RENEWABLE FUELS ASSOCIATION

April 12, 2018

The Honorable John Shimkus
Chairman
Subcommittee on the Environment
Committee on Energy and Commerce
U.S. House of Representatives

The Honorable Paul Tonko
Ranking Member
Subcommittee on the Environment
Committee on Energy and Commerce
U.S. House of Representatives

Dear Chairman Shimkus and Ranking Member Tonko:

RFA is the leading trade association for America's ethanol industry. Its mission is to advance the development, production, and use of fuel ethanol by strengthening America's ethanol industry and raising awareness about the benefits of renewable fuels. Founded in 1981, RFA serves as the premier meeting ground for industry leaders and supporters. RFA's 300-plus members are working to help America become cleaner, safer, more energy secure, and economically vibrant. In advance of the Energy and Commerce Subcommittee on the Environment's hearing this week on "High Octane Fuels and High Efficiency Vehicles: Challenges and Opportunities," we wanted to be sure the Subcommittee was provided the perspective of American ethanol producers.

As the cleanest and most affordable source of octane available, ethanol can play a pivotal role in enabling low-cost advanced vehicle technologies that will improve fuel economy and significantly reduce emissions of harmful tailpipe pollutants and greenhouse gases (GHG). Ethanol has unique properties that make it a highly attractive octane component for the high-octane fuels that will enable the advanced engines of tomorrow. Not only is ethanol a renewable fuel that offers superior GHG performance, but it also is lower cost than other octane sources, possesses an extremely high octane rating (109 RON), a high heat of vaporization, and high octane sensitivity. The auto engineers, government scientists, and academic researchers who are examining the costs and benefits of our future fuel options have identified these attributes as highly desirable.

Internal combustion engines will continue to be the predominant light duty vehicles propulsion technology through 2025 and beyond.

Internal combustion (IC) engines powered by liquid fuels will continue to serve as the most prevalent propulsion technology for light duty vehicles (LDVs), with the U.S. Environmental Protection Agency (EPA) under the previous administration admitting that only "modest levels" of strong hybridization and "very low levels" of full electrification (plug-in vehicles) are expected by 2025.[1] Further, the efficiency of modern IC engines can be significantly improved through increased adoption of incremental technologies that exist today or are near commercialization.[2]

According to Paul Whitaker, powertrain and technical director for AVL Power Train Engineering, "We see big efficiency improvements with (IC) engines today and see the potential for lots more in the future, and they are very inexpensive relative to the other options."[3] Additionally, the U.S. Department of Energy (DOE) states that "…vehicles with internal combustion engines will continue to comprise a significant portion of the nation's vehicle fleet for the next several decades."[4] Further, the National Research Council (NRC) states, "…spark-ignition engines are expected to be dominant beyond 2025."[5]

Further improvements in IC engine efficiency are imminent, and such improvements are relatively low cost in comparison to other options.

Many of the advanced IC engine technologies expected in the next decade call for fuels with higher octane ratings than today's regular grade gasoline.

Increased use of advanced IC engine technologies has already resulted in greater demand for higher octane fuels. For example, growth in turbocharging has already resulted in increased demand for higher-octane fuels, according to recent analysis by the Energy Information Administration (EIA).[6] The EIA analysis suggests that more stringent CAFE and GHG standards caused automakers to increase the market penetration of turbocharging from 3.3% in MY2009 to 17.6% in MY2014. The surge in turbocharging was accompanied by an increase in the demand for high octane premium gasoline, according to EIA. In fact, premium gasoline sales rose from 7.8% of total gasoline sales in June 2008 to 11.3% of total gasoline sales by September 2015.

According to the EIA analysis, "As automakers produce more vehicles with turbocharged engines, it is likely they will recommend or require more LDVs to use higher-octane gasoline. Premium gasoline sales as a percent of total gasoline sales are likely to increase as more car models either recommend or require premium gasoline. This increase is expected to continue as automakers increase the use of turbocharging as one strategy to comply with increasingly stringent fuel economy standards."

