

**WRITTEN COMMENTS OF THE  
MANUFACTURERS OF EMISSION CONTROLS ASSOCIATION  
ON CALIFORNIA AIR RESOURCES BOARD'S REQUEST FOR PUBLIC  
COMMENTS ON 2013 UPDATE TO THE CLIMATE CHANGE SCOPING PLAN**

*November 1, 2013*

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MECA is pleased to respond to the California Air Resources Board's request for public comments on its Discussion Draft of the 2013 Updated AB 32 Scoping Plan.

MECA is a non-profit association of the world's leading manufacturers of emission control technology for mobile sources. Our members have over 40 years of experience and a proven track record in developing and manufacturing emission control 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 programs to deal with air quality problems.

MECA is supportive of the ARB staff's inclusion of short-lived climate pollutants in the 2013 updated AB 32 Scoping Plan. MECA agrees with ARB that reducing short-lived climate pollutant results in immediate climate and air quality benefits due to their shorter lifetimes in the atmosphere. MECA believes that reduction in short-live climate pollutant, especially black carbon, will achieve significant climate benefits as well as public health benefits. As stated in the 2013 update to the Scoping Plan, black carbon is the most strongly light-absorbing component of particulate matter and contributes to climate change both directly, by absorbing sunlight, and indirectly, by depositing on snow and by interacting with clouds and affecting cloud formation. Reducing black carbon emissions globally can have immediate economic, climate, and public health benefits.

Black carbon emissions from diesel vehicles can be significantly reduced through emission control technology that is already commercially available. High efficiency diesel particulate filters on new and existing diesel engines provide nearly 99.9% reductions of carbon emissions. As has been shown in the heavy-duty highway sector, DPFs are extremely efficient at reducing particulate emissions over a wide range of particle sizes, including reducing emissions of the smallest, ultrafine particles emitted by a diesel engine. MECA commends ARB for its efforts in reducing diesel particulate matter through its various in-use diesel regulations that require retrofit of these in-use diesel engines with advanced technologies, such as DPFs. MECA believes that significant opportunity exists to reduce PM emissions from heavy-duty in-use diesel engines.

In the highway, heavy-duty sector, DPF-equipped engines are routinely being certified at PM emissions levels that are 90% or more below the 0.01 g/bhp-hr 2010 EPA PM heavy-duty highway diesel engine standard. The "bonus" PM reductions provided by DPFs in the highway sector provide significantly more public health benefits than estimated by EPA in their final 2007-2010 heavy-duty highway regulation. In addition to "bonus" public health benefits

afforded by DPFs, DPFs have also provided important co-benefits on climate change due to the large reductions in black carbon emissions that result from the use of high efficiency DPFs (an ARB funded study highlighting the significant impact of reducing black carbon emissions from diesel engines on climate change was released in June 2013). These same opportunities for increased protection of public health and reduced climate change impacts are lost on EPA Tier 4 final off-road diesel engines that are not certified with DPFs. In some cases, OEMs may choose to remove DPFs that were certified with engines for Tier 4 interim compliance in certifying the Tier 4 final configuration. MECA encourages ARB to characterize the regulated and unregulated exhaust emissions of similar Tier 4 final nonroad diesel engines certified with and without DPFs to more completely understand the impacts of these alternative compliance pathways on public health and climate change. A Tier 5 off-road diesel engine regulation that forces the use of best available PM controls would provide additional public health and climate change benefits associated with further reductions in black carbon emissions from this sector.

MECA is concerned about the PM emissions durability of nonroad Tier 4 engines certified without DPFs. There is ample evidence that engine-based PM control strategies are prone to higher in-use emissions than DPF-equipped engines, due to factors such as cold starts, poor maintenance, and the large variety of duty cycles encountered in the nonroad sector. Given the expected, relatively small compliance margins of nonroad Tier 4 final engine designs that do not utilize DPFs, MECA believes that ARB (and EPA) should closely scrutinize Tier 4 final certification packages of non-DPF diesel engines and allocate extra compliance and enforcement resources to follow up with in-use emissions testing of any Tier 4 nonroad engines certified without a DPF. MECA also believes that ARB and EPA should also strongly consider adoption of a manufacturer run, in-use emissions testing program in the nonroad sector that utilizes the latest portable emissions measurement technology to ensure that Tier 4 final nonroad engines are delivering the emission reductions associated with the Tier 4 nonroad standards. The nonroad sector could also benefit from the adoption of on-board diagnostic requirements that are similar in scope to the heavy-duty highway diesel on-board diagnostic requirements required by ARB. In-use testing and OBD ensure that the emissions performance of the engine/equipment is maintained over the regulated full useful life.

