



February 10, 2023

Attention: Docket ID No. EPA-HQ-OAR-2021-0427

The Honorable Michael Regan
Administrator
U.S. Environmental Protection Agency
EPA Docket Center
Office of Air and Radiation Docket
Mail Code 28221T
1200 Pennsylvania Ave NW
Washington, DC 20460

Via: www.regulations.gov

Re: Comments on Proposed Rule; *Renewable Fuel Standard (RFS) Program: Standards for 2023–2025 and Other Changes*; 87 Fed. Reg. 80,582; December 30, 2022).

Dear Administrator Regan,

The Renewable Fuels Association (RFA) appreciates the opportunity to submit these comments regarding the U.S. Environmental Protection Agency's (EPA) proposed rule setting the 2023-2025 renewable volume obligations (RVOs) under the Clean Air Act's (CAA) Renewable Fuel Standard (RFS) (*Renewable Fuel Standard (RFS) Program: Standards for 2023–2025 and Other Changes*; Proposed Rule; 87 Fed. Reg. 80,582; December 30, 2022).

RFA is the leading trade association for America's ethanol industry. Its mission is to drive expanded demand for American-made renewable fuels and bioproducts worldwide. Founded in 1981, RFA serves as the premier organization for industry leaders and supporters. With over 300 members, we work every day to help America become cleaner, safer, and more economically vibrant.

The RFS has been a tremendous success. It has bolstered energy security by reducing demand for petroleum imports; it has reduced greenhouse gas emissions by replacing petroleum with low-carbon, renewable alternatives; it has lowered fuel prices for American consumers; and it has created jobs and spurred economic development across the country.

Moving forward, expanding the use of low-carbon renewable fuels like ethanol is the most immediate and effective strategy for meeting the Administration's carbon reduction goals. Under the RFS2 program, biofuels use has already resulted in the avoidance of more

than 1.2 billion metric tons of greenhouse gas emissions from the transportation sector.¹ As the industry continues to innovate and invest in new technologies, the lifecycle carbon intensity of ethanol continues to fall. RFA's member companies are committed to continuous improvement and carbon reduction in the ethanol production process. In fact, our members have pledged that the ethanol they produce will be fully carbon neutral (net zero emissions) by 2050 or sooner.²

Overall, RFA believes the proposed rule for 2023-2025 RVOs establishes a firm foundation for the future of the RFS and creates a sustainable pathway for growth in the production and use of low-carbon renewable fuels. Once finalized, the 2023-2025 RVOs will further enhance the energy security, carbon reduction, and economic benefits that have already been realized under the RFS program.

Specifically, RFA supports EPA's proposed implied volume requirements for conventional renewable fuels in 2023-2025, along with the proposed supplemental standard for 2023. Once finalized, these volumes will drive continued adoption of technologies that reduce carbon intensity, as well as greater investment in the infrastructure needed to expand distribution and consumption of fuels with higher renewable fuel content, like E15 and E85.

We also strongly support the proposal's well-reasoned approach to small refinery exemptions (SREs). EPA's position on SREs is consistent with the spirit and intent of the law establishing the RFS2 and is compliant with recent court decisions. The Agency's responsible approach brings much needed certainty and long-term clarity to the RFS program.

While RFA supports the proposed implied conventional renewable fuel volumes, we encourage EPA to re-evaluate future growth and investment in advanced biofuel production when setting the final biomass-based diesel and advanced biofuel requirements. It is our hope that EPA carefully considers information and data submitted by stakeholders regarding current and expected advanced biofuel production capacity. Importantly, any increases EPA may consider for the final advanced biofuel standards must be accompanied by corresponding increases in the total renewable fuel requirements.

