ENVIRONMENTAL PROTECTION AGENCY 40 CFR Parts 86 and 600 [EPA–HQ–OAR–2021–0208; FRL 8469–02– OAR] RIN 2060–AV13 Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards

Notice of Proposed Rulemaking on
Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Standards Rule

Comments Submitted by the
Clean Fuels Development Coalition

September 27, 2021

Introduction and Executive Summary. For nearly 40 years, the Clean Fuels Development Coalition (CFDC) has promoted the development and use of domestically produced, cleaner-burning transportation fuels containing renewable, high octane/low carbon (HOLC) fuel ethanol additives that offer unique and substantial benefits to the nation's climate, public health/environmental justice, economic, energy security, and agricultural priorities.

Over the past 15 years the CFDC has made dozens of submissions and comments to the U.S. Environmental Protection Agency (EPA) concerning the value of HOLC fuels as replacements for carbon-intensive, carcinogenic, and costly gasoline aromatics. Without exception, the EPA has rejected these comments as "outside the scope" despite having requested comments on how ethanol's superior octane properties can be used to meet the objectives of various EPA rulemakings such as the Tier 3 Rule and more recently, the SAFE Rule that is currently being revised. In addition to providing information on how HOLC Fuels can increase vehicle efficiency, we showed how high octane ethanol can protect public health by cost effectively replacing gasoline aromatics. Frequently, it seemed to us that two different sets of authors had been involved in the NPRMs and final rules.

CFDC had hoped this rule would turn out differently. Immediately upon taking office, President Biden singled out the SAFE-2 Rule as one of his Administration's top priorities in the fight against climate change and promotion of environmental justice. The U.S. gasoline market is the world's largest. Americans consume more than half of all the gasoline burned on earth. Gasoline is the primary source of U.S. carbon emissions and the most harmful urban toxics emissions. Consequently, CFDC assumed that President Biden's EPA would recognize the opportunity the fuel economy rule presented and pay special attention to decarbonizing U.S. gasoline by substantially reducing its most carbon-intensive components: the carcinogenic aromatics petroleum refiners use to increase gasoline octane ratings. In fact, EPA is legally required to take such action by a mandatory provision first enacted in Section 202(l) of the 1990 Clean Air Act Amendments (CAAA).

CFDC was greatly disappointed when EPA in its proposed rule did not even request comments on how the US light-duty fleet's fuel efficiency could be improved and its carbon emissions could be reduced. We met with EPA staff, provided preliminary information, and requested that at a minimum EPA solicit comments on octane, just as the agency did in formulating the 2018 Final SAFE Rule. While EPA took no action on octane in that rule, as we testified in the August 2021 public hearing, we do not understand how the agency could acknowledge a potential role for high octane fuels then, but not now.

EPA Invokes Section 202(a) and "Places Greater Weight on Reducing Emissions that Endanger Public Health and Welfare." After years of disappointment, CFDC had feared the flawed analyses and anti-ethanol biases displayed by EPA's Office of Transportation and Air

Quality (OTAQ) would once again prevent EPA's acknowledgment that HOLC fuels are a superior substitute for gasoline aromatics. However, the NPRM contained an obscure statement on p. 43729 in the Federal Register that rekindled CFDC's hope that Administrator Regan will honor his pledge to "be driven by science and the rule of law" and direct OTAQ to comply with mandatory language in section 202(l) of the Clean Air Act that requires EPA to reduce gasoline aromatics to the "greatest achievable extent".

Specifically, the NPRM announced that EPA is "revising decisions made in the SAFE final rule in accordance with Supreme Court decisions" based upon "statutory purposes…in particular of section 202(a)". EPA further explained that "it is more appropriate to place greater weight on the magnitude and benefits of reducing emissions that endanger public health and welfare…".

Section 202(a)(1) of the CAA states that "The Administrator shall by regulation prescribe (and from time to time revise) * * * standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles or new motor vehicle engines, which in the Administrator's judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare."

Before the Administrator may issue standards addressing emissions of greenhouse gases from new motor vehicles or engines under section 202(a), the Administrator must satisfy a two-step test. First, the Administrator must decide whether the air pollution under consideration may reasonably be anticipated to endanger public health or welfare. Second, the Administrator must decide whether emissions of an air pollutant from new motor vehicles or engines cause or contribute to this air pollution. If the Administrator answers both questions in the affirmative, he/she must issue standards under section 202(a). *Massachusetts* v. *EPA,* 549 U.S. at 533.

However, Congress Made Its Own Endangerment Finding for Gasoline Aromatics When It Enacted Section 202(l).

Section 202(l) is a unique provision of the Clean Air Act in that it constitutes a Congressional endangerment finding—there is no need to wait for EPA to make one under section 202(a) because the MSAT provisions of CAA section 202 are not like most EPA provisions. including the climate endangerment sections, which ask for or authorize studies of possible harm as a necessary predicate to action.

According to C. Boyden Gray, Counsel to President George H.W. Bush during the CAAA deliberations, "The MSAT provisions by contrast constitute a legislative finding of harm and command a correction--- an elimination of air toxics to the extent technology permits with attention to cost factors. There is no need to find harm---that having already been established by Congress."

9th Circuit Ruled EPA Can't Selectively Choose Which Parts of a Statute to Enforce.

In the *United States National Bank of Oregon v. Independent Insurance Agents of America, Inc.* [508 U.S. 439---] decided in 1993, the DC Circuit found that the "court must not be guided by a single sentence of a statute but must look to the provisions of the whole law and to its object and policy." The court ruled that EPA could not uncouple one sentence of a section from the rest of the section in order to expand its authority beyond the aims and limits of the section as a whole.

Consequently, CFDC believes if EPA is going to justify its proposed revisions to the 2020 ruling upon the statutory objectives of section 202(a), it is also bound by the statutory requirements of section 202(l). As we noted above, this requires EPA/OTAQ to recognize that Congress has made a legislative endangerment finding as technologies present themselves.

U.S.C. 7545 Guidelines Support CFDC Position on "Substantially Similar" and Legacy Vehicles. In the 1995 API v. EPA ROR ruling, the DC Circuit Court cited 42 U.S.C. section 7545, which authorizes EPA to control or prohibit the manufacture or sale of fuels or fuel additives if the agency finds that such fuels or fuel additives cause or contribute to air pollution or impair the performance of emission Control devices. However, before it can prohibit a fuel or fuel additive, EPA must do several things, including publish a finding that such prohibition will not cause the use of any other fuel or fuel additive which will produce emissions to endanger the public health to the same or greater degree than use of the fuel or additive to be prohibited.

CFDC believes that EPA is in violation of this legal principle because it has unlawfully blocked the use of higher ethanol blends as octane substitutes for highly toxic gasoline aromatics in defiance of the aforementioned Congressional endangerment finding. EPA's prohibition against the use of HOLC fuels such as E30 has led to the continued or expanded use of aromatics which Congress has directed EPA to reduce to the greatest achievable extent in section 202(l). EPA has known for many years that gasoline aromatics are the predominant source of highly toxic SOA-bound PAHs that its defective MOVES Model is unable to predict. Furthermore, PAHs formed in the presence of SOAs have a synergetic effect in which PN (particle number) concentrations are amplified by a factor of 100 or greater, and the particles are insulated and preserved, enabling long-range transport. EPA's failure to come clean on its models' deficiencies—and the grave consequences that has for public health—borders on professional malpractice.

Fuel Additive "Already in Commerce". In *American Methyl Corp. v. EPA* [749 F.2d at 943-836], the court determined that EPA must comply with this section to ban or control a fuel additive that is already in commerce. The Court wrote: "*This suggests that EPA's power to control a…fuel additive already in commerce is controlled by section 7545(c) and that EPA does not have an independent source of authority to control or prohibit nonrenewable oxygenates springing from the considerations enumerated in section 7545(k)(1).*"

EPA Has Signaled its Intention to Avoid 202(l) Compliance by Claiming Excessive "Lead Times" for E30 and HOLC Fuels to be used in Standard Vehicles.

In the NPRM [p. 43279], EPA states the following:
"We are revising decisions made in the SAFE final rule in accordance with Supreme Court decisions affirming that agencies are free to reconsider and revise their prior decisions where they provide a reasonable explanation for their revised decisions. In this rulemaking, the agency is changing its 2020 position and restoring its previous approach by proposing to find, in light of the statutory purposes of the Clean Air Act and in particular of section 202(a), that it is more appropriate to place greater weight on the magnitude and benefits of reducing emissions that endanger public health and welfare, while continuing to consider compliance costs, lead time and other relevant factors."