The EIA report is corroborated by analysis performed by MathPro, Inc., a consulting firm that specializes in petroleum refining economics.[7] MathPro's analysis shows that the average pool-

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[1] EPA, NHTSA, CARB (July 2016), "Draft Technical Assessment Report: Midterm Evaluation of Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards for Model Years 2022-2025", at ES-2.

[2] *Id*., at 5-12 ("[i]nternal combustion engine improvements continue to be a major focus in improving the overall efficiency of light-duty vehicles." and "Vehicle manufacturers have more choices of technology for internal combustion engines than at any previous time in automotive history and more control over engine operation and combustion.")

[3] Detroit Public Television. Aug. 21, 2016. *Autoline with John McElroy*. Episode #2026 ("Deep Freeze for the ICE?")

[4] U.S. Department of Energy. *Co-Optimization of Fuels & Engines for Tomorrow's Energy-Efficient Vehicles.* Available at: http://www.nrel.gov/docs/fy16osti/66146.pdf

[5] National Research Council, Committee on the Assessment of Technologies for Improving Fuel Economy of Light-Duty Vehicles. June 2015. *Cost, Effectiveness and Deployment of Fuel Economy Technologies for Light-Duty Vehicles,* at S-4.

[6] EIA. April 6, 2016. *Engine design trends lead to increased demand for higher-octane gasoline.*

[7] MathPro, Inc. Sep. 8, 2016. *Capturing Ethanol's Octane Value in Gasoline Blending*. Webinar presentation to RFA members. (Available upon request)

wide octane rating for gasoline increased from approximately 88.2 AKI in 2009 to 88.5 in 2015, largely as a result of increased sales of vehicles requiring or recommending the use of premium gasoline. In examining EPA projections of future advanced IC engine technology deployment, MathPro concluded that greater use of higher compression ratio and turbocharging will "substantially increase the call for octane."

Based on projected growth in turbocharging alone, MathPro calculated that premium gasoline could account for 17-22% of total gasoline sales by 2025, depending on varying levels of consumer adherence to the auto manufacturers' fueling recommendations. According to MathPro, "By itself, increasing the use of turbocharging could increase the required average octane of the gasoline pool by 0.3-0.6 numbers (AKI), depending on consumer response to fueling recommendations." Notably, this MathPro analysis does not account for the impact of high compression ratio (HCR), which would further intensify the call for octane. EPA projects HCR naturally aspirated (NA) engine technology will need to penetrate 44% of the market by MY2025 (compared to 3% or less today) to facilitate compliance with future CAFE/GHG standards.

It is important to note, however, that retail prices for premium grade gasoline have annually averaged 7-16% more than regular grade gasoline prices since 2010 ($0.24-0.40/gallon).[8] This cost increase likely has deterred some owners of GDI, turbocharged vehicles from purchasing premium, even though the manufacturer recommends or requires premium. The cost discrepancy between regular and premium grade gasoline also highlights the need to leverage lower-cost sources of octane, such as ethanol.

Historically, Federal regulations have failed to treat IC engines and liquid fuels as integrated systems, even though fuel properties can have significant effects on fuel economy and emissions.

By itself, the IC engine does nothing to propel a light duty vehicle or generate GHG emissions. It is only when a liquid fuel is introduced into the engine that the technology works to deliver the service of mobility. In this way, IC engines and liquid fuels combine to form a highly integrated system in which one component is useless without the other. Indeed, the IC engine's efficiency and emissions can be greatly affected by the characteristics of the liquid fuel used in the engine.

DOE's Co-Optima program appropriately recognizes the symbiotic relationship between fuels and engines, and should be used as a model for future fuel economy and GHG regulations. Recognizing that fuels and engines must be developed in concert to maximize efficiency and emissions reductions, DOE has launched an initiative to focus on "Co-optimization of Fuels and Engines for Tomorrow's Energy Efficient Vehicles." The initiative, known simply as "Co-optima," endeavors to "…simultaneously tackle fuel and engine innovation to co-optimize performance of both elements and provide dramatic and rapid cuts in fuel use and emissions."[9] Co-optima has two major research tracks, the first of which is "…improving near-term efficiency of spark-ignition engines through the identification of fuel properties and design parameters of existing base engines that maximize performance."[10] Importantly, this track includes identifying "candidate fuels" for use in co-optimized engines to achieve peak performance, energy efficiency and emissions reductions. The "market introduction target" for co-optimized fuels and IC engines under this research track is 2025.