RFA also encourages EPA to ensure that its final provisions for renewable electricity RINs (eRINs) honor the statutory intent of the RFS program and are truly consistent with RIN generation provisions for all other renewable fuel pathways under the program. We are concerned that EPA's proposal for eRINs could create a novel and overly complex regulatory program that is incongruent with established RIN generation methods and inconsistent with the statutory purpose of the RFS. As such, we urge EPA to make the eRIN provisions of the final rule severable from the remainder of the RVO rule.

¹ Unnasch, S., D. Parida, and B. D. Healy (2023). *GHG Reductions from the RFS2 – A 2022 Update*. Life Cycle Associates Report LCA. LCA.6145.238.2023 Prepared for Renewable Fuels Association (forthcoming).

² Letter from RFA member companies to President Joseph R. Biden. July 27, 2021.
<https://ethanolrfa.org/file/2036/RFA-Net-Zero-Commitment-Letter-to-President-Biden--1.pdf>

Finally, we believe EPA must revisit some of the assumptions and analyses included in the Draft Regulatory Impact Analysis (DRIA). Specifically, RFA disagrees with key elements of the DRIA's analyses on ethanol's blending value in E15, impacts on consumer fuel prices, lifecycle greenhouse gas emissions, and consumer food costs.

These issues and others are discussed more fully in the attached comments. Thank you again for the opportunity to comment on this important rulemaking proposal, and please do not hesitate to contact me should you have questions.

Sincerely,

A handwritten signature in black ink that reads "Geoff Cooper". The signature is written in a cursive, flowing style.

Geoff Cooper
President & CEO

COMMENTS OF THE
RENEWABLE FUELS ASSOCIATION (RFA)
IN RESPONSE TO
RENEWABLE FUEL STANDARD (RFS) PROGRAM:
STANDARDS FOR 2023–2025 AND OTHER CHANGES;
PROPOSED RULE
DOCKET ID No. EPA-HQ-OAR-2021-0427
87 FED. REG. 80582 (DECEMBER 30, 2022)

The Renewable Fuels Association (RFA) submits these comments in response to the U.S. Environmental Protection Agency’s (EPA) proposed rule establishing the Clean Air Act’s (CAA) Renewable Fuel Standard (RFS) volume obligations for 2023-2025, also referred to as the “Set rule” proposal. EPA, *Renewable Fuel Standard (RFS) Program: Standards for 2023–2025 and Other Changes*; Proposed Rule (87 Fed. Reg. 80582; December 30, 2022).

I. The renewable volume obligations (RVOs) established by EPA should encompass the 2023-2025 period.

RFA supports EPA’s decision to propose RVOs for the next three years. We agree with EPA’s statement in the proposed rule that a three-year period “strikes an appropriate balance between improving the program by providing increased certainty over a multiple number of years and recognizing the inherent uncertainty in longer-term projections.”¹

The past process of issuing RVOs on an annual basis often created uncertainty, since rules sometimes were not finalized until well into the compliance year or reflected significant changes in the Agency’s approach to RFS implementation from one year to the next. This made it more difficult to plan for compliance or make investments in facilities and infrastructure, and it caused volatile fluctuations in renewable identification number (RIN) prices that were not always related to market fundamentals.

The certainty and stability provided by a rule covering three years will benefit not only renewable fuel producers but also obligated parties. Clarity will be provided for decisions about investments and operations as well as planning for compliance.

¹ 87 Fed. Reg. at 80589.

Still, we do not believe it would be prudent to set volumes for 2026 at this time, as contemplated in the proposal. Not only is it more difficult to predict fuel supply and demand farther into the future, but the EPA also has proposed implementing new provisions for the generation of RINs from renewable electricity (eRINs) in 2024 and 2025, and the Agency expects that engineering reviews and biogas electricity generation facility registrations will not be complete by the end of 2024, which makes late 2025 an appropriate time to take stock of the eRIN program and its implications for the cellulosic biofuel RVO (and, in turn, the advanced biofuel and total renewable fuel RVOs).²