CFDC challenges EPA's historical position as set forth in its 2018 Preliminary Regulatory Impact Analysis, where it gravely distorted the facts at pp. 256, 257:

> *" 6.3.2.2.17.3 Potential of higher octane fuels. Automakers and advocacy groups have expressed support for increases to fuel octane levels for the US market and are actively participating in Department of Energy research programs on the potential of higher octane fuel usage. Some positions for potential future octane levels include advocacy for today's premium grade becoming the base grade of fuel available, which could enable low cost design changes that would improve fuel economy and CO_2. Challenges associated with this approach include the increased fuel cost to consumers who drive vehicles designed for current regular octane grade fuel that would not benefit from the use of the higher cost higher octane fuel. The net costs for a shift to higher octane fuel would persist well into*

the future. Net benefits for the transition would not be achieved until current regular octane fuel is not available in the North American market, and manufacturers then redesign all engines to operate the higher octane fuel, and then after those vehicles have been in production a sufficient number of model years to largely replace the current on-road vehicle fleet. The transition to net positive benefits could take many years."
(Emphasis supplied)

EPA's Assertion on High Octane Fuels, and specifically the use of E30 Clean Octane Fuels in Legacy Vehicles Is Insupportable on Technical, Commercial, and Legal Grounds.

Over the years, CFDC provided detailed information on the benefits from transitioning to a nationwide E30 Clean Octane standard. We rebutted EPA's assertions in its 2018 Preliminary RIA, which misstated the facts as noted above. EPA did not respond to CFDC's arguments, once again claiming them to be "outside the scope" even though it had requested comment on that very issue.

In fact, the opposite is true. E30 can be safely used in, and benefit, standard (non-flex fuel) vehicles on the road today.[1] Light-duty vehicles (LDVs) would operate more efficiently and with more power, the most dangerous tailpipe emissions would be substantially reduced, and consumers would save billions of dollars by paying less for a higher quality fuel. For example, between 2008 and 2014 U.S. gasoline prices remained well above the $3 per gallon mark. Without ethanol's contribution to the finished gasoline pool, Merrill Lynch estimated gasoline prices could have been 50¢ per gallon higher. The Department of Energy also concluded that ethanol reduces retail gasoline prices and reduces crude oil demand, which makes crude oil cheaper for the entire world.[2] Other studies show using E30 would save consumers 20 cents per gallon. Consequently, this language should be deleted from the final SAFE Rule RIA.[3]

A. Ethanol Blends' Unique "Time to Market" Strengths Are Critical to Success of the Biden Carbon Reduction Plan and its Role in Environmental Justice.

Even in a best-case scenario for transport sector electrification, literally TRILLIONS of gasoline-powered miles will be driven by Americans over the next several decades. In 2021, approximately 270 million light-duty vehicles (LDVs) will consume 120 billion gallons of gasoline containing 25% aromatics. U.S. LDVs are typically in service for 12 or more years. Every year, billions of gallons of aromatics will be emitted in the form of millions of tons of ultrafine particles (UFPs), secondary organic aerosol (SOA)-bound PAHs and other potent toxics, and black carbon (BC). Americans—especially infants, children, and other vulnerable citizens—will be exposed to billions of invisible nanoparticles on a 24/7 basis with no means of escape.

Unfortunately, unless EPA acts quickly, things will get worse. As gasoline direct injection (GDI) engines dominate the US fleet, the most dangerous emissions will get increase exponentially. GDI engines increase particle number (PN) and UFP-bound toxic emissions by a factor of 100 or more. Their associated, highly potent PAH toxics cause harm in the parts-per-trillion

[1] Id. Effective January 1, 2017, EPA adopted E10 (10% ethanol/90% gasoline) blends as the nation's "certification fuel". This means that ethanol is "substantially similar" under Section 211(f) of the Clean Air Act. EPA should correct its misinterpretation of that provision, and remove its regulatory barriers so that E30 high-octane fuels may be legally used in non-flex fuel (standard) vehicles.

[2] Impact of Ethanol Blending on U.S. Gasoline Prices, National Renewable Energy Laboratory, NREL/SR-670-44517, 2008.

[3] The Economics of Eco-Performance Fuel, Air Improvement Resource, Inc., DeFour Group LLC, Transportation Fuels Consulting Inc., April 22, 2014

according to experts like Dr. Frederica Perera (Columbia University) and former NIEHS Director Linda Birnbaum.

Again, in the context of information that has already been submitted to EPA, a recent letter from the Alliance of Automotive Innovation (AAI) to former Senate Majority Leader Tom Daschle, chair of the High Octane Low Carbon (HOLC) Alliance, provides new information that we believe has been ignored. AAI's membership includes the manufacturers of 99% of all new LDVs sold in the U.S. There can be no more credible source of information about vehicle performance, the importance of fuel quality and octane, and the connection between emissions and human health. AAI stated high octane low carbon fuels can provide benefits "*in new and existing internal combustion engines and therefore should be encouraged … as soon as possible".*

This is not a new position for automakers—they have always recognized the importance of linking fuel quality to vehicle performance and emissions. In October 2011, the automakers' alliance wrote then-EPA Administrator Lisa Jackson: *"EPA has long recognized that vehicle technology and the fuel employed with that technology need to work in concert as an integrated 'system' so that vehicles can operate efficiently and achieve the lowest technologically and economically feasible emissions targets."*

They concluded the letter by saying: *"Furthermore, to help achieve future requirements for the reduction of greenhouse gas emissions, we also recommend increasing the minimum market gasoline octane rating, commensurate with increased use of ethanol. Adding ethanol to gasoline increases its octane rating. To attain necessary octane levels, it is important that refiners not be permitted to reduce base gasoline octane ratings in light of the additional octane contribution from higher ethanol."* This again is further justification for our rejection of any suggestion by EPA that octane is a "new issue", or that octane is beyond the jurisdiction of EPA regulation.

Ten years ago, the AAM letter was written as EPA was considering its Tier 3 sulfur reduction rules. Despite requesting comment on how it could encourage widespread use of E30 (30% ethanol) high octane blends in the Tier 3 NPRM, EPA ultimately rejected CFDC's comments as being "outside the scope". Instead of complying with Congressional directives, for the past ten years EPA has covertly encouraged refiners to increase their use of aromatics and unlawfully blocked the use of HOLC Fuels.

Please see Attachment B for Relevant Automaker Documentation

B. Background on the Potential and Appropriateness of High Octane Low Carbon Fuels.

On the first day of his new Administration, President Biden identified correction of the Trump SAFE rule as a top priority for new EPA Administrator Regan. President Biden announced that the EPA would expeditiously release a new fuel efficiency rule, the primary goal of which would be to reduce transportation sector carbon emissions 50% by the year 2030. President Biden also emphasized that environmental justice issues would receive paramount attention as his agencies develop plans to reduce transportation sector carbon emissions.

In its NPRM EPA stated that "*in addition to substantially reducing GHG emissions, a longer-term rulemaking could also address criteria pollutant and air toxics emissions from the new light-duty vehicle fleet".*

CFDC and others worked in good faith with EPA officials in recent months to develop a near term carbon mitigation plan that would be consistent with the President's 2030 goals as well as his emphasis on promoting environmental justice. CFDC pointed out to EPA that trillions of miles will be driven on gasoline in the United States for the next several decades as the transition to an electrified transportation sector occurs. This means that the 25% aromatics

fraction of US gasoline which petroleum refiners use to boost gasoline octane levels will emit literally billions of highly toxic nanoparticles that will seriously damage Americans' health for years to come.

Oil interests prefer to use crude oil-derived, benzene-based aromatics even though Congress has required EPA to replace them with HOLC Fuel blends. And even though gasoline aromatics are the primary source of urban carbon emissions (especially potent Short-Lived Climate Pollutants such as black carbon) and highly pathogenic toxics such as SOA-bound PAHs, the career bureaucrats at OTAQ inexplicably block the use of HOLC Fuels to displace gasoline aromatics.

Congress knew that gasoline aromatics were a predominant source of both carbon and toxics emissions when it banned leaded gasoline in the 1990 Clean Air Act amendments. At that time Congress was determined to avoid the horrendous social and economic costs imposed on America and the world by the poisonous leaded gasoline. After months of exhaustive debates, Congress overwhelmingly approved mandatory language that requires EPA to reduce gasoline aromatics to the greatest achievable extent as technologies present themselves. Despite repeated directives over the years OTAQ continues to stonewall and erect unlawful barriers to aromatics' Congressionally-preferred replacement—HOLC Fuel blends made with ethanol.

C. Critical to Understand Importance of Legal Authorities Created by the 1990 Clean Air Act Amendments. CFDC was actively involved in the 1990 CAAA floor debates and the passage of the Daschle – Dole "clean octane" provision. which catalyzed the Title II provisions including sections 202(a) and 202(l). Many view this as "miraculous" because the Senate passed that controversial—and hugely consequential—amendment by the lopsided margin of 69-30, unimaginable in today's gridlocked Congress. A primary catalyst of the Senate floor vote was EPA's 1987 proposal to approve a new certification fuel with 45% aromatics, which the agency said was necessary to compensate for the ban on leaded gasoline. Oil interests pulled out all the stops to defeat the amendment (which would impose a 25% aromatics cap and require periodic reductions as "technologies presented themselves"). The debate raged for months, with the oil industry spending millions of dollars in national media.

