COMMENTS OF

THE 25x'25 ALLIANCE

On the National Highway Traffic Safety Administration and U.S. Environmental Protection Agency Proposed Rule:

Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks

Docket ID Nos. NHTSA-2018-0067;
EPA-HQ-OAR-2018-0283

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Introduction

The 25x'25 Alliance (25x'25) is a diverse, grassroots national alliance of nearly 1000 agriculture, forestry, conservation, business and environmental organizations working collaboratively to advance the goal of securing 25 percent of the nation's energy needs from renewable sources by the year 2025.

High-octane, low-carbon fuels are needed by automakers to support their wide-spread introduction of higher efficiency power trains to meet fuel economy goals and emissions performance objectives. High-octane, low-carbon fuel blends can be derived by using less costly, clean, domestic ethanol. 25x'25 believes ethanol is the best available source of higher octane that can be generally available in the market within the next few years.

We appreciate the opportunity to submit comments in response to the proposed Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks (SAFE Vehicles Rule).[1]

Background

The National Highway Traffic Safety Administration (NHTSA) and Environmental Protection Agency (EPA) have conducted two joint rulemakings to establish a National Program for Corporate Average Fuel Economy (CAFE) and greenhouse gas (GHG) emissions standards. Together, the two rules established coordinated federal GHG and fuel economy standards for passenger cars, light-duty trucks, and medium-duty passenger vehicles. Each agency adopted standards covering MYs 2012-2016 in May 2010[2] and covering MYs 2017-2025 in October 2012.[3]

EPA's GHG emission standards for MYs 2022–2025 were subject to a ''Mid-term Evaluation'' to re-evaluate the GHG emission standards for those model years. The Mid-term Evaluation, to be conducted in conjunction with NHTSA, was intended to be a collaborative process that would involve stakeholder feedback and real data on current and future technologies, and their ability to meet the ambitious standard of 54.4 miles per gallon equivalent across the new vehicle fleet by 2025. EPA and NHTSA will finalize their actions related to MYs 2022–2025 standards concurrently.

On March 22, 2017, under the new Administration, the EPA and NHTSA filed the Notice of Intention to Reconsider the Final Determination of the Mid-Term Evaluation of Greenhouse Gas Emissions Standards for Model Years 2022-2025 Light-Duty Vehicles.[4] 25x'25 supported this move, recognizing the importance of ensuring that the Mid-term Evaluation is conducted in a collaborative and data driven manner that seeks to harmonize the greenhouse gas and fuel economy standards set by each agency.

[1] Federal Register / Vol. 83, No. 165 / Friday, August 24, 2018 / Page 42986.
[2] Federal Register Vol. 75 No. 88 Page 25324, May 7, 2010.
[3] Federal Register Vol. 77 No. 199 Page 62624, October 15, 2012.
[4] *See* 40 CFR Part 86, Federal Register/Vol. 82, No. 54/Wednesday, March 22, 2017/Proposed Rules, Page 14671.

EPA is charged with achieving the greatest degree of emissions reduction, taking into consideration availability, costs, and lead time of technologies and available fuels. EPA must take action to support adoption of high-octane, low-carbon fuels to enable efficiency improvement and emissions reductions, remove market barriers to expanded use of ethanol as the primary octane source, and utilize the best available science and methodologies to increase ethanol fuel blends.

25x'25 has not taken a position on the proposed efficiency and emission standards. Rather, we are focusing our comments on fuel quality and increased octane levels as an important and necessary pathway to achieve any CAFE and GHG emission standards that are established going forward.

The Final SAFE Vehicles Rule Should Include High-Octane, Low-Carbon Fuel Pathways as a Compliance Strategy to Achieve CAFE/GHG Standards

In previous comments to EPA[5], 25x'25 noted a glaring omission from the Draft TAR in that no effort was made to address and consider fuel quality and octane pathways for meeting the very aggressive GHG and fuel efficiency targets that had been previously established for MYs 2022-2025. In order to meet the targets called for in the current proposed rule, this lack of consideration must be rectified. 25x'25 and other commenters continue to point out that U.S. Department of Energy (DOE)'s National Laboratories have reported extensively on major engine-efficiency and emission-reduction benefits derived from high-octane, low-carbon (HOLC) fuels, specifically blends of ethanol in the 25- to 30-percent range.[6]

Studies by the Ford Motor Company and others also show that ethanol blends of up to 30 percent (E30) increase fuel efficiency and reduce tailpipe carbon emissions by seven percent each. Just as importantly, the combination of HOLC fuels and higher-compression engines can enable a compliance pathway that is much more cost-effective than many other more expensive and complex technologies.