II. EPA should finalize the implied conventional renewable fuel volumes as proposed.

RFA strongly supports finalization of the implied conventional renewable fuel requirement at 15 billion gallons for 2023 and 15.25 billion gallons for both 2024 and 2025, as proposed. Although there is not a separate standard for conventional renewable fuels within the RFS, the difference between the total renewable fuel RVO and the advanced biofuel RVO is referred to as the implied conventional renewable fuel requirement, and EPA specifically requested comment on the size of this implied requirement.³

The implied conventional renewable fuel requirements proposed by the EPA are not only consistent with the law, but they also are realistically achievable. EPA projects that compliance with the proposed implied conventional renewable fuel volumes can be achieved as the average ethanol concentration in the U.S. gasoline pool (i.e., the blend rate) grows to 10.53% in 2025. Notably, such a blend rate has already been achieved for sustained periods in the U.S. According to an analysis by the U.S. Energy Information Administration (EIA), “The summer 2022 fuel ethanol blend rate from June through August reached 10.5%”—demonstrating that EPA’s 2025 projection has already been met on a multi-month basis.⁴ On a monthly basis, the ethanol blend rate has been at or above 10.60% eleven times since November 2017, with a record high of 10.83% in October 2021.

A review of historical trends further substantiates EPA’s forecast and would actually support a slightly higher trajectory. The 12-month moving average blend rate (calculated each month) can be used to smooth month-to-month variations in the underlying data. The moving average has increased steadily over time except for a period in 2018 and 2019, when large-scale exemptions from the RFS were provided to small refineries (Exhibit 1).

Applying a linear trend to the moving average starting a decade ago in January 2013, after the historical period when the blend rate increased most rapidly, the concentration would reach 10.59% in 2025. If the trend is started in January 2019, after the retrenchment caused by small refinery exemptions (SREs), the concentration would hit

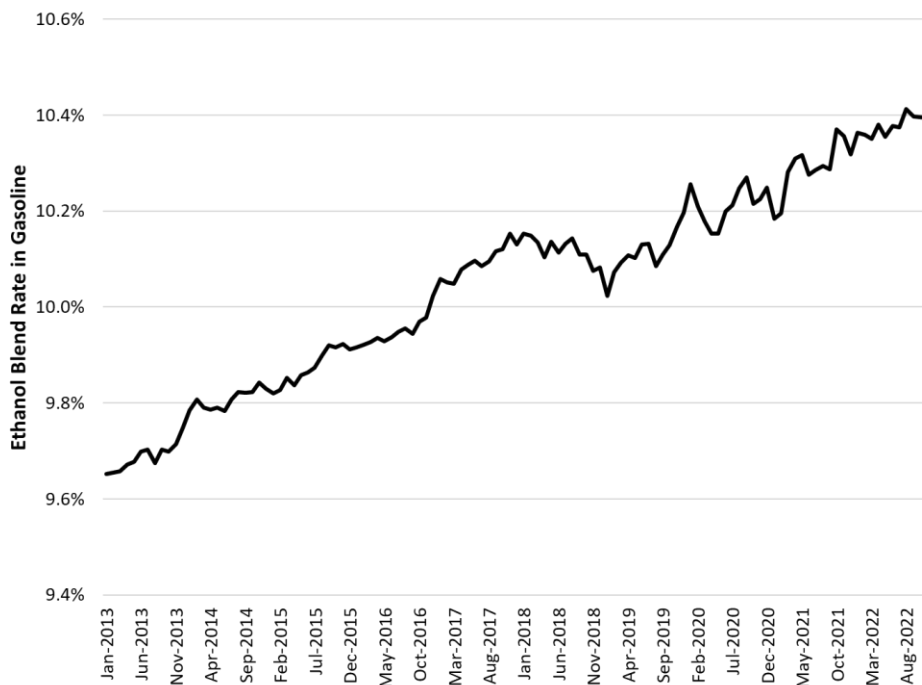
² U.S. Environmental Protection Agency. *Draft Regulatory Impact Analysis: RFS Standards for 2023-2025 and Other Changes*. Washington, D.C. 2022.