Ambassador C. Boyden Gray—who was White House Counsel to President George H. W. Bush during the 1990 CAAA debates—has noted that the Section 202(l) Mobile Source Air Toxics (MSAT) provision is unique in that it represents a "Congressional endangerment finding" which "pinpointed gasoline aromatics as a major human health threat that demands correction.

The *Congressional Record* debates prove beyond a shadow of a doubt that Congress was determined to prevent a repeat of the tragic human and economic costs the nation suffered under decades of lead poisoning (which Henry Ford had warned against in 1921 when he pushed for E30 high octane fuels). The Environmental and Energy Study Institute has since stated "Aromatics Are the New Lead."

Behind the scenes, OTAQ officials opposed the 1990 MSAT provision—we believe they resented having Congress tell them what to do about gasoline composition. Once it passed, they refused to enforce it and years went by with little or no action. When Senators Daschle and Lugar introduced the first Renewable Fuel Standard (RFS) bill, OTAQ also covertly opposed it. When RFS1 finally became law, some within OTAQ supported oil industry efforts to have Section 202(l) repealed during the 2005 EPACT conference negotiations. However, Congress did not forget the enormous threat aromatics posed to public health, and it doubled down, requiring EPA to promulgate the 2007 MSAT Rule eighteen months later.

In a slide deck presented on January 28, 2013, OTAQ's director of fuels policy contended that "octane" has "historically had no effect" on air toxics. *"CAA 211(c)(1)(A) – Cause or Contribute* •

EPA endangerment finding and regulation of GHG emissions from motor vehicles raises the issue of considering fuel controls that might reduce GHG emissions – Octane historically has had little or no effect on criteria pollutants or air toxics but could affect GHG emissions." [Slide 13]

CFDC and others asked EPA how a veteran OTAQ fuels expert could make such an outrageous statement, but received no satisfaction until two years later, when in May 2015 a revised version deleted this erroneous assertion:

May 2015: "CAA 211(c)(1)(A) – Cause or Contribute • First requires an EPA finding that emissions from a F/FA causes or contributes to air pollution that endangers public health and welfare – To date we have not done so for GHG under 211(c) - fuels – Only for motor vehicles under 202(a)."

We wonder why this statement was stricken from OTAQ presentations. Apparently, someone realized that it was indefensible yet took no affirmative action to correct the record.

One likely answer can be found in Senator Daschle's letter to Acting Office of Air and Radiation Director Joe Goffman, footnote #5, which referenced the Baldauf et al. "Ultrafine Particle Metrics and Research Considerations: Review of the 2015 UFP Workshop" peer-reviewed report published in the *International Journal of Environmental Research and Public Health.* Here EPA's own scientists were finally forced to admit that their atmospheric models were hopelessly defective and that an entirely new paradigm must be developed for the synergetic relationship between PAHs and SOAs generated by the combustion of gasoline aromatics.

This OTAQ "smoking gun" was clearly explained by Reid Detchon, Senior Advisor for Climate Solutions at the U.N. Foundation, at the February 2020 Clean Fuels Forum in Washington, DC.

As noted in a July 9, 2021, *Inside EPA* article, featuring an interview with former Senator Daschle, Stuart Parker wrote "*The agency has long studied octane issues in relation to the vehicle rules. For example, EPA fuel programs chief Paul Machiele told a 2015 event that the agency likely has authority to require higher octane levels but that the issue is "complicated" and that it would not occur until after MY25, the original end date of the Obama rules.*"

It is time EPA answered a serious question that lies at the heart of this rulemaking: Why is OTAQ so insistent that the gasoline aromatics issue cannot be taken up until 2025 and cannot be resolved until 2035 at the earliest—45 years after Congress directed EPA to urgently address the problem and five years after President Biden wants to see 50% reductions in transport sector carbon emissions?

CFDC's confusion is further compounded by the fact former OTAQ Director Chris Grundler has confirmed EPA's ongoing legal obligations under Section 202(l). Extensive correspondence between then-OTAQ Director Grundler (who was shortly thereafter transferred to EPA's Climate Office without explanation after 30+ years at OTAQ) and Doug Sombke, South Dakota Farmers Union president, reinforces CFDC's concerns about OTAQ's failure to comply with Congressional directives.

Notably, in his March 15, 2018, letter to Sombke, Grundler acknowledged the importance of light-duty vehicle fine particle and associated emissions:

> *"We agree that ambient levels of PM are a result of secondarily formed particles in addition to direct PM emissions, and that light-duty gasoline vehicles are important sources of the precursors to PM formation."*[4]

As noted previously, EPA has asked for comment on "*if and how EPA could support the production and use of higher octane gasoline consistent with Title II of the Clean Air Act."* In the same letter, Grundler responded to Sombke's question about why EPA has not enforced the MSAT provision in Title II:

> *"With respect to Clean Air Act section 202(l), the EPA has acted twice under this specific authority, including the February 2007 rule that addresses the aromatic content of gasoline through required limits on benzene (72 FR 8428, February 26, 2007). … While the EPA continues to look for opportunities to further reduce air toxics, as required by Clean Air Act section 202(l), we must also consider technological feasibility and costs, among other factors."*[5]

In his April 9, 2018, response, Sombke pointed out to Grundler that EPA used obsolete and fallacious factual predicates in its 2007 MSAT CBA to conclude that it would not be cost effective to substitute E30 "clean octane" fuels for BTEX/aromatic hydrocarbons to replace lost octane.

EPA's 2007 MSAT Final Rule was an uninspired distortion of science and market rationale. However, there was one very important positive aspect directly germane to this rule in that EPA admitted "…there may be compelling reasons to consider aromatics control in the future, especially regarding reduction in secondary PM2.5 emissions, to the extent that evidence supports a role for secondary PM2.5 formation". [*Federal Register/Vol. 72, No. 27/Monday, Feb. 26, 2007/Rules and Regulations, p. 8479.*]

D. EPA Has Failed Time and Again to Control Gasoline Aromatics with "Clean Octane".

Over the past ten years CFDC and its affiliated organizations have communicated with OTAQ and EPA dozens of times about to clean octane issues. In every case EPA has refused to recognize the best available science and the rule of law as it pertains to the displacement of gasoline aromatics by high octane ethanol. Below is a partial list of the EPA rulemakings and other official communications between it and CFDC that clearly prove that the "clean octane" issue is not "new" and should be squarely addressed in this final rulemaking.

- 2005 EPACT and 2007 Final MSAT Rule.
- 2011 EPA report to Congress.
- 2011 GHG rule.
- 2013 PM rule.
- 2013 CARB Short-Lived Climate Pollutant Rule (critical importance of black carbon).
- EFC/UAI letter to EPA Administrator Gina McCarthy regarding defective MOVES Model.
- 2014 Tier 3 Rule and EPA's discredited factual predicates.

[4] *See letter from* Christopher Grundler, Director, OTAQ to Doug Sombke (March 15, 2018)

[5] Id.

- 2014 EFC and NIEHS toxics workshop.
- 2015 EPA UFP workshop.
- 2016 greenhouse gas rule mid-term evaluation review.
- 2017 REGS rule and E15 RVP waiver.
- 2018 Trump SAFE Rule.
- 2020 UN Foundation clean fuels forum.
- 2021 HOLCA SAFE-2 rule interactions (US LDV fuel efficiency declines prove 87 AKI gasoline insufficient, contrary to EPA assertions).

E. Comments Specific to NPRM Section 8.3 on Environmental Justice Concerns.

In Section 8.3 of the NPRM, EPA noted the importance of environmental justice considerations, including President Biden's February 1, 2021, Executive Order 14008 (86 FR 7619), which directed federal agencies to "develop programs, policies, and activities to address the disproportionately high and adverse human health, environmental, climate-related, and other cumulative impacts on disadvantaged communities, as well as the accompanying economic challenges of such impacts".

There are few environmental justice challenges that demand immediate attention more than the adverse impact pre-term births (PTBs) have on communities of color. CFDC believes that EPA's models' failure to account for gasoline aromatics' substantial contribution to the United States' terrible PTB performance demands attention in this final rule as part of EPA's revised section 202(a) emphasis on the public health and welfare.

http://www.nytimes.com/2012/05/03/health/us-lags-in-global-measure-of-preterm-births.html

Best Available Science Directly Connects Gasoline Aromatics' PAH Emissions to PTBs and IQ Loss.
The 2018 Perera et al. study on PM and PAHs established a causal link to numerous adverse health endpoints for children, including preterm births. That study reviewed 205 peer reviewed studies over a course of 15 years and concluded that significant economic benefits could be achieved by reducing fossil fuel related pollutants including gasoline exhaust emissions. A recent EPA study estimates economic benefits that can be achieved by reducing fine particle matter by 10% in urban areas with an estimated benefits range of $339 million to $1 billion.

The World Health Organization has given the United States a very bad report card with regard to global comparisons of premature births. A New York Times article noted that the rate of preterm births in the United States has risen 30% since 1981. The US preterm birth rate of 12% is in the same range as Kenya, Turkey, Thailand, East Timor, and Honduras and means that one in 9 births in the U.S. is early PTB increases the risk of both mortalities and long-term morbidities in infants.