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[8] EIA. *Retail Gasoline Prices*. https://www.eia.gov/dnav/pet/pet_pri_gnd_dcus_nus_w.htm Accessed Sep. 12, 2016.
[9] U.S. Department of Energy. *Co-Optimization of Fuels & Engines for Tomorrow's Energy-Efficient Vehicles.* Available at: http://www.nrel.gov/docs/fy16osti/66146.pdf
[10] *Id*.

A recent summary of DOE research conducted as part of the Co-optima program demonstrates that significant additional improvement in fuel economy and GHG emissions reduction can occur when advanced IC engines are paired with high octane low carbon (HOLC) fuels.[11] Automakers have also advocated for a coordinated approach to the development and regulation of engines and fuels. According to Dan Nicholson, vice president of global propulsion systems at GM, "Fuels and engines must be designed as a total system. It makes absolutely no sense to have fuel out of the mix."[12]

Pairing advanced IC engine technologies with high octane low carbon (HOLC) fuels would result in significant fuel economy and emissions benefits.

Numerous studies by the automotive industry, DOE, and academia have examined the efficiency gains and emissions reductions that can be achieved when HOLC fuels is used in an IC engine with HCR, turbocharging, and other advanced technologies examined by EPA as part of the midterm evaluation. These studies have repeatedly shown that high octane fuels (98-100 RON) used in HCR engines improve efficiency and reduces emissions by 4-10%, depending on drive cycle and other factors. Studies using a high octane mid-level ethanol blend also demonstrate that fuel economy and vehicle range using HOLC blends like E25 and E30 is equivalent or superior to performance using E10, even though the E25 and E30 blends have lower energy density.

Ethanol's unique properties make it an attractive candidate for boosting octane in future HOLC fuel blends.

Certain chemical properties, such as "sensitivity" and heat of vaporization, make some octane boosters more attractive than others. As researchers have examined different methods of boosting gasoline octane ratings, one option—increased levels of ethanol—has stood out as the most efficient and economical pathway.

Not only does ethanol offer extremely high octane (109 RON, 91 MON), it also features high sensitivity and high heat of vaporization. These are attractive properties that, when considered along with ethanol's lower "lifecycle" carbon intensity and lower cost relative to other octane options, make ethanol the clear choice for future HOLC fuels. The importance of octane sensitivity and heat of vaporization are discussed in great detail in the Ricardo report.[13] Ricardo states that these benefits are important considerations for "…DI engines especially, both NA and turbocharged, which are expected to comprise the majority of future engines for both conventional and hybrid vehicles."

In addition to the tailpipe CO_2 reductions observed in several of the studies cited in these comments, ethanol-based HOLC fuels also offer important lifecycle GHG emissions benefits. That is, the total "well-to-wheels" (WTW) emissions associated with producing and using ethanol are significantly lower per unit of energy delivered than the emissions resulting from petroleum production and use. The latest analysis conducted by DOE's Argonne National Laboratory found that today's corn ethanol reduces GHG emissions by an average of 34-44% compared to petroleum, while emerging cellulosic ethanol technologies offer GHG reductions of 88-108%.[14] These benefits are compounded when the ethanol is used in a HOLC fuel that achieves greater

[11] Oak Ridge National Laboratory. July 2016. *Summary of High-Octane, Mid-Level Ethanol Blends Study*. ORNL/TM-2016/42

[12] Society of Automotive Engineers. Aug. 3, 2016. *GM, Honda execs agree: Higher octane gas needed to optimize ICE efficiency.* http://articles.sae.org/14940/

[13] *The Draft Technical Assessment Report: Implications for High Octane, Mid-Level Ethanol Blends*. Ricardo, Inc. September 20, 2016. Project Number C013713

[14] Wang, M.; Han, J.; Dunn, J. B.; Cai, H.; Elgowainy, A. Well-to-wheels energy use and greenhouse gas emissions of ethanol from corn, sugarcane and cellulosic biomass for US use. Environ. Res. Lett. 2012, 7, 1−13, DOI: 10.1088/1748-9326/7/4/045905

fuel economy and vehicle range (i.e., more miles with less energy) than today's marketplace fuels.