³ 87 Fed. Reg. at 80585.

⁴ U.S. Energy Information Administration. “More Ethanol Was Blended into U.S. Gasoline Last Summer than Ever Before,” December 1, 2022. <https://www.eia.gov/todayinenergy/detail.php?id=54839>.

10.65% in 2025. The likely reason for the differential between these trajectories and EPA’s projection is discussed below, in the section addressing the Draft Regulatory Impact Analysis (DRIA).

Exhibit 1: 12-Month Moving Average Ethanol Blend Rate in U.S. Gasoline



Source: RFA based on U.S. Energy Information Administration data

While it is expected that renewable fuels other than corn ethanol, possibly including some advanced biofuels, will be used to comply with the implied conventional renewable fuel requirements in 2023-2025, setting the requirements at the proposed level would stimulate increased demand for lower-carbon ethanol blends like E15 and E85. This was correctly recognized by the EPA in its analysis.

If the implied requirements were reduced to levels below the so-called E10 “blendwall,” an option for which EPA invited comment, billions of dollars in public and private investment in infrastructure to distribute and sell higher-level biofuel blends such as E15 and E85 would be severely undermined. This includes funds from the Biofuels Infrastructure Partnership (BIP) and the subsequent Higher Blends Infrastructure Incentive Program (HBIIP) that were administered by the U.S. Department of Agriculture (USDA).

To date, the federal government has allocated \$300 million to the two programs, including \$100 million for BIP and \$200 million for HBIIP (\$100 million each for two rounds of HBIIP). At least \$280 million has been invested by the private sector in projects that received USDA funding through BIP and the first round of HBIIP. The second round of HBIIP applications has only recently closed, but the associated private investment is expected to exceed the combined amount for BIP and the first round of HBIIP. Thus, total

investment by the federal government and private sector in connection with the two programs is estimated to be approximately \$1 billion.

This does not include other investments by the private sector or incentives made available through state governments and other organizations. Additionally, the Inflation Reduction Act of 2022 appropriated \$500 million through 2031 for higher-level biofuel blend infrastructure.

Beyond the financial implications, reducing the volume requirement below the so-called “blendwall” would cause an increase in emissions of greenhouse gases (GHGs). Lower use of renewable fuels and higher GHG emissions are contrary to the statutory intent of the RFS. Notably, the monthly average ethanol blend rate has been above 10.0% in each of the past 19 months, according to EIA data.

III. The Agency should finalize its proposed supplemental standard for 2023 to complete its fulfilment of the remand by the U.S. Court of Appeals for the D.C. Circuit in *Americans for Clean Energy v. EPA*.

RFA strongly supports EPA’s inclusion of a supplemental standard in the 2023 RVO to address the 2017 vacatur and remand of the 2016 standards from the D.C. Circuit’s decision in *Americans for Clean Energy v. EPA* (“ACE”).⁵ EPA’s proposal for a 2023 supplemental standard is consistent and well-aligned with the supplemental standard that was finalized as part of the 2022 RVO. The 2016 standards were improperly reduced by 500 million gallons on the basis of an “inadequate domestic supply” waiver, an action that led RFA and other groups to form Americans for Clean Energy for the purpose of challenging EPA’s misuse of its waiver authority. In ruling on the case, the court gave the Agency a clear directive to “vacate EPA’s decision in the [2016] Rule to reduce the total renewable volume requirements.”⁶

In its comments on the proposed RVOs for 2020-2022, RFA supported EPA’s proposal to spread the remand volume requirement over two compliance years, since the Agency asserted that this would “lessen both the disruption to the market and the burden on obligated parties.”⁷ Still, the job is only half done, and EPA must implement the proposed 250-million-gallon supplemental standard for 2023 to be in full compliance with the court order.