Higher Octane Content in Fuels is Key

To satisfy customer desires and meet the dual goals of greater fuel efficiency and reduced GHG emissions, the utilization of higher compression spark ignition internal combustion engines will be essential. Increasing engine compression improves thermal efficiency. However, as compression increases, higher octane fuels will be needed to prevent engine knock. Automakers and advocacy groups have expressed support for increases to fuel octane levels for the US market.

[5] 25x'25, Comments on Midterm Evaluation of Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards for Model Years 2022-2025, September 26, 2016

[6] Theiss T., et al., "*Summary of High-Octane Mid-Level Ethanol Blends Study*," ORNL/TM-2016/42, July 2016.

Ethanol – with its octane rating of 113 – offers engine knock resistance at a lower cost than any other octane booster in gasoline. In addition, ethanol's lower direct and life-cycle GHG emissions as compared to gasoline are well documented.[7,8,9] For this reason, a HOLC fuel produced from a mixture of ethanol and gasoline and used in conjunction with advanced high compression engines presents itself as a technology pathway capable of complying with new CAFE/GHG standards.

As previously mentioned, automakers are pushing for the U.S. to embrace higher-octane gasoline to help them meet fuel economy and GHG emissions goals. They understand that higher octane, preferably an octane rating of 95 or greater on the Anti-Knock Index (AKI), will allow higher efficiency. Executives from GM, Ford, Fiat Chrysler Automobiles and Honda called out the need for higher-octane, lower-carbon fuels at the SAE 2016 World Congress & Exhibition in Detroit.[10] Automakers say it will be difficult to further boost power and efficiency without raising the octane level. A low-carbon octane enhancer such as renewable ethanol can achieve these higher-octane fuel ratings at a cost that is cheaper and cleaner than petroleum-based octane additives.

A report released by three of the DOE national laboratories cited numerous benefits of using high-octane, mid-level ethanol blends in future engines. An analysis issued by Oak Ridge National Laboratory, Argonne National Laboratory and the National Renewable Energy Laboratory – "*Summary of High Octane, Mid-Level Ethanol Blends Study*" – cites increased vehicle efficiency, increased acceleration and significant reductions in GHG emissions among the demonstrated benefits of mid-level ethanol blend fuels, such as E25 and E40.[11]

Reporting from the nation's leading biofuel and engine research facilities reinforces the fact that more ethanol in gasoline can save consumers money and reduce the emissions from the transportation sector, which represents about 26 percent of the country's total GHG emissions and has surpassed electricity generation as the largest source of GHG emissions.[12] This research helps underscore the need for this Administration to maximize the contributions of low-carbon biofuels towards the larger emissions-reduction effort.

Liquid Fuels Will Dominate the Transportation Sector for Decades to Come

While internal combustion engines powered by liquid transportation fuels will likely dominate the marketplace for decades, lower-carbon liquid transportation fuels such as grain-based

[7] Steffen Mueller and Jennifer Dunn. "CCLUB Evolution"; GREET User Workshop, Argonne National Laboratory, October 15-16, 2015.
[8] Gustafson, A., C. Gray and J. Conde, Request for Correction of Information Submitted on behalf of the Energy Future Coalition, the Urban Air Initiative and Governors' Biofuels Coalition concerning the EPA's Life Cycle Analysis of Ethanol and Gasoline Under the Renewable Fuel Standard, April 7, 2016.
[9] Mueller, S., Request for Correction of Information Submitted on behalf of the Energy Resources Center at The University of Illinois at Chicago concerning the EPA's Life Cycle Analysis of Ethanol and Gasoline Under the Renewable Fuel Standard, April 11, 2016.
[10] Cars.com, Automakers Push for Higher Octane to Meet Fuel Economy Standards, April 15, 2016.
[11] Theiss T., et al., "*Summary of High-Octane Mid-Level Ethanol Blends Study*," ORNL/TM-2016/42, July 2016.
[12] USDOE-EIA, August 2016 Monthly Energy Review, DOE/EIA-0035(2016/08), Tables 12.6 and 12.7.

ethanol, cellulosic ethanol, and biodiesel have already established a strong market for themselves in the U.S.

A study by auto engineering firm Ricardo, Inc. predicted that "[t]he vast majority of vehicles sold through 2025 in the United States will use gasoline-fueled, spark-ignited internal combustion engines as the primary form of propulsion." However, the report also concluded that these powertrains "will have a natural thirst for higher octane fuels."[13]

The International Energy Outlook 2016[14] makes clear that a vast majority of the global transportation fleet will continue to run on energy-dense liquid fuels through 2040. However, to meet the climate change and GHG emission targets that nations of the world (including the U.S) have set, the supply of liquid fuels must include high-octane, low-carbon emitting biofuels.