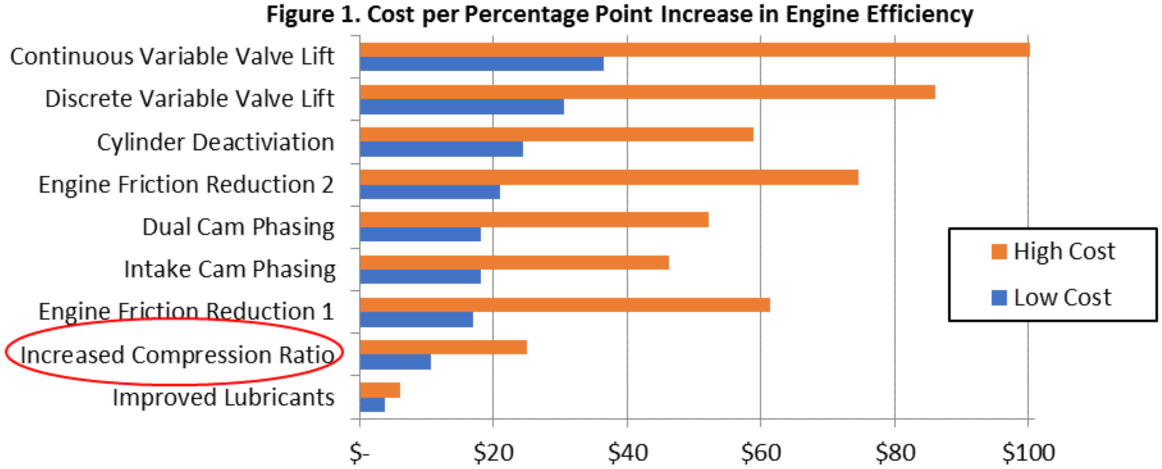
In a recent study, Argonne National Laboratory examined the WTW GHG emissions impacts of HOLC fuels (100 RON) containing 25% and 40% ethanol.[15] The analysis found that the inherent efficiencies resulting from using a high-octane fuel in a HCR engine alone resulted in a 4-8% reduction in GHG emissions per mile compared to baseline E10 gasoline vehicles. Additional GHG reductions of 4-9% were realized as a result of corn ethanol's lower lifecycle emissions upstream, meaning total GHG emissions per mile were 8% and 17% lower for E25 and E40, respectively, compared to baseline E10. Meanwhile, E25 and E40 HOLC blends made with cellulosic ethanol were shown to reduce total WTW GHG emissions by 16-31% per mile compared to E10. While high octane fuels using petroleum-derived octane sources may provide similar tailpipe CO_2 reductions as ethanol-based HOLC fuels, they clearly do not offer the additional GHG reductions associated with ethanol's full WTW lifecycle.

Additional studies show that using ethanol as the source of octane in future high-octane fuels has the potential to significantly decrease petroleum refinery GHG emissions by reducing the energy intensity of the refining process.[16]

Use of an ethanol-based HOLC in optimized IC engines would be the lowest cost means of achieving compliance with CAFE and GHG standards for MY2022-2025 and beyond.

When only the costs of various engine technologies are considered, HCR stands out as one of the most cost-effective means available for increasing engine efficiency (Figure 1).

Figure 1. Cost per Percentage Point Increase in Engine Efficiency



Based on NRC (June 2015); Draft TAR (July 2016); AIR, Inc. (Sep. 2016)

The NRC estimates that the cost to the automaker to introduce higher compression ratio for use with "higher octane regular fuel" is likely $75-150 per vehicle.[17] However, analysis by Air

[15] Oak Ridge National Laboratory. July 2016. *Summary of High-Octane, Mid-Level Ethanol Blends Study*. ORNL/TM-2016/42

[16] See "Refining Economics of U.S. Gasoline: Octane Ratings and Ethanol Content", DS Hirshfeld, JA Kolb, JE Anderson, W Studzinski, and J Frusti. (2014) dx.doi.org/10.1021/es5021668 | Environ. Sci. Technol. 2014, 48, 11064-11071; and "Petroleum refinery greenhouse gas emission variation related to higher ethanol blends at different gasoline octane rating and pool volume levels", V Kwasniewski, J Blieszner, and R Nelson, DOI: 10.1002/bbb.1612; Biofuels, Bioprod. Bioref (2015)