IV. EPA should consider future growth and investment in renewable fuel production when setting the final biomass-based diesel and advanced biofuel requirements.

As discussed by EPA in the proposed rule and the DRIA, a substantial amount of biomass-based diesel production capacity (predominantly renewable diesel) is under

⁵ 864 F.3d 691 (D.C. Cir. 2017)

⁶ *Id.* at 696-97

⁷ 86 Fed. Reg. at 72,459.

construction or has been announced. Additionally, the DRIA acknowledged that “a number of companies have recently announced plans to build new soybean crushing facilities, or expand existing facilities.” It specifically mentioned, “In comments on the 2020–2022 RFS annual rule the American Soybean Association noted at least 13 announcements for the expansion of soybean crush facilities or new facilities.”⁸ However, in the USDA baseline projection utilized by EPA (published February 2022), soybean oil production through 2025 increases in line with the historical trend.⁹ These factors were the subject of considerable discussion during the EPA’s virtual public hearing on the proposed rule, which was held on January 10.

EPA correctly recognizes in the proposal that volumes of advanced biofuel produced in excess of the advanced biofuel volumetric requirements can be used to satisfy overall (i.e., “total”) renewable fuel requirements. However, if excess advanced biofuel volumes far exceed the “gap” between expected ethanol blending and the implied conventional renewable fuel requirement, then the incentive to increase ethanol blending would be severely diminished and some volume of ethanol could be displaced from the market by advanced biofuel. This could particularly impact E15 and E85, undermining substantial investment that has occurred in recent years to expand the availability of these fuels.

RFA also notes that the EIA recently suggested that “U.S. production capacity for renewable diesel could more than double from current levels by the end of 2025...”¹⁰ The EIA analysis states that “if all projects begin operation as scheduled,” U.S. renewable diesel production capacity could reach 5.9 billion gallons/year by the end of 2025. If operated at full capacity, this volume of renewable diesel alone (i.e., not including existing fatty acid methyl ester biodiesel or other advanced biofuels) could result in the generation of some 9 billion RIN credits, far in excess of the proposed advanced biofuel RVO for 2025. While we agree with EIA that it is likely “some announced projects will be delayed or canceled,” we nonetheless encourage EPA to carefully consider renewable diesel projections and other data from EIA and other sources as it prepares the final RVOs. RFA recommends that EPA carefully examine the information presented by stakeholders during the public hearing and in written comments and ensure that the final biomass-based diesel and other advanced biofuels volumes appropriately reflect future growth and investment.

V. Any increases in the final advanced biofuel standards must be accompanied by corresponding increases in the total renewable fuel requirements.

To the extent that EPA considers increasing the final volumes for total advanced biofuel (i.e., compared to the proposed volumes), we believe the Agency must also increase the total renewable fuel requirements by a corresponding amount.

⁸ American Soybean Association, Comment on Proposed Rule for Renewable Fuel Standard (RFS) Program for Years 2020, 2021, and 2022, February 4, 2022. <https://www.regulations.gov/comment/EPA-HQ-OAR-2021-0324-0471>

⁹ EPA, *Draft Regulatory Impact Analysis*, 360.

¹⁰ U.S. Energy Information Administration, “Domestic renewable diesel capacity could more than double through 2025,” February 2, 2023. <https://www.eia.gov/todayinenergy/detail.php?id=55399>

The analysis contained within EPA's proposal clearly demonstrates that the proposed implied conventional renewable fuel volumes are readily achievable. If EPA were to increase the total advanced biofuel volumes without simultaneously increasing the total renewable fuel requirement, the result would be a lower implied volumetric requirement for conventional renewable fuels. This would undermine confidence in the RFS and slow the investments that are occurring in conventional renewable fuel production, blending, and distribution infrastructure. Any increases that EPA may contemplate for total advanced biofuels must be additive to the proposed volumes.