In a study of immigrants from Mexico experts found that the longer a woman lived in the U.S. the greater her chances of giving birth prematurely. Even after controlling for risk factors like age, poverty, smoking, obesity and diabetes experts really don't have an explanation. However,

experts were quoted as saying that “whatever it is it's not genetic. It is something they acquire here.”

Policy Implications

EPA economists recently published a report that attempted to do a preliminary benefit – cost analysis of reducing PTBs of a 10% reduction in PM and related toxics emissions. It concluded that such a reduction could yield annual savings of $1 billion.

To date, EPA has not included PTB in any BCA. However, at some point EPA is expected to update its most recent integrated science assessment (ISA) for PM which was last published in 2009. Experts believe that because of emerging new science this ISA will be changed to causal or likely causal meaning that EPA will be required to conduct a BCA for PBT economic costs imposed by PM and its associated toxics.

In October of 2001, the California Office of Health and Environmental Assessment (OEHHA) explained why the state had passed the Children's Environmental Health Protection Act in October 2001: “…this evaluation of POM as a toxic air contaminant causing health effects in infants and children was primarily based on the known health effects of PAHs. Prenatal exposure to PAHs results in serious or irreversible effects in the fetus. PAH are transplacental carcinogens, and the effect of fetal exposure is irreversible. There is greater exposure of children to environmental PAH compared to adults. Children's daily doses of PAH were generally higher from all routes of exposure than those of adults in the same household.“

The OEHHA concluded: “In view of this range of evidence for differential sensitivity of the fetus, infants and children to health effects induced to POM, OEHHA has placed PAH in Tier One of the priority list.”

Consequently, it is extremely significant that EPA has recently admitted that its models fail to predict substantial quantities of SOA-bound PAHs in the urban environment (see 2015 EPA UFP Workshop). This means that the benefit cost estimates presented here are significantly understated because the models upon which they rely are vastly underestimating the amount of PM and associated toxics that urban children and pregnant women cannot escape. If EPA were to update and correct its modeling, the benefit cost of reducing gasoline aromatics for not only PTB but other childhood adverse health conditions would be far greater than the billion dollars per year estimated here.

The authors note that the seriousness of the relationship between these toxic pollutants and PTB is especially concerning because by nature of the common presence of these pollutants, exposure is effectively unavoidable. Similarly, a disproportionate burden of exposure may be placed on individuals and disadvantaged communities, who are already subjected to multiple social economic and health iniquities.

Clean Air Act regulations promulgated to limit or reduce exposure to criteria pollutants including mobile source air toxics typically require benefit cost analyses. Economically significant regulations—those with an annual effect on the economy of $100 million or more—are required by a series of executive orders dating back to 1981. Consequently, this novel methodology, which was developed by EPA policy staffers at the National Center for Environmental Economics, may offer guidance for EPA as it considers reduction of gasoline aromatics under section 202(l).

F. This Rule Demands an Accurate Cost Benefit Analysis on Reducing High Carbon, Toxic Octane Additives

EPA Has Relied on Five Major Flaws in its Policies to Improve Gasoline Quality

1. EPA claims its regulatory policies have been successful at reducing U.S. transportation sector's most prevalent and harmful source of carbon and toxics emissions. **Fact:** The opposite is true, as the agency has focused on diesel while gasoline direct injection (GDI) engines increase particulates and their toxics by orders of magnitude unless gasoline aromatics are reduced.
2. EPA has stated decarbonizing gasoline's "octane" is a "new issue" that must be addressed "outside the scope" of this rule. **Fact:** Ethanol's "clean octane" has been central to every major EPA transportation sector-related rulemaking since Congress banned the use of leaded gasoline in the 1990 CAAA.
3. EPA has stated high octane low carbon (HOLC) ethanol blends such as E30 are unsuitable substitutes for carcinogenic aromatics that petroleum refiners synthesize from crude oil and use to increase market gasoline octane ratings. **Fact:** HOLC fuel blends are superior in terms of octane and vehicle performance, substantially reduce carbon and the most dangerous toxics emissions, and cost less than the gasoline aromatics they would replace.
4: OTAQ's regulatory schemes as they relate to gasoline emissions seem to assume that ground level ozone poses a greater threat to human health than fine/ultrafine particulate matter (PM) and its associated toxics. **Fact:** Fine/Ultrafine PM accounts for 90% of the human health threat, ozone less than 10% (2011 EPA Report to Congress).
5: EPA's defective atmospheric models underestimate the degree to which gasoline aromatics produce fine/ultrafine PM, and incorrectly assume that their associated toxics dissipate after 300 meters. **Fact**: Gasoline aromatics are the predominant source of urban fine/ultrafine PM, and their potent toxics are transported long distances, where they penetrate into the lungs, brains, and organs of infants, children, and other vulnerable Americans.

CFDC has previously noted that in its 2016 TAR, EPA conceded that:

> *"It is important to quantify the co-pollutant-related health and environmental impacts associated with the GHG standards because a failure to adequately consider these ancillary impacts could lead to an incorrect assessment of the standards' cost and benefits. Moreover, the health and other impacts of exposure to criteria air pollutant and airborne toxics tend to occur in the near term, while most effects from reduced climate change are likely to occur only over a time frame of several decades or longer."*[6]

Unfortunately, when it comes to transportation fuels-related policy, EPA does not follow its own advice—it consistently fails to conduct the necessary cost-benefit analyses as required by law.

> *"However, there are several health benefit categories that EPA was unable to quantify due to limitations associated with using benefits-per-ton estimates, several of which could be substantial. For example, we have not quantified a number of known or suspected health benefits linked to reduction in ozone and other criteria pollutants, as well as health benefits linked to reductions in air toxics."*[7]

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[6] *EPA Midterm Evaluation of Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards for Model Years 2022-2025, Draft Technical Assessment Report (2016)*, Draft TAR, available at https://www3.epa.gov/otaq/climate/documents/mte420d16900.pdf p. 3-36.

[7] Id.

Now that EPA/OTAQ have admitted that their atmospheric models are defective and that gasoline aromatics are a predominant contributor to SOA-bound toxics and secondary PM2.5 emissions, it must act expeditiously to comply with Congressional directives by substantially reducing gasoline aromatics content.

EPA's Office of Transportation and Air Quality (OTAQ) used obsolete and faulty data for its 2007 MSAT CBA comparative economics model. The underlying economics and technologies have undergone radical changes during that period, all of which inure to the benefit of ethanol's cleaner octane. Consequently, as emphasized earlier, we respectfully urge EPA to use the pending rule to encourage a thorough but timely update to its 2007 MSAT CBA which includes current and accurate pricing, octane values, and ethanol production rate data. Most importantly, EPA needs to ensure the use of updated and accurate octane equivalency factors by the U.S. Department of Energy national laboratory data (e.g., Oak Ridge National Laboratory, Argonne National Laboratory, etc.), and incorporate the dramatic progress that has been made in the nation's ethanol blending infrastructure, including terminals, wholesale price differentials, and legacy fleet compatibility.[8]

Federal law requires agencies to justify major rules like the SAFE proposal with thorough cost–benefit analyses (CBAs). CBAs include assessments of societal costs associated with harmful emissions. Recent media reports have cited economists' criticism of EPA's attempt to redefine $PM_{2.5}$ health effects to justify its proposed changes to the previous administrations carbon rule.

One prominent reporter noted "The authors of the rule had counted the health benefits from reducing particles in their justification for why the benefits of regulating greenhouse gases outweighed the costs of implementing it. The health benefits of cutting CO_2 become even more evident when paired with the "co-benefits" of cutting fine particles."

Recognition of E30's ability to substantially reduce gasoline exhaust PM and SOA-bound toxics is especially appropriate, because failure to reduce gasoline BTEX content will substantially INCREASE such emissions as advanced engine technologies dominate the fleet.[9] As Ambassador Gray pointed out, EPA should not be allowed to ignore the Title II section 202(l) mandates to control MSAT emissions in the same rule they are relying on section 202(a) statutory authorities to improve fuel efficiency and reduce carbon emissions.

In other words, the MSAT emission reductions from a nationwide E30 HOLC Fuels "clean octane" standard will not be merely "co-benefits". They will be primary, direct, and mandated benefits that address national climate and health priorities, while also providing enormous energy security/trade balance, farm sector, and economic benefits.

If EPA does a proper job in conducting such an updated Cost Benefit Analysis as part of this proposed rule it will confirm the following:

Climate, Health, Economic, and Environmental Justice Benefits

- The benefits of moving to High Octane Low Carbon E30 fuels are clear and substantial with regard to their impact on greenhouse gas emissions – potentially reducing U.S.

[8] Appendix II of the Urban Air Initiative Tier 3 Rule Comments, as well as Addendum A of the Urban Air Initiative et al. Midterm Evaluation Comments, EPA-HQ-OAR-2015-0827-9904 (August 21, 2017), *available* at https://bit.ly/2NgfiSZ.