Cost Advantages of a HOLC Option

The utilization of a HOLC fuel such as an ethanol-gasoline mixture when paired with higher compression engines provides perhaps the most promising lower-cost technology to gain fuel economy and reduce GHG emissions. A study by the National Research Council (NRC) and commissioned by NHTSA acknowledges that a "high compression ratio with high octane gasoline" could increase engine efficiency.[15] However, up to this point, the EPA has failed to sufficiently consider the benefits that could be attained by HOLC fuels, not to mention the absence of costs comparisons to other technology alternatives.

Air Improvement Resource, Inc. (AIR) utilized the EPA's publicly available Optimization Model for reducing Emissions of Greenhouse gases from Automobiles (OMEGA) to evaluate the possible implementation of higher compression ratio (HCR) engines using HOLC fuel in the 2022-2025 model years, and the impacts on program costs and technology penetrations before and after this implementation. From the report "*Evaluation of Costs of EPA's 2022-2025 GHG Standards with High Octane Fuels and Optimized High Efficiency Engines*," it can be concluded that universal availability of HOLC fuels such as E25 (25% ethanol, 75% gasoline) would create the incentive for vehicle manufacturers to increase the compression ratio on most of their spark ignition vehicles, thereby improving thermal efficiency and reducing CO2 emissions.[16]

By reducing manufacturer reliance on more complex and expensive technologies to achieve the same emission reduction goals, the cost of the average new MY 2025 vehicle could be reduced by $404. In addition, the cost impact of some vehicles, such as popular crossover SUVs with three row seating, could be reduced by $873. These anticipated manufacturing cost reductions are significant, and the general public would benefit from the engine technology enabled by universally available, HOLC fuels that costs the same or less than today's regular gasoline. Furthermore, the use of clean, domestic ethanol to raise the octane floor on gasoline rather than hydrocarbons would result in significant fuel cost savings.

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[13] Kasab J., December 5, 2011, *Influence and Importance of Fuel Octane in Future Engine Developments*.

[14] U.S. Energy Information Administration, May 2016, *International Energy Outlook 2016*.

[15] NAS, 2015, *Cost Effectiveness and Deployment of Fuel Economy Technologies for Light Duty Vehicles.*

[16] Air Improvement Resource, Inc., September 2016, *Evaluation of Costs of EPA's 2022-2025 GHG Standards with High Octane Fuels and Optimized High Efficiency Engines*

Establish a Minimum Octane Standard for Fuels

Oak Ridge National Laboratory (ORNL) analyzed the market potential for high-octane fuels of 25% and 40% ethanol in their July 2016 "*Summary of High-Octane, Mid-Level Ethanol Blends Study*."[17] ORNL surmised that vehicle manufacturers could benefit from HOLC fuels as a means to meet future fuel economy and GHG requirements and serve as a way to increase torque in performance applications. In total, consumers could benefit from projected fuel cost savings, reduced price volatility, increased torque in performance applications, and the energy security and environmental attributes of HOLC fuels.

Within this notice, the EPA has requested comments on the "eliminat[ion of] today's lower-octane fuel blends."[18] EPA should phase out today's low-octane blends, as new vehicles are available to take advantage of the efficiency benefits of higher ethanol blends. In fact, the Renewable Fuels Association has found that 93% of 2019 model year vehicles are explicitly approved by the manufacturer to use 15% ethanol blends (E15), according to the results of an annual analysis of warranty statements and owner's manuals.[19]

The transition of above ground equipment to E25-40 compatibility has started and will be capable of supplying fuel to all vehicles that can use it by late 2022. But without fuel octane standards set by EPA, fuel producers and providers will not likely make major infrastructure changes nor implement the marketing strategies needed to support a robust market for HOLC fuels.

EPA has acknowledged that Clean Air Act section 211(c) gives it authority to "control" gasoline octane levels.[20] EPA should set a minimum octane level under Clean Air Act section 211(c)(1) because low octane gasoline impairs manufacturers' ability to further increase compression ratios to reduce GHG emissions to meet current GHG standards and also increase GHG emissions in existing legacy vehicles.[21]

The minimum level of octane should be 98 RON. For combustion efficiency, higher octane is better. Midlevel ethanol blends are a proven means to cost-effectively increase octane levels in the U.S. gasoline pool. Stopping short, and continuing to treat fuel and vehicle standards as bureaucratic benchmarks instead of a consolidated system incentivizing improvement, wastes an opportunity to provide maximum performance benefits to the consumer at least cost and reduced overall carbon emissions.