VI. RFA strongly supports EPA's approach to small refinery exemptions and the Agency's assumption that zero exemptions will be granted in 2023-2025.

RFA fully supported EPA's June 2022 decision to deny 69 pending SRE petitions on the basis that compliance with the RFS program does not cause disproportionate economic hardship to small refineries. EPA's decision was consistent with the statute, recent court decisions, and with the Agency's repeated determinations that small refineries pass through the cost of RFS compliance to the wholesale prices of their products and, therefore, do not face such hardship. In *Renewable Fuels Association et al. v. EPA*, the U.S. Court of Appeals for the Tenth Circuit held that "[1] EPA may grant relief only when it finds that the small refinery would suffer disproportionate economic hardship due to compliance with the RFS program, not due to other factors, and [2] EPA had failed to discuss how granting the exemptions was consistent with [EPA's] findings on RIN cost pass-through."¹¹ Given EPA's interpretation of the Clean Air Act SRE provisions in light of these unappealed holdings, the Agency's assumption that zero exemptions will be granted in through 2025 is appropriate.

Still, EPA's continued inclusion of the projected volumes of gasoline and diesel for exempt small refineries in the formula used to calculate the annual RFS percentage standards is merited. Even though the exempt volumes were set at zero through 2025, SREs remain the subject of litigation by small refineries. Thus, it is reasonable for EPA to protect its ability to prospectively account for projected SRE volumes (i.e., using the methodology established in the original 2020 RVO final rule), should the need arise to do so in the future.

In a related matter, RFA agrees with the findings in EPA's December 2022 report *An Analysis of the Price of Renewable Identification Numbers (RINs) and Small Refineries*.¹² In that report, EPA addressed shortcomings in the U.S. Government Accountability Office report *Renewable Fuel Standard: Actions Needed to Improve Decision-Making in the Small Refinery Exemption Program*.¹³ Importantly, the EPA paper pointed out, "The GAO Report analyzes RIN prices as a function of the ratio of buyer size to seller size ... but does not

¹¹ 86 Fed. Reg. at 72,463.

¹² U.S. Environmental Protection Agency. "An Analysis of the Price of Renewable Identification Numbers (RINs) and Small Refineries," December 2022. <https://www.epa.gov/system/files/documents/2022-12/420r22038.pdf>.

¹³ U.S. Government Accountability Office. "Renewable Fuel Standard: Actions Needed to Improve Decision-Making in the Small Refinery Exemption Program," November 2022. <https://www.gao.gov/assets/gao-23-105801.pdf>.

specifically evaluate RIN transactions by small refineries. Companies buying small quantities of RINs ... are not necessarily small refineries.” On the other hand, the Agency’s analysis specifically compared prices that small refineries paid or received for RINs to average daily prices and the prices that large refineries paid or received.

Inside EPA characterized the findings by saying, “EPA now finds that 24 small refineries studied paid slightly more for certain types of RFS compliance credits than their larger competitors, but the difference is minimal, and may disappear entirely for credits used for the conventional corn-based ethanol that still satisfies most of the overall RFS blending requirement.”¹⁴ Specifically, the EPA report “found that on average these 24 small refineries paid ... 0.5% (0.6¢) more per RIN than the largest 20 refiners. For conventional renewable fuel (D6) RINs, this analysis finds that on average these 24 small refineries paid ... 0.2% (0.1¢) *less* per RIN than the 20 largest refineries.” (Emphasis added.)

VII. For its analysis of the GHG emissions impacts of ethanol, EPA’s use of a range—and the study it chose to use for the high end of the range—are misleading. For the final rule, EPA should utilize the Greenhouse gases, Regulated Emissions, and Energy use in Technologies Model (GREET) model or take other steps to improve its approach.