[9] Sadaf Sobhani, *Air Pollution from Gasoline Powered Vehicles and the Potential Benefits of Ethanol Blending: A Review of Particulate, Nitrogen Oxide, and Volatile Organic Pollution*, Energy Future Coalition/United Nations Foundation, October 2016.

emissions by more than 100 million tons a year before 2030, accounting for a significant share of the Biden Administration's goal of 50% carbon reduction by 2030.

- E30 HOLC fuels have important "time to market" advantages over competing carbon reduction strategies. Specifically, E30 HOLC fuels dramatically reduce black carbon (BC) emissions, a short-lived climate pollutant (SLCP) with a GWP (global warming potential) 3,200 more potent than CO_2.[10]

- Effective January 1, 2017, EPA adopted E10 (10% ethanol/90% gasoline) blends as the nation's "certification fuel". This means that ethanol is "substantially similar" under Section 211(f) of the Clean Air Act. EPA should correct its misinterpretation of that provision and remove its regulatory barriers so that E30 high-octane fuels may be legally used in non-flex fuel (standard) vehicles.

- In addition to its carbon benefits and central to EPA's primary mission, E30 HOLC fuels offer substantial public health benefits, with the strongest impact being seen in urban communities, a priority of the administration's environmental justice concerns. A 2021 assessment in the journal Environmental Research[11] concluded that the fossil-fuel component of PM2.5 alone is responsible for more than 8 million premature deaths annually, amounting to nearly one-fifth of all global deaths. In other words, it is the leading cause of premature death from environmental pollution.

- The smallest particles are the most dangerous to human health. A 2019 report from the International Council on Clean Transportation, "Recommendations for Post-Euro 6 Standards for Light-Duty Vehicles in the European Union,"[12] noted that the ability of inhaled particles to be captured within the human body, called the deposition efficiency, is a function of particle size. Vehicle exhaust, in particular that of gasoline direct injection (GDI) engines, contains copious amounts of particles in the size ranges with high deposition efficiency." ICCT experts have noted that *"Compared to other octane-boosting alternatives, ethanol has unique octane properties. Properly blended E30-E40 HOFs used in optimized engines could double GDI particulate-borne toxics emission reductions (John German, ICCT, Health Effects Institute PM Workshop, www.healtheffects.org/meeting/workshop-effects-fuel-composition-pm).*

- A research team which included the late Nobel Prize winner, Mario Molina, reported last year that "Photooxidation of vehicular exhaust yields abundant [UFP] precursors, and organics, rather than sulfuric acid or base species, dominate formation of UFPs under urban conditions. Recognition of this source of UFPs is essential to assessing their impacts and developing mitigation policies. Our results imply that reduction of primary particles or removal of existing particles without simultaneously limiting organics from automobile emissions is ineffective and can even exacerbate this problem."[13] Thus, given the role of aromatic hydrocarbons in PM formation, and given the propensity of GDI engines to increase emissions of UFPs, EPA's strategies for regulating fine particle

[10] Black carbon is considered the second most important human emission in terms of its climate forcing; only carbon dioxide (CO_2) has a greater overall effect. Because black carbon is rapidly removed from the atmosphere by deposition, its atmospheric concentrations respond quickly to reductions in emissions. Such reductions are thus an attractive near-term mitigation strategy to slow the rate of climate change – especially as the short-term (20-year) global warming potential per ton of black carbon is 3200 times that of CO_2.

[11] https://www.sciencedirect.com/science/article/abs/pii/S0013935121000487O.

[12] https://theicct.org/sites/default/files/publications/Post_Euro6_standards_report_20191003.pdf.

[13] https://www.pnas.org/content/117/7/3427 (emphasis added).

pollution in urban areas are doomed to failure unless they significantly reduce gasoline aromatics.

- "…almost 96% of contribution to the PMI is from aromatics."[14]
- Oak Ridge National Laboratories (ORNL) singled out E30 HOLC fuels for their unique ability to facilitate EPA compliance with the Renewable Fuel Standard, the GHG – CAFE Rule, the Tier 3 Rule, and the MSAT provision (Section 202(l) of the Clean Air Act).

Trade Deficit, Energy Security, & Critical Material Supply Chain Benefits

- A nationwide E30 "Clean Octane" Gasoline Standard would reduce U.S demand for imported oil by one billion barrels a year, which at $100 oil would free up an additional $100 billion/year for investment in the creation of quality jobs, improved infrastructure, and better health and education for our children.[15]
- Increased supplies of unconventional oil and gas (fracking) should not be eligible contenders for displacing oil imports because of their extremely high carbon intensity and toxicity which poses substantial risk to the climate and human health.[16]
- E30 HOLC fuels utilize 100% domestic inputs, so there is zero risk of critical material supply chain interference from foreign actors, unlike the energy transition minerals required by electric vehicle manufacturers.
- DOE's Energy Information Administration (EIA) has warned of a worsening octane shortage in the U.S. as automobile manufacturers adopt advanced internal combustion engine designs such as direct injection and turbocharging in response to tighter fuel efficiency and carbon emission requirements.

Farm Sector Benefits

- A nationwide E30 "Clean Octane" Gasoline Standard would re-energize the U.S. farm economy without need for taxpayer subsidies.
- Nationwide E30 would increase U.S. Gross Domestic Product (GDP) by more than $100 billion/year and save motorists billions more at the pump for a cleaner-burning, higher octane, better performing fuel.
- Ethanol's high-quality concentrated protein co-products would benefit the nation's livestock producers and enable significant reductions in ruminant animal methane emissions.

[14] Chapman, E., Geng P., and Konzack A., "Global Market Gasoline Quality Review: Five Year Trends in Particulate Emission Indices," SAE Technical Paper 2021-01-0623, 2021, doi:10.4271/2021-01-0623.

[15] "2018 Ethanol Industry Outlook." Ethanol RFA, RFA, 2018, ethanolrfa.org/wp-content/uploads/2018/02/NECfinalOutlook.pdf. Page 23.

[16] https://www.sciencedirect.com/science/article/pii/S016041201832186X, slide 10.

Conclusion:

In the NPRM, EPA states the following:

We are revising decisions made in the SAFE final rule in accordance with Supreme Court decisions affirming that agencies are free to reconsider and revise their prior decisions where they provide a reasonable explanation for their revised decisions.5 In this rulemaking, the agency is changing its 2020 position and restoring its previous approach by proposing to find, in light of the statutory purposes of the Clean Air Act and in particular of section 202(a), that it is more appropriate to place greater weight on the magnitude and benefits of reducing emissions that endanger public health and welfare, while continuing to consider compliance costs, lead time and other relevant factors.

CFDC respectfully urges EPA to in fact "revise its position". It is EPA's duty to account for the health impacts, the legal obligations, and all the other factors identified in these comments as the agency finalizes this rulemaking.

Ambassador C. Boyden Gray, former White House Counsel to President George H.W. Bush during enactment of the 1990 CAAA, identified the fatal flaw in EPA's 2011 GHG – CAFE rule when he said:

"If EPA is going to rely on the CAAA to reduce mobile CO_2, it cannot ignore the same statute's requirements to reduce mobile source air toxics, especially if that reduction also reduces CO_2… EPA cannot under the CAA cause an increase of one form of regulated pollution that causes serious health problems by reducing another that does not."[17]

Increasing gasoline octane now, while enforcing toxic controls, would provide significant efficiency gains and pollution reduction. As stated by the automakers themselves, the existing LDV fleet—and the environment and public health—would see immediate benefits from an orderly transition to "clean octane" HOLC fuels such as E30. And the benefits would increase exponentially as optimized, higher compression vehicles dominate the LDV fleet.

At a minimum we ask, in the strongest terms, for a commitment in writing in this final rule to acknowledge the factual data we have provided and work with all stakeholders to recognize the need to focus on improving gasoline octane quality as a near-term priority to protect the public health and welfare, promote environmental justice, substantially reduce transport sector carbon and toxics emissions, advance the nation's energy security, and stimulate the agricultural economy without need for taxpayer outlays.

[17] Comments of Boyden Gray & Associates PLLC to the NHTSA-2010-0131 and EPA-HQ-OAR2010-0799 Proposed Rule, 2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards, February 13, 2012, p. 7.

Appendix A

A Regulatory Roadmap to Ensure EPA Compliance with SAFE Rule Objectives: Enforce CAA Section 202(a) and Section 202(l) Requirements, Protect Public Health and Welfare, Reduce Transportation Sector Carbon Emissions, Strengthen the Nation's Energy Security, and Stimulate the Agricultural Economy

EPA/OTAQ have all the legal and scientific tools necessary to justify each of the action steps proposed below. EPA's implementation of this roadmap will stimulate and protect free market competition; dismantle unlawful regulatory barriers that have enabled the continued use of the most carbon intensive, costly, and carcinogenic gasoline components; and restore integrity to the oversight of programs designed to protect the nation's public health and welfare, consistent with the Administration's environmental justice priorities.