Additional reductions in black carbon emissions will result from the light-duty sector through ARB's lower LEV III PM limits. MECA strongly supported and agreed with ARB's decision to include a 1 mg/mile particle matter standard for light-duty vehicles over the FTP test cycle in their LEV III requirements. In their Tier 3 proposal, EPA proposed only to harmonize with the LEV III 3 mg/mile FTP PM standard and not propose a 1 mg/mile FTP PM standard. The 2012 decision by the European Commission to establish a particle number emission standard for light-duty vehicles powered by gasoline direct injection (GDI) engines as a part of their upcoming Euro 6 light-duty emission standards provides a more stringent particle emission limit for these GDI vehicles in the same time frame as the Tier 3/LEV III 3 mg/mile PM standard (phase-in for the LEV III/Tier 3, 3 mg/mile PM standard starts in 2017 and is fully phased-in with the 2021 model year; implementation of the Euro 6 GDI particle number limit of  $6 \times 10^{11}$  particles/km [equivalent to the Euro 5 light-duty diesel particle number limit], measured using the European PMP particle measurement protocol, begins in September 2017; see: [ec.europa.eu/enterprise/sectors/automotive/documents/directives/motor-vehicles/index\\_en.htm](http://ec.europa.eu/enterprise/sectors/automotive/documents/directives/motor-vehicles/index_en.htm)).

This European light-duty GDI particle number limit will cause auto manufacturers to introduce cleaner technologies such as advanced fuel injection systems and/or gasoline particulate filters to comply with the European Euro 6 GDI particle number limit. Auto manufacturers are already working to bring forward early introductions of these ultra-low PM, Euro 6-compliant gasoline engines to the European market in the coming 12 to 18 months (European member states are permitted to introduce tax incentives for early introductions of Euro 6 vehicles prior to the first implementation dates of September 2014 for new models and September 2015 for all passenger car models). Nearly all auto manufacturers that sell into the European market are working with MECA members on potential applications of particulate filters on gasoline direct injection vehicles.

Gasoline particulate filters (GPFs) are based on the same, wall-flow ceramic filters that have been successfully applied on millions of light-duty and heavy-duty diesel vehicles in Europe and the U.S. for more than 10 years. The performance and application of these gasoline particulate filters has been highlighted in a number of recent technical publications in both the U.S. and Europe (e.g., SAE paper nos. 2010-01-0365, 2011-01-0814, and 2013-01-0836; SAE paper no. 2013-01-0527 authored by Environment Canada and MECA). Like diesel particulate filters, gasoline particulate filters are capable of reducing particle/black carbon emissions by more than 85% over a wide range of particle sizes, including high capture efficiencies for ultra-fine particulates. The application of a GPF on a four-cylinder gasoline direct injection vehicle is expected to cost approximately \$100-120 (see ICCT's GPF cost estimate available here: [www.theicct.org/estimated-cost-gasoline-particulate-filters](http://www.theicct.org/estimated-cost-gasoline-particulate-filters)), making this emission control technology a cost-effective solution for reducing particulate emissions from future gasoline vehicles. When these filters are properly designed, the impact of a GPF installation on the backpressure and fuel-efficiency of the vehicle is expected to be minimal.

EPA and ARB needs to make sure that these same ultra-low PM, Euro 6 GDI engine/emission technologies are also utilized in the U.S. To that end, MECA believes that it is important for EPA, at a minimum, to harmonize with ARB's LEV III, 1 mg/mile light-duty vehicle PM FTP standard to maximize the public health benefits associated with reducing public exposure to particulate emissions from future light-duty vehicles. MECA provided EPA with this recommendation in our submitted Tier 3 comments. Some consideration should also be given to aligning with the European Euro 5 diesel and the Euro 6 diesel/GDI particle number limits, especially if EPA or ARB believe that there are measurement issues with a 1 mg/mile PM standard. A particle number standard could also be implemented as an optional compliance path along with a mass-based standard. Based on information presented by ARB at the 2013 CRC On-Road Vehicle Emissions Workshop held in San Diego in April 2013 and presented to MECA in May 2013, ARB believes that there is a pathway to measuring PM emissions at levels below 1 mg/mile. ARB has published a revised PM mass measurement protocol that is part of their pathway to measuring very low PM mass levels from the exhaust of a vehicle (see ARB test method MLD 145 available at: [www.arb.ca.gov/testmeth/slb/exhaust.htm](http://www.arb.ca.gov/testmeth/slb/exhaust.htm)). Ford researchers have also developed a correlation between particle number measurements and particle mass that can provide an alternative pathway to measuring very low PM mass levels (see M. Matti Mariq and Ning Xu, *Aerosol Science* 35 (2004), pp. 1251-1274). EPA and ARB need to continue to work together and reach agreement on measurement protocols that are acceptable for use with a 1 mg/mile FTP PM standard.

ARB as part of their short-lived climate pollutants strategy ARB should give some consideration to additional light-duty vehicle policies that force the use of high efficiency filters on future gasoline vehicles. The application of best available filtering technology on future gasoline vehicles will provide additional black carbon reductions from this sector and further health benefits for the citizens of California. The particle/black carbon emission issues cited in these comments for diesel and gasoline engines and vehicles are discussed in more detail in MECA's recently released report: "Ultrafine Particulate Matter and the Benefits of Reducing Particle Numbers in the United States," available on MECA's website at: <http://www.meca.org/resources/reports>.

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