[17] NRC. June 2015. TABLE S.2 NRC Committee's Estimated 2025 MY Direct Manufacturing Costs of Technologies

Improvement Resource, Inc. suggests "…costs of increased compression ratio would be near zero, especially if it were accomplished during normal engine re-design cycles."[18] Similarly, Ricardo notes that "Since the costs to an OEM for increasing compression ratio are minimal for a new engine design, it is clear that implementing a high octane mid-level ethanol fuel standard would be the lowest cost technology and have even greater benefits in real world driving."

Still, the engine technology cost is only one-half of the equation when total vehicle purchase and operation costs are considered; fuel costs must also be considered. To examine the total cost of high compression ratio engines using a HOLC fuel (98 RON E25) as a technology pathway for compliance with 2022-2025 CAFE and GHG standards, Air Improvement Resource, Inc. (AIR) conducted a study that found this pathway can substantially reduce the cost of compliance with the standards, concluding that "With higher compression ratio engines included, total costs of the 2025 model year standards are reduced from $23.4 billion to $16.8 billion. …This analysis has shown that if a high octane mid-level blend ethanol fuel such as 98-RON E25 were an option for model year 2022-2025 vehicles meeting EPA's GHG standards, overall program costs would be significantly reduced."

Increasing octane should not come at the expense of air quality, carbon emissions, or human health.

The potential for significant environmental, economic, and public health benefits from introducing higher octane fuels is obvious. However, the transition to higher octane fuels must be accompanied by requirements that octane sources improve air quality, reduce carbon emissions, and protect public health. Without such protections, there is the potential that increasing gasoline octane could result in unnecessary backsliding on criteria air pollutants, air toxics, and other harmful emissions linked to certain high-octane hydrocarbons. When it comes to air quality and human health, not all octane sources are created equal. Ethanol reduces criteria pollutants, and is the only source of octane that is truly renewable and results in a significant reduction in carbon. But much of the octane contribution in today's gasoline comes from petroleum-derived aromatic hydrocarbons such as benzene, toluene, and the C8 aromatics like xylene. Those sources of octane are far from benign.

The health impacts of aromatic hydrocarbons are well known. A 2015 study published in the *American Journal of Epidemiology* linked benzene found in traffic emissions to childhood leukemia. A 2012 study published by the University of California ties the risk of autism to toxics found in traffic pollution. And a 2015 study published in the *Journal of Environmental Health Perspectives* links microscopic toxic particles in car exhaust to heart disease. Aromatic hydrocarbons compose 20-50% of the non-methane hydrocarbons in urban air and are considered to be one of the major precursors to urban secondary organic aerosols (SOA). SOA is a form of fine particulate matter pollution (PM2.5), which is widely viewed as the most lethal air pollutant in the U.S. today. Moreover, new evidence is confirming that particulate matter from gasoline exhaust is a major source of black carbon, which is thought to be a significant contributor to climate change.

To date, EPA has been relatively quiet on the growing health and environmental threat posed by increased aromatics in gasoline. Because increasingly stringent fuel economy and GHG standards will likely result in increased use of higher octane fuels, the EPA must take into consideration the ancillary health and climate impacts of the various octane sources, and assure that no backsliding can occur.

[18] *Evaluation of Costs of EPA's 2022-2025 GHG Standards With High Octane Fuels and Optimized High Efficiency Engines*. AIR, Inc. September 16, 2016

Automotive engineers and executives, DOE researchers, the National Research Council, and academia all are calling for HOLC fuels to increase fuel economy and decrease GHG emissions.

Over the past several years, a growing chorus of automotive engineers and executives, government scientists, expert panels, and university researchers has called for the introduction of HOLC fuels. These experts have clearly demonstrated that HOLC fuels would enable HCR engines and other advanced IC engine technologies, which in turn would improve engine efficiency and reduce emissions. Below is a partial list of statements from these experts regarding the need for HOLC fuels.