Encourage an Orderly Transition to a Nationwide 100 RON Higher Octane Gasoline Standard: Consistent with Title II of the Clean Air Act, transitioning to a nationwide 100 RON market gasoline octane standard using High Octane Low Carbon (HOLC) Fuels such as E30 would achieve multiple national priorities simultaneously with no need for taxpayer outlays. EPA should emulate the successful transitions from leaded to unleaded gasoline and the Reformulated Gasoline with Minimum Oxygen programs.

Comply with the Mandatory Mobile Source Air Toxics (MSAT) Reduction Provisions in Section 202(l) of the CAAA: Similar to the transition from leaded to unleaded gasoline and then RFG, Congressional intent was clear -- the CAAA was designed to spur technological innovation and force the development and advancement of both fuels and automotive technologies. Proper enforcement of Section 202(l) will ensure compliance with the Biden Administration's transportation sector carbon and air toxics reduction goals, consistent with environmental justice priorities and existing law.

Correct the Agency's Misinterpretation of 211(f) Substantially Similar Rule: As of January 1, 2017, E10 became the nation's certification fuel. At that time, ethanol became an additive used in certification of new vehicles and is therefore not subject to control under section 211(f). If EPA wishes to control the use of HOLC Fuels such as E30 in standard (non-FFV) vehicles, the legal burden of proof is on EPA under section 211c to prove that such fuels damage emissions control systems and/or contribute to harmful tailpipe emissions.

Update The Agency's Corn Ethanol Life Cycle Analysis (LCA): Bringing EPA's woefully outdated corn ethanol carbon footprint lifecycle assessment into line with the updated and more widely accepted Argonne National Laboratory GREET model is necessary to ensure EPA's reliance on best available science.

Among other changes, EPA's LCA model should recognize the ability of high-yield corn to restore soil organic matter, which transforms corn acres into substantial carbon sinks. As precision agriculture advances are adopted, the corn ethanol carbon footprint should approach "net zero".

Update the Agency's 2007 Mobile Source Air Toxics (MSAT) Cost-Benefit Analysis (CBA): EPA's obsolete and wildly inaccurate factual predicates used in its 2007 MSAT rule (e.g., $19/barrel crude oil, $.85 gasoline, and a 2:1 ethanol's octane replacement value for toluene/BTEX/aromatics) were used to support EPA's conclusion that replacing toxic aromatic hydrocarbons with higher octane lower cost ethanol could not be economically justified. A properly done CBA will confirm that HOLC Fuel blends would cost effectively reduce the most harmful mobile source air toxics and ultrafine particulates.

Approve a Mid-Level Ethanol Blend Certification Fuel: EPA should expeditiously approve the use of a mid-level ethanol certification fuel (e.g., E30) to provide automakers with a clear pathway to design optimized, higher compression vehicles optimized to use 98–100 RON gasoline.

Update and Reform the Agency's MOVES2014 Model: EPA has admitted that its atmospheric models—especially and including MOVES2014—are defective and in need of significant repair. OTAQ should immediately suspend the use of its defective and outdated MOVES2014 model which was built upon manipulated fuel samples provided by oil interests. Samples provided for the model contained the deliberate addition of "high boiler" aromatics "to match blend" and designed to produce negative results for ethanol blends. The results unfairly and inaccurately attribute higher emissions to ethanol rather than added aromatics.

Accelerate and Ensure Completion of the HOLC Fuel Infrastructure Buildout. Most of the nation's terminals, underground storage tanks, and retail dispensers have been approved and readied to accept HOLC Fuels such as E30. EPA should encourage rapid completion of the infrastructure buildout, similar to the expeditious and effective transition to E10 blends as a result of the first Renewable Fuels Standard.

Reinstate Credits for Automakers Producing Engines Optimized for HOLC Fuels Such as E30: EPA should provide the regulatory roadmap and supporting data to help stakeholders interested in establishing meaningful CAFE/GHG credits, financial incentives to cover the cost of certification, or other ideas that would incentivize automakers to produce engines that utilize high octane low carbon fuels (e.g. E30).

Extend the 1 psi RVP Waiver for E10 to E15 and all Higher Blends: EPA's longstanding misinterpretation of the Reid Vapor Pressure (RVP) prevents a timely transition to higher octane fuels. It must be rectified without delay.

Attachment B

A Clean Fuels Development Coalition FACT SHEET: Connecting the Dots of Ethanol, Octane, the Auto Industry, and the key role of DOE.

The auto industry has a long history of promoting higher octane in gasoline as a means of increasing performance, increasing efficiency, and reducing emissions.

This has been a message automakers have brought to the US EPA through their various trade associations and as individual companies. They have repeatedly asked EPA to raise the minimum octane in gasoline and made it clear the higher the better. It is important to note that this is not a new phenomenon. Major car companies have consistently identified ethanol as a key source of that octane beginning with Henry Ford and going back many years. In the development of the Fuel Economy and carbon reduction rules in 2012, the auto industry clarified their longstanding view of ethanol.

Chrysler, 2012: Ethanol Offers Low Carbon Content and Less GHG Emissions....and offers most expedient and least expensive means to lessen CO2 for Liquid Fuels

.General Motors, 2012: Ethanol can be used to produce new, higher octane fuels that can be used more efficiently.....using ethanol to increase octane of fuels could be a cost effective means to reduce GHG.

Ford Motor Co. 2012: 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..... we estimate that large increases (4–7 points) in the RON of US gasoline are possible by blending in an additional 10–20%v ethanol above the 10% already present. Keeping the blendstock RON at 88 (which provides E10 with _92.5 RON), we estimate RON to as much as 98.6 for E30. Even further RON increases may be achievable.

As the Mid Term evaluation of the 2012 rule approached, the auto industry increased their calls for high octane, referencing their own research and work done by the U.S. Department of Energy through their labs and from the Co-Optima program, Despite the overwhelming body of evidence that high octane fuels could provide significant gains in efficiency and reductions in emissions, EPA has failed to integrate fuels into their rules.

In 2016, the position of the auto industry could not have been clearer.

Higher Octane fuels are the cheapest CO2 reduction on a well to wheels analysis. Fuels and engines must be designed as a total system. It makes absolutely no sense to have fuel out of the mix…..higher octane fuels can be delivered cost effectively”.. **Dan Nicholson, VP Global Propulsion Systems, General Motors. (2016).**

The real key is the ability to design the engine with a higher compression ratio…….Higher RON Values allow us to stretch efficiency even further. **Chris Cowland, Fiat Chrysler (FCA) Director of Advanced and SRT Powertrains, 2016.**

The leadership role of the Department of Energy in assessing high octane fuels and the role of alternatives to the highly toxic aromatic compounds refiners use to increase octane has largely been ignored. It is more timely than ever to embrace a clean octane strategy as the revision of federal fuel economy standards will weigh heavily on the ability to reduce carbon emissions for both climate and health benefits, with a particular emphasis on environmental justice and the impact on minority communities.

The net result of years of research and demonstration—and significant expenditures-- by DOE and its affiliates is that high octane fuels made with low carbon additives are the most readily available tools we have to achieve the Biden-Harris Administration's goals.

DOE must have a voice in the formation of future fuel economy and emission rules and be able to apply its expertise. The DOE GREET Model is considered the gold standard of CI measurements. Oak Ridge has led the way in vehicle testing. NREL has led the way in developing new ethanol production pathways.

In conjunction with the work of NREL* to develop ethanol from biomass feedstocks, the application of that fuel in the market has been validated through the agency's testing and studies that have concluded "ethanol has an inherently high octane number and would be an ideal octane booster".....and that a 25-40% volume blend of ethanol would provide "significant benefits to the United States." .

Former DOE Secretary Dr. Ernest Moniz identified a 30% ethanol blend as the "sweet spot" for ethanol blends to achieving climate change goals in a 2016 speech at the Washington auto show before the Society of Automotive Engineers.

If this was the position of the DOE in 2016 it should be even stronger now. Carbon reduction data is significantly more positive now than 5 years ago. Emission benefits are more understood than 5 years ago. The pressing need to act is greater than 5 years ago.

With all new dispensing pumps certified to ethanol blends up to 40% or more, getting these fuels in to the system is not an issue. As for the vehicles themselves, in addition to newer vehicles that may have higher compression ratios, including emerging variable compression vehicles available now, the legacy fleet can benefit from high octane according to Ford and other OEMs.

Brazil has been running their cars on high ethanol blends for decades and has indicated an intent to go to 40% volume ethanol.

The DOE BETO commissioned research in 2016 utilizing the Automotive Deployment Options Tool (ADOPT) also noted E40 was a likely preferred blend due to lower costs and large GHG reductions.

