STATEMENT OF THE
MANUFACTURERS OF EMISSION CONTROLS ASSOCIATION
ON THE WAIVER REQUEST RECEIVED BY THE U.S. ENVIRONMENTAL PROTECTION AGENCY TO INCREASE THE ETHANOL CONTENT OF GASOLINE UP TO 15%

DOCKET ID NO. EPA-HQ-OAR-2009-0211

July 16, 2009

The Manufacturers of Emission Controls Association (MECA) is pleased to provide comments on the U.S. EPA waiver request submitted by Growth Energy to increase the ethanol content of gasoline up to 15% by volume.

MECA is a non-profit association of the world's leading manufacturers of emission control technology for mobile sources. Our members have over 30 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 light-duty vehicles in all world markets and gasoline engines used in nonroad applications. Our industry has played an important role in the emissions success story associated with light-duty vehicles in the United States, and has continually supported efforts to develop innovative, technology-forcing, emissions programs to deal with air quality problems.

MECA is familiar with many of the issues that have been raised by various stakeholder groups concerning the use of mid-level ethanol blends (ethanol content in gasoline above the current 10% volume cap set by EPA) in existing light-duty gasoline vehicles and gasoline nonroad engines. A panel discussion of these issues was included in the May 13, 2009 EPA Mobile Source Technology Review Subcommittee meeting held in Washington, D.C. The Mobile Source Technology Review Subcommittee (MSTRS) is a subcommittee of EPA's Clean Air Act Advisory Committee. MECA's Executive Director, Dr. Joseph Kubsh is a member of this subcommittee. The concerns raised during the May 13, 2009 EPA MSTRS meeting and in other similar forums include the potential impacts of mid-level ethanol blends on the performance and durability of exhaust emission controls that have been designed for vehicles and nonroad engines that make up the hundreds of millions of legacy light-duty vehicles and nonroad gasoline engines that currently operate in the U.S.

Emission control-related concerns associated with the use of mid-level ethanol blends include the potential for accelerated thermal deactivation of three-way catalysts equipped on existing light-duty vehicles or nonroad spark-ignited engines due to higher exhaust temperatures that have been observed on engines fueled with mid-level ethanol blends in comparison to gasoline with no ethanol content or gasoline with 10% ethanol. MECA members have no available data with respect to the aging of three-way catalysts on mid-level ethanol blends. However, there are numerous references that indicate that the thermal durability of three-way catalyst formulations is function of time, catalyst temperature, and gas composition. Extended catalyst exposure to higher exhaust temperatures, especially in the presence of oxygen-rich exhaust conditions that can be created through the use of an oxygenated gasoline that contains ethanol, can accelerate catalyst thermal deactivation mechanisms (e.g., sintering of active precious metal sites, sintering of oxygen storage materials, and migration of active materials into inert support materials).

Based on these known three-way catalyst deactivation mechanisms, operation of existing light-duty vehicles on a mid-level ethanol blend over an extended period of time could create conditions that could lead to higher exhaust emissions than would have occurred with operation of the vehicle on gasoline with ethanol levels of 10% by volume or less. These catalyst thermal deactivation issues are likely to be more significant for older, Tier 1 or Tier 0-compliant vehicles (e.g., pre-2004 model year) and catalyst-equipped nonroad engines that do not have any adaptive air/fuel control capabilities. Some of these older vehicles (or nonroad engines) were equipped with less thermally robust catalyst formulations (compared to, for example, three-way catalysts designed for Tier 2-compliant applications) and the catalyst could see extended exposure to a high temperature, lean exhaust condition that is associated with an uncorrected lean air/fuel shift due to the higher oxygen content of the mid-level, ethanol-containing fuel. The potential increase in exhaust emissions that results from such vehicles (or nonroad engines) will depend on catalyst composition, air/fuel control characteristics of the vehicle (or nonroad engine), and the integrated time of catalyst exposure under lean, high temperature conditions.

Another emissions-related impact from engine operation on a mid-level ethanol blend is higher levels of aldehyde emissions (chiefly acetaldehyde). Aldehyde emissions are classified as a mobile source air toxic and are known to have significant public health impacts. Widespread use of mid-level ethanol blends in existing vehicles and catalyst-equipped nonroad engines will significantly increase the emissions inventory of aldehydes. The increase in aldehyde emissions will depend on the amount of ethanol present in gasoline, the operating characteristics of the vehicle or engine, and the catalyst formulation present on the vehicle or engine. Information on ethanol effects on vehicle emission performance has been the subject of several recent studies including studies sponsored by the Coordinating Research Council (CRC). Exhaust emission impacts for 12 late model vehicles certified to California emission regulations were reported on as part of CRC's E-67 test program (see *Environmental Science and Technology*, vol. 41, pp 4059-4064, 2007). In this study emissions of non-methane organic gases (NMOG), acetaldehyde, benzene, and 1-3, butadiene all increased with increasing ethanol content in the gasoline (ethanol contents of 0, 5, 7 and 10 vol% were included in this study).

Depending in part on a vehicle's ability to compensate for the oxygen content of the fuel and the composition of the catalyst equipped on the vehicle, NOx exhaust emissions have also been shown to increase on late model light-duty vehicles with increasing levels of ethanol in the fuel (see again the CRC E-67 test program results). Higher levels of NOx emissions from light-duty vehicles and nonroad engines operating on mid-level ethanol blends could lead to increased levels of ozone in regions with large population centers (e.g., California, Northeast U.S.). Ambient ozone levels, like aldehydes, have known negative human health impacts.

These exhaust emissions and catalyst-related issues represent only some of the concerns that environmental groups, automotive manufacturers, and engine manufacturers have voiced in recent statements concerning the use of mid-level ethanol blends of gasoline. A number of industry and governmental groups (e.g., EPA, DOE, CRC) are currently engaged in test programs to better understand the emissions and catalyst durability impacts of mid-level blends relative to the existing 10% ethanol cap on the variety of existing light-duty vehicles and nonroad engines that operate across the U.S. Some preliminary results have been released from some of these test programs with more complete datasets expected to be available in the coming 12 months. In some cases these test programs have already observed higher exhaust temperatures, higher aldehyde emissions, and higher NOx emissions on a small subset of existing vehicles or engines. MECA believes that an EPA waiver decision to increase the ethanol blending cap above 10% requires more test data on a wider variety of existing vehicles and nonroad engines to more fully understand the emissions and catalyst durability impacts associated with such fuels. Until a more comprehensive database is available and has been reviewed by EPA, no waiver request should be allowed for the use of a mid-level ethanol-containing gasoline.

CONTACT:
Joseph Kubsh
Executive Director
Manufacturers of Emission Controls Association
1730 M Street, NW
Suite 206
Washington, D.C. 20036
Tel.: (202) 296-4797
E-mail: jkubsh@meca.org