- "Higher octane is necessary for better engine efficiency. It is a proven low-cost enabler to lower CO2; 100 RON fuel is the right fuel for the 2020-2025 timeframe."*—Dan Nicholson, vice president of global propulsion systems, GM*[19]
- "100 RON has been on the table for a long time. The only way we will ever get there is to continue to push and work in a collaborative way." *– Tony Ockelford, director of product and business strategy for powertrain operations, Ford Motor Company*[20]
- "We need to find a new equilibrium. Whether it is 98 or 100 (RON) octane, we need something at that level. *"— Bob Lee, head of powertrain coordination, Fiat Chrysler*[21]
- "…it appears that substantial societal benefits may be associated with capitalizing on the inherent high octane rating of ethanol in future higher octane number ethanol-gasoline blends." *– Ford Motor Company*[22]
- "…a mid-level ethanol-gasoline blend (greater than E20 and less than E40) appears to be attractive as a long-term future fuel for automotive engines in the U.S." *– AVL Powertrain Engineering and Ford Motor Company*[23]
- "There has been a big push in the industry for higher octane ratings…and it is proven that you can gain several percentage points in improvement of fuel economy if you have higher octane rating fuel available." *– Dean Tomazic, executive vice president and chief technology officer, FEV North America*[24]
- "One of the advantages without costing more on the vehicle side is to look at upping the minimum octane rating on the fuel and allowing OEMs to optimize compression ratio in engines, which would give us an efficiency benefit without actually adding cost to the whole system. …the addition of ethanol blends would be a good improvement to actually drive efficiency." *– David McShane, vice president of business development, Ricardo, Inc.*[25]

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[19] Truett, Richard. Automotive News. April 13, 2016. *Powertrain executives press for higher octane gasoline to help meet mpg, CO2 rules.*
[20] *Id*.
[21] *Id*.
[22] J.E. Anderson et al. July 2012. *High octane number ethanol–gasoline blends: Quantifying the potential benefits in the United States*. Fuel, Volume 97: Pages 585–594.
[23] Stein, R., Anderson, J., and Wallington, T., "An Overview of the Effects of Ethanol-Gasoline Blends on SI Engine Performance, Fuel Efficiency, and Emissions," *SAE Int. J. Engines* 6(1):470-487, 2013, doi:10.4271/2013-01-1635.
[24] Detroit Public Television. Aug. 21, 2016. *Autoline with John McElroy*. Episode #2026 ("Deep Freeze for the ICE?")
[25] *Id*.

- "If we could optimize engines only to operate on premium fuel, then life would be a lot easier for us and we'd be able to see much more of a benefit in terms of efficiency. …if ethanol was widely available then our life as developers of gasoline engines would become easier." – *Paul Whitaker, powertrain & technical director, AVL Powertrain Engineering*[26]
- "(High octane fuels), specifically mid-level ethanol blends (E25-E40), could offer significant benefits for the United States. These benefits include an improvement in vehicle fuel efficiency in vehicles designed and dedicated to use the increased octane." – *Oak Ridge National Laboratory, Argonne National Laboratory, and National Renewable Energy Laboratory*[27]
- "Improvements to engine efficiency made possible with ethanol fuels may be a synergistic approach to simultaneous compliance with CAFE and RFS II. This presents a unique and infrequent opportunity to dramatically alter internal combustion engine operation by improving fuel properties." – *Oak Ridge National Laboratory*[28]
- "Several technologies beyond those considered by EPA and NHTSA (National Highway Traffic Safety Administration) might provide additional fuel consumption reductions for spark ignition engines or provide alternative approaches at possibly lower costs for achieving reductions in fuel consumption by 2025. These technologies include…higher compression ratio with higher octane regular grade gasoline…" – *National Research Council*[29]
- "[T]ransitioning the fleet to higher-octane gasoline would result in significant economic and environmental benefits through reduced gasoline consumption." – *Massachusetts Institute of Technology*[30]

As they begin a new rulemaking to revise 2022-2025 CAFE/GHG standards, EPA and NHTSA should "heed the call" for HOLC fuels.

