NOx adsorbers (catalysts that adsorb NOx at exhaust temperatures below 200˚C and then release NOx as exhaust temperatures rise), and the use of alternative SCR reductant strategies (such as heated dosing). These advanced emission control technologies can all provide improved cold transient cycle NOx performance on a heavy-duty diesel engine. An example of future improvements in SCR catalyst system designs is the direct application of SCR catalysts to diesel particulate filter substrates to provide a single catalyst module that provides reductions to all four criteria pollutants: hydrocarbons, CO, NOx, and PM. These SCR coated filters will lead to less complex emission system designs, reduced engine backpressure, and the ability to utilize the SCR catalyst more quickly after engine-start since the SCR catalyst function will be displayed directly on the filter and positioned closer to the turbocharger for more rapid warmup.

Advanced three-way catalyst systems are already being deployed with stoichiometric, natural gas engines to meet California's optional low NOx standard. These advanced three-way catalysts are combined with higher cell density, low thermal mass substrates in configurations with close-coupled and underfloor converters to enable improved cold transient calibrations on stoichiometric, natural gas engines to achieve the voluntary, low emission NOx levels. One manufacturer of stoichiometric, heavy-duty natural gas engines has certified an 8.9 L stoichiometric natural gas engine to ARB's voluntary 0.02 g/bhp-hr NOx standard and a second engine size is expected in the near future.

MECA has partnered with ARB on an important heavy-duty engine technology demonstration program that is targeting 0.02 g/bhp-hr NOx emission levels on both a diesel and stoichiometric natural gas engine. Many of the advanced diesel and stoichiometric natural gas NOx emission control technologies mentioned above have been evaluated in this test program. This program, being conducted at Southwest Research Institute in San Antonio, TX, has already demonstrated promising results with some aftertreatment packages able to achieve well under the 0.02 g/bhp-hr level on both types of engines. ARB has already released the contract for the next phase of this work that will aim to demonstrate ultra-low NOx emissions on a diesel engine calibrated for vocational applications including extended periods of low-load operation.

Employing technologies to reduce NOx emissions from heavy-duty engines enables engine manufacturers to further optimize and reduce fuel consumption of these engines, providing important reductions in greenhouse gas emissions. Engine manufacturers that employ SCR technologies on 2010-compliant heavy-duty, highway engines in the U.S. and Canada claim up to 5% improvements in fuel efficiency versus engines that do not employ SCR technology.

These fuel efficiency improvements are most evident at highway speeds. The high NOx conversion efficiencies associated with SCR catalyst systems enable engines to be operated at conditions that yield lower fuel consumption. Engine manufacturers are expected to continue to further optimize engine fuel consumption characteristics and SCR system designs to provide additional benefits to fuel consumption and NOx emission reduction in order to meet federal and California heavy-duty engine greenhouse gas standards. Taking advantage of existing efficiency and emission control technologies, one engine manufacturer has already certified a 2017 heavy-duty engine to the Phase 2 2027 CO_2 limits while also achieving a 0.08 g/bhp-hr NOx emission level at full useful life.

While this proposed regulation grants certification flexibility in the form of relaxed on-board diagnostic (OBD) requirements, MECA encourages ARB to consider incentives for OBD equipment manufacturers as they work towards the challenge of developing sensors to measure at lower thresholds necessary for engines certified to future low emissions standards. Manufacturers are committed to providing technologies that will enable operators to identify problems and mechanics to quickly diagnose and perform repairs. In addition, ARB might consider a certification pathway under the ITR that would reward manufacturers for including advanced OBD sensor technology and/or foregoing some of the OBD flexibilities being granted.

In conclusion, MECA supports ARB's proposed Innovative Technology Regulation. MECA believes that this proposal would incentivize manufacturers to accelerate development of new low emission engines, including ultra-low NOx engines and higher efficiency engines, to achieve early emission reductions and help California meet its State Implementation Plan commitments to improve ambient air quality. MECA also believes that the proposed certification flexibility granted by this rule, coupled with state funding and a clear path toward low NOx engine emission standards, would accelerate the introduction of new advanced technologies that reduce NOx emissions into the market place. Finally, MECA recommends ARB work with EPA to explore how elements of the ITR could be implemented nationally to incentivize broader market penetration of advanced technology engines.

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