In the Climate Change section of the proposed rule, EPA explained its approach as follows: “Instead of providing one estimate of the GHG impacts of each candidate volume, we provide a high and low estimate of the potential GHG impacts, which is inclusive of the values we estimated in the 2010 RFS final rule and subsequent agency actions. We then use this range of values for considering the GHG impacts of the candidate renewable fuel volumes that change relative to the No RFS baseline.”¹⁵ In Table IV.A–1, it then shows the lifecycle analysis (LCA) range for corn starch ethanol as 38 to 116 gCO₂e/MJ without explaining which studies or models were chosen for the high and low end of the range and why. It is only in the DRIA that more information is provided.

For corn starch ethanol the DRIA reveals, “The highest estimates are from Lark et al. (2022), a study that modeled historical U.S. land use change GHG emissions attributable to corn ethanol and *added* these estimates to the LCA estimates from RFS (2010), CARB (2018) and GREET.”¹⁶ (Emphasis added.) However, the study focused predominantly on land use change (LUC) and does not constitute an LCA; rather, as noted in the DRIA, Lark et al. *added* their hypothesized LUC values to core LCA estimates from EPA, CARB and GREET to arrive at “what if” GHG emissions totals. In addition, EPA’s characterization of the Lark et al. study fails to note that its method for attributing LUCs to corn ethanol expansion (versus other factors) is speculative and uncertain, something Lark himself has acknowledged in previous iterations of this work. More than 30 pages of the DRIA were

¹⁴ Parker, Stuart. “EPA Defends Stance on RFS Refinery Waivers in Face of GAO Findings.” *Inside EPA*, December 23, 2022. <https://insideepa.com/daily-news/epa-defends-stance-rfs-refinery-waivers-face-gao-findings>.

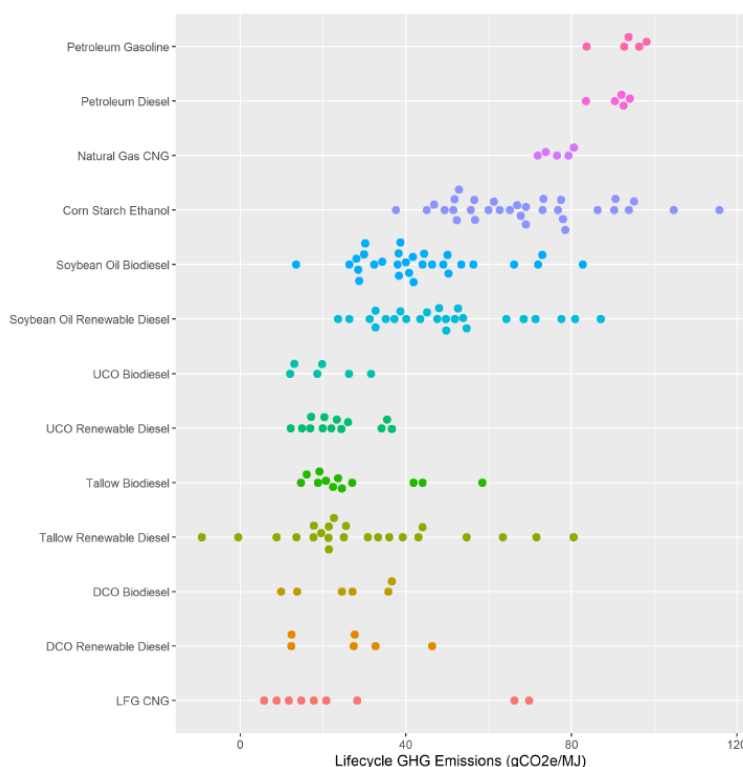
¹⁵ 87 Fed. Reg. at 80610.

¹⁶ EPA, *Draft Regulatory Impact Analysis*, 174.

spent detailing the main models used in LCA (GREET, GLOBIOM, GTAP-BIO, ADAGE and GCAM), but only one paragraph in the Other Models and Approaches section discusses Lark. Indeed, EPA acknowledges, “The fact that [the Lark et al.] study only estimates historical U.S