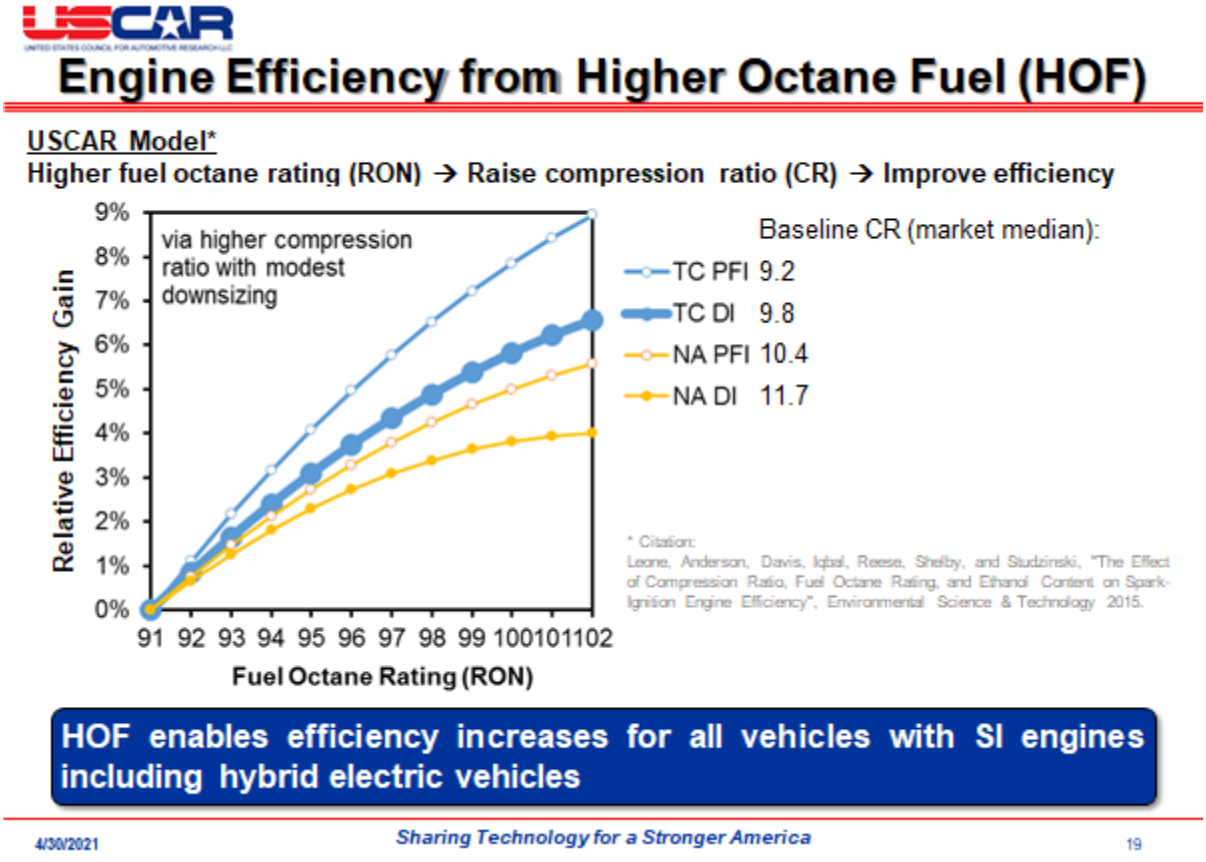
Shell Oil recently announced the development of an ethanol blended fuel that contains a combination of ethanol and other renewable additives of 33%, with ethanol being the largest part of the mix due to its high octane.

Higher octane via a low carbon fuel like ethanol is a value proposition that simply must be captured. . With renewed emphasis on carbon reduction at the federal level, aggressive actions by states, and a growing recognition that electrification may require a longer lead time to market, liquid fuels—according to the experts below-- can be de-carbonized with tools we have at our disposal now, and a pathway to do so via the revision of the SAFE Rule.

In an October 2011 letter from the Alliance of Automobile Manufacturers to then-EPA Administrator Lisa Jackson, they said *"EPA has long recognized that vehicle technology and the fuel employed with that technology need to work in concern as an integrated system so that vehicles can operate efficiently and achieve the lower technologically and economically feasible emissions targets."*

Later on in the same letter, AAM wrote: *"Furthermore, to help achieve future requirements for the reduction of greenhouse gas emissions, we also recommend increasing the minimum market gasoline octane rating, commensurate with increased use of ethanol."*

US Car was a joint research program by Ford, Chrysler, and GM and validates the benefits of high octane in this simple graphic.



GM:

- "**GM supports the future of higher octane and higher ethanol content in order toprovide a pathway to improved vehicle efficiency and lower GHG emissions.**"
- "**One pathway to improved vehicle efficiency and lower GHG emissions is** to increasethe engine compression ratio (CR)..... Since ethanol has a higher [octane number] than gasoline, **a mid-level gasoline-ethanol blend** . . . will .....allow[] the engine to be designed with a higher CR. Ethanol's high heat of vaporization, which produces an in- cylinder cooling effect, and its high octane number compared to that of gasoline, can increase engine efficiency. The resultant efficiency gains can also enable a downsizing ofthe engine to reduce weight, thereby further reducing fuel consumption and CO_2 emissions."
- "While **higher ethanol, higher octane fuels** can be useful in all types of engines tovarying degrees, they are of particular **benefit** to **direct-injection** (DI) engines."
- "GM fully supports the Alliance/Global comments on octane."
- "[A]t that time [of CAFE negotiations] **EPA gave the industry assurance that theseissues would be addressed promptly** within the Tier 3 rulemaking to support the GHG/FE standards, as well as Tier 3 requirements."

Ford:

- "**Ford strongly recommends that EPA pursue** regulations and other measures to facilitate the introduction of **higher octane rating market fuels**, which offer the potential for the introduction of more efficient vehicles. Progress on **this issue will bea key parameter for consideration in the** "One National Program" **mid-term evaluation process**, as well as for all phases (current and future) of the medium and heavy-duty GHG and fuel economy standards." Ford Tier 3 Comments

- "**Ford supports the development and introduction of an intermediate level blendfuel** (E16-E50), with a minimum octane rating of 91 anti-knock index (AKI) that increases proportionally as ethanol is splash-blended on top of the base Tier 3 gasoline emission test fuel. The development of **such a fuel would enable** the first steps to the development of a new generation of **highly efficient internal combustion engine vehicles**. We look forward to future collaboration with the EPA on this item."
- "**Current engines in the fleet could also benefit** from the higher

octane ratingthrough more aggressive spark timing during certain driving conditions."

- "**High compression ratio engines are already found in Europe .....** [T]he introduction of higher octane rated/intermediate level ethanol blend fuel would allowfor a faster introduction of more efficient vehicle designs from Europe with lower CO_2 emissions and increased efficiency without the need for significant design changes."

- Maricq/Ford study found that E30+ blends reduced PM/BC by **45%,** and NOx, etc. by 20% in optimized DI engines. CARB found that E30 blends used in PFI enginesreduced PM/PN/BC by more than 80%.

Others:

Mercedes Benz:

- **Octane** is the single most important fuel property in engine design

- Vehicles Optimized for mid blend ethanol can enjoy both **power and efficiency**

- "An **E30 blend** would be a Rocket Fuel"

Department of Energy Validation:

The U.S. Department of Energy and its National Renewable Energy Lab (NREL) have extensively studied the use of E20 blends in legacy vehicles.

The DOE concluded that such blends **do not degrade emission control systems or lead to increased tailpipe emissions**, even after 100,000 miles of operation.

The study exposed vehicles to 120,000 miles of "aging", and found that E20 blends were in most cases
BETTER than E0 blends with regard to emissions and equipment deterioration.

DOE discovered that the vehicles aged on 15% and 20% ethanol-containing fuels did not produce higher exhaust emissions compared to control vehicles aged on ethanol-free fuel, for all six models tested in the study.

More extensive DOE tests confirmed National Renewable Energy Laboratory findings

- The DOE tests covered more than 80 different vehicles, operated more than 6 million miles

- E0 gasoline was splash-blended with 10, 15, and 20% ethanol to produce the blends.
- **EXX blends do NOT degrade the emissions control systems, even after "aging" over 100,000miles.**
- In most cases, vehicles run on EXX blends did better than on E0.
  - DOE's multi-year catalyst durability study investigated effects of adding up to 20% ethanol on vehicle emissions control systems. The released results were positive for the use of EXX blends in legacyvehicles.

E30's Superior Octane Properties Benefit Standard Vehicles Even Without Recalibration

2015 Leone/Ford Motor et al. Study. From the Leone et al. (Ford, GM, etc.) study, the highlighted statements on standard vehicles (p. 10781) and Table 2 on p. 10785 are of particular interest.

ABSTRACT: Light-duty vehicles (LDVs) in the United States and elsewhere are required to meet increasingly challenging regulations on fuel economy and greenhouse gas (GHG) emissions as well as criteria pollutant emissions. New vehicle trends to improve efficiency include higher compression ratio, downsizing, turbocharging, downspeeding, and hybridization, each involving greater operation of spark-ignited (SI) engines under higher-load, knock-limited conditions. Higher octane ratings for regular-grade gasoline (with greater knock resistance) are an enabler for these technologies. This literature review discusses both fuel and engine factors affecting knock resistance and their contribution to higher engine efficiency and lower tailpipe CO2 emissions. Increasing compression ratios for future SI engines would be the primary response to a significant increase in fuel octane ratings. Existing LDVs would see more advanced spark timing and more efficient combustion phasing. Higher ethanol content is one available option for increasing the octane ratings of gasoline and would provide additional engine efficiency benefits for part and full load operation. An empirical calculation method is provided that allows estimation of expected vehicle efficiency, volumetric fuel economy, and CO2 emission benefits for future LDVs through higher compression ratios for different assumptions on fuel properties and engine types. Accurate "tank-to-wheel" estimates of this type are necessary for "well-to-wheel" analyses of increased gasoline octane ratings in the context of light duty vehicle transportation.

P. 10781: " If the minimum octane rating of the fuel available to customers was increased, it may be technically feasible to update (or "reflash") the engine calibrations on existing vehicles to extract the most benefit from the improved fuel properties… The efficiency gains noted in Figure 2 are estimated assuming the engine was recalibrated to take full advantage of the higher fuel quality. A lesser gain would be realized on most, if not all, vehicles without a calibration change."

Comparing 101-RON E30 to 96-RON E20. Leone's Table 2 confirmed significant improvements for E30 compared to E20 blends in terms of increased compression, fuel efficiency improvement, and tailpipe CO_2 reductions:

E30: Compression Ratio = +3.3; Total Fuel Efficiency = 7.0%; Tailpipe CO_2 Change = -7.0%

E20: Compression Ratio = +1.8; Total Fuel Efficiency = 4.4%; Tailpipe CO_2 Change = -4.5%

Table 2. Estimation of Efficiency, Volumetric Fuel Economy, and CO_2 Emissions for a GTDI Engine with Higher CR Enabled by Higher-Octane Fuel with Comparison to Ref 28 Engine Dynamometer and Vehicle Modeling Results[a,b]

fuel	91-RON E10 (baseline)	96-RON E20		101-RON E30	
	ref 28	ref 28	estimate	ref 28	estimate
RON	90.8	96.2		100.7	
ethanol (%v)	10.2	20.4		31.5	
energy content (MJ/L)	30.8	29.7		28.5	
energy-based carbon content (gC/MJ)	72.7	72.5		72.4	
effective RON	90.8	n/a	96.2	n/a	100.7
CR	10.0	11.9	11.8	> 13.0	13.3
efficiency gain from higher CR (% vs baseline)	baseline	n/a[c]	3.48%	n/a	5.35%
efficiency gain from higher ethanol content (% vs baseline)	baseline	n/a[c]	0.51%	n/a	1.07%
Estimates without Downsizing:					
total efficiency gain (% thermal efficiency change vs baseline)	baseline	4.7% M/H 4.8% US06	4.0%	6.0% M/H 9.6% US06	6.5%
FE change (% MPG change vs baseline)	baseline	1.0% M/H 1.1% US06	0.3%	−2.1% M/H 1.2% US06	−1.7%
tailpipe CO_2 change (% g CO_2/mi change vs baseline)	baseline	−4.8% M/H −4.9% US06	−4.1%	−6.0% M/H −9.1% US06	−6.5%
Estimates with Downsizing:					
efficiency gain multiplier from downsizing ($F_{downsize}$)	n/a	n/a[d]	1.1	n/a	1.1
efficiency gain from downsizing (% vs baseline)	baseline	n/a[d]	0.35%	n/a	0.54%
total efficiency gain (% thermal efficiency change vs baseline)	baseline	n/a[d]	4.4%	n/a	7.0%
FE change (% MPG change vs baseline)	baseline	n/a[d]	0.6%	n/a	−1.2%
tailpipe CO_2 change (% g CO_2/mi change vs baseline)	baseline	n/a[d]	−4.5%	n/a	−7.0%

[a]All fuel property data taken directly from ref 28. [b]"M/H" indicates result for U.S. EPA metro-highway test cycle. "US06" indicates result for EPA US06 highway test cycle. [c]The total efficiency gain was measured in ref 28. A breakdown of contributing factors was not reported. [d]The calculated changes in vehicle efficiency, fuel economy, and CO2 emissions in ref 28 did not include incremental benefits from additional downsizing.

2021 Alliance for Automotive Innovation Letter to Senator Daschle/HOLC Alliance. Underlining the importance of reducing carbon and other harmful emissions in the early years while the transition to electric vehicles plays out, AAI's letter endorsed a strong federal policy to support "HOLC fuels whose benefits would be realized by new and existing internal combustion engines and therefore should be encouraged as additional solutions as soon as possible to maximize environmental benefits across the fleet."

AAI also noted that: "High octane, low carbon fuels provide the benefit of lower aromatics, and therefore lower exposure to toxics, when combusted in a vehicle."

2019 Letter from SDFU President Doug Sombke to General Motors CEO Mary Barra

Sombke wrote: "…General Motors experts made a presentation to the ASTM High Octane Task Force that set forth six ideal properties of the "fuel of the future". As you know, 100 RON gasoline made with E30 "Clean Octane" is the only liquid fuel that checks all six boxes."

E30 HOLC Fuels Are Only Liquid Fuel That Checks All Six Boxes

Summary of ACEC Recommendations for SI Fuel (Priority Rank Ordered)

		Recommended Target Value
1.	**RON** 1. Higher is better 2. Phase out current Regular (91 RON) Midgrade (95 RON), and Premium (98 RON) Grades - includes sub-octanes in regions like Colorado.	RON ≥ 100
2.	**Sensitivity S = (RON-MON)** 1. Phase out current range of sensitivity. 2. For now, higher is better for anticipated future engine pathways. 3. More research is recommended to fully understand high values of S.	S > 12 or MON < 88
3.	**Sulfur** 1. Lower is better 2. Harmonize US sulfur maximum with regulations in Europe, Japan, and others.	10 ppm maximum
4.	**Volatility** 1. Reduced regional variation in Drivability Index 2. Reduced seasonal variation in Drivability Index 3. Limit T90 to a maximum temperature	Reduce DI variation
5.	**Properties governing Particulate Matter** 1. Lower (Particulate Matter Index) PMI is better. 2. Research in progress to determine overall robustness of PMI	PMI < 1.5
6.	**Heat of Vaporization (HoV)** 1. For now, higher HoV is desirable for anticipated future DI engine pathways. 2. More research is recommended to fully understand HoV, especially to separate its RON-like effects versus other effects like volumetric efficiency.	HoV ≥ current

USDRIVE

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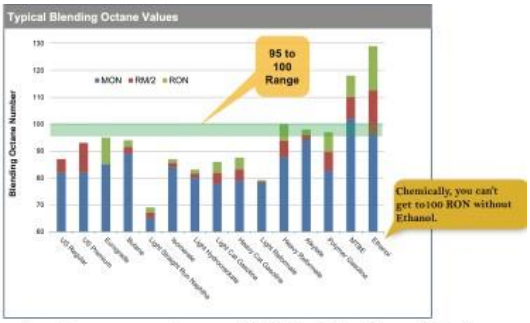
E30 Is Only Commercially Available Gasoline Additive That Meets Automakers' Criteria: High Octane, Low Volatility, Reduced Carbon Footprint, & Substantially Reduced PM/Toxics Emissions

E30 Superior Properties Will Play A Crucial Role in 4 Key Areas

1. Octane
2. RVP/Volatility: E30 returns blend RVP to E0
3. Corn ethanol carbon footprint on its way to "net zero": High-yield corn is a "carbon sink"
4. Carbon/BC and UFP/toxics tailpipe reductions (45 – 85%)



Very few refinery components exceed 95 RON – limiting the capability of refiners to improve pool octane to that level

*Source: NREL Study E17-E24 table 3-1

	10%	12%	14%	17%	20%	25%	30%	35%	40%	50%
base gasoline RVP	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63
Ethanol blend RVP	9.15	9.28	9.19	9.06	9.02	8.89	8.6	8.63	8.26	7.6

To Protect the Public Health & Welfare "Consistent with the Rule of Law", EPA Must Act Quickly to Substantially Reduce Gasoline Aromatics

EPA Priorities Are Inverted & Vulnerable to Challenge & Reversal

- 2011 EPA Report to Congress: in 2020, **90% of Clean Air Act's health benefits will come from reductions in fine and ultrafine PM and associated toxics**; ozone only accounts for 10% of health threat
- Gasoline BTEX is the predominant source of the most harmful urban PM/BC and UFP-borne toxics
- Rapid adoption of GDI engines will substantially increase emissions of the most dangerous pollutant UNLESS BTEX LEVELS ARE REDUCED
  - GDI engines increase PN (particulate number) emissions by a factor of 100 (as well as BC, PAHs, and other MSATs)
- **Ethanol does not produce PM emissions!**
- Thus, EPA is legally required to improve US gasoline quality by encouraging E30 HOLC Fuels:
  - Higher octane (improved fuel efficiency)
  - Lower carbon/BC
  - Lower RVP/ozone
  - Lower toxics
  - Lower fine and ultrafine particulates (PM)