EPA and NHTSA should use the new rulemaking process to establish the roadmap to broad commercial introduction of HOLC fuels in advanced IC engines beginning in 2023 or sooner. Consensus is building around the need for HOLC fuels to enable greater engine efficiency and reduced emissions. Automotive engineers and executives, government scientists, expert panels, and university researchers have called for a higher minimum octane rating for future fuels. These experts have clearly demonstrated that HOLC fuels would enable HCR engines and other advanced IC engine technologies, which in turn would improve engine efficiency and reduce emissions.

However, without regulatory intervention or guidance, there is no guarantee that HOLC fuels will indeed be broadly available in the marketplace to enable advanced IC engine technologies to proliferate. Many of the stakeholders calling for the introduction of HOLC fuels have also called upon EPA to use its regulatory authority to establish a minimum octane rating for future gasoline. The Alliance of Automobile Manufacturers made such a request during the Tier 3 rulemaking.

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[26] *Id*.
[27] Oak Ridge National Laboratory. July 2016. *Summary of High-Octane, Mid-Level Ethanol Blends Study*. ORNL/TM-2016/42.
[28] Derek A. Splitter and James P. Szybist (2014) "Experimental Investigation of Spark-Ignited Combustion with High-Octane Biofuels and EGR. 2. Fuel and EGR Effects on Knock-Limited Load and Speed" *Energy & Fuels*.
[29] NRC. June 2015, at 2-84.
[30] R.L. Speth et al. Economic and environmental benefits of higher-octane gasoline. *Environ Sci Technol.* 2014 Jun 17;48(12):6561-8. doi: 10.1021/es405557p

Meanwhile, the NRC recommended that "EPA and NHTSA should investigate the overall well-to-wheels CAFE and GHG effectiveness of increasing the minimum octane level and, if it is effective, *determine how to implement an increase in the minimum octane level* so that manufacturers would broadly offer engines with significantly increased compression ratios for further reductions in fuel consumption."[31] Similarly, the attached Ricardo report states, "It is clear that implementing a high octane fuel standard would provide opportunity for increased engine efficiency and hence reduced greenhouse gases."

EPA clearly has the authority to regulate gasoline octane ratings, as octane has direct implications for emissions of CO_2 and other pollutants. EPA has acknowledged this authority, stating that "CAA 211(c) provides EPA with broad and general authority to regulate fuels and fuel additives; this authority could be used to…'control'…the octane level of gasoline."[32] While EPA has acknowledged it has the authority to regulate octane levels, the agency has suggested that the "time frame to complete all the steps [to implement octane regulations] could be ~10 years" and that "[e]ven if the rule were initiated now it would likely be a number of years before it could be implemented."[33] Chris Grundler, director of EPA's office of transportation and air quality, recently confirmed that EPA is not likely to consider regulating gasoline octane levels before 2025.[34]

Although RFA believes adoption of new regulations governing octane levels could be done relatively quickly (certainly more quickly than 10 years), EPA maintains that an extremely long lead time is required. Similarly, automakers would require a long planning horizon to adjust engineering and design activities in response to impending changes to fuel composition. Given the long lead time involved in effectuating changes to EPA regulations and automaker engineering and design plans, the agencies should indicate ***now*** the future direction of potential octane regulation and HOLC fuel introduction. That is, EPA and NHTSA should use the new rulemaking process as an opportunity to respond to stakeholder outcry for HOLC fuels, including a regulatory roadmap that the agencies, automakers and other stakeholders can follow to guarantee gasoline in 2025 and beyond has the necessary minimum octane rating to enable proliferation of advanced IC engine technologies that improve fuel efficiency and slash GHG emissions.

Thank you for the opportunity to comment and I look forward to working with you to find opportunities for high octane fuels.

Sincerely,

Bob Dinneen

Bob Dinneen
President & CEO

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[31] NRC. June 2015, at 2-86.
[32] P. Machiele, EPA. May 5, 2015. "EPA's Regulatory Authority to Address Octane." Presentation to EPA Mobile Sources Technical Review Subcommittee.
[33] *Id*.
[34] Society of Automotive Engineers. Aug. 3, 2016. *GM, Honda execs agree: Higher octane gas needed to optimize ICE efficiency.* http://articles.sae.org/14940/