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[17] Theiss T., et al., "*Summary of High-Octane Mid-Level Ethanol Blends Study*," ORNL/TM-2016/42, July 2016.
[18] 83 Fed. Reg. at 43,041.
[19] *E15 Approval Status for Conventional (Non-FFV) Automobiles*, October 25, 2018.
[20] *EPA's Regulatory Authority to Address Octane*, May 5, 2015.
[21] See CRC, Final Report on CRC Project No. E-108, at 8 (Mar. 2015) (concluding that "[c]onsistent with the loss of FE, the fleet CO2 results correspondingly increased for the 85 AKI test fuel.").

Reduce Regulatory Barriers to HOLC Fuels

HOLC supporters recognize numerous barriers and other associated regulatory hurdles must be resolved before HOLC ethanol fuels are adopted at large scale. 2x'25 believes that EPA should:[22]
(1) Approve a midlevel ethanol certification fuel with a minimum specified octane rating;
2) Relatedly, correct the erroneous R-factor used in the fuel economy calculation for gasoline and apply that corrected equation to midlevel ethanol certification fuel;
(3) Acknowledge that midlevel ethanol blends can be introduced into commerce consistent with the sub-sim law, Clean Air Act 211(f), because ethanol is now a fuel additive used in certification; and
(4) Extend a 1-pound Reid Vapor Pressure waiver to ethanol blends with more than ten percent ethanol, as the President has directed.

Feedstock availability and cost are not expected to be obstacles to the substantial development of a HOLC fuel market. In addition, high-octane ethanol production continues increase each year with the Renewable Fuel Standard (RFS) as the primary policy mechanism to ensure continued market access and biorefinery investor confidence.

The carbon emissions of high-octane ethanol should not be a barrier to the growth of the HOLC fuel market. In its 2010 lifecycle analysis, EPA recognized that carbon emitted from the combustion of ethanol is the same carbon that the corn plant absorbed from the atmosphere as it grew. Unlike gasoline tailpipe emissions, ethanol tailpipe emissions do not alter the carbon cycle and thus do not endanger public health or welfare, so treating these emissions differently makes sense.[23]

With the growth of high-octane ethanol production, distribution, and use by customers, the further development of engines optimized to operate on HOLC fuels will follow. Automakers are already aware of the benefits of using HOLC in higher-compression ratio engines and know how to build them, but they need the certainty of stable policy to signal that investments in these technology pathways are viable.

Engines and Fuel Must be an Integrated System

Ethanol-based HOLC fuels will provide significant benefits for the U.S. These benefits include an improvement in vehicle fuel efficiency and lower well-to-wheel GHG emissions. However, these benefits will be most noticeable in vehicles designed for, and dedicated to use of, increased octane.

[22] These recommendations are discussed in detail in separate comments filed by the THE ILLINOIS, IOWA, KENTUCKY, & MISSOURI CORN GROWERS ASSOCIATIONS in response to this NOPR, October 26, 2018.
[23] *See* Renewable Fuel Standard Program, Regulatory Impact Analysis 444 (2010) ("Over the full lifecycle of the fuel, the CO2 emitted from biomass-based fuels combustion does not increase atmospheric CO2 concentrations, assuming the biogenic carbon emitted is offset by the uptake of CO2 resulting from the growth of new biomass. As a result, CO2 emissions from biomass-based fuels combustion are not included in their lifecycle emissions results."); *accord id.* at 470, Figure 2.6-2 (indicating that corn ethanol has no tailpipe CO2 emissions).

25x'25 believes it is imperative that the vehicle and fuel be treated as a comprehensive system. To date CAFE/GHG standards have largely focused on vehicle engine technology. Advance engine vehicles perform best in concert with fuels of suitable properties and composition to optimally enable and power them. A significant body of research demonstrates that, for GHG reductions and fuel economy improvements, the combined performance of co-optimized fuels and vehicles exceed the total of their individual contributions.[24]

Conclusion

Through the use of advanced high-octane, low-carbon fuels, it is possible to deliver on the promises of high fuel efficiency and reduced emissions in the most cost-effective and timely manner. The EPA and NHTSA should put considerable focus on the composition of liquid fuels, thereby recognizing octane – as many other federal and industry partners already have – as the single most important fuel property for maximizing efficiency and performance.

Unlike premium E10 gasoline, midlevel ethanol blends could unlock higher octane fuel for consumers at affordable costs. The EPA and NHTSA should support high-octane midlevel ethanol blends by removing regulatory barriers and as well as recognizing the petroleum reduction and carbon-neutrality benefits of increasing ethanol levels in gasoline.

Thank you again for the opportunity to provide comments in response to the proposed SAFE Vehicles Rule.

[24] Theiss T., et al., "*Summary of High-Octane Mid-Level Ethanol Blends Study*," ORNL/TM-2016/42, July 2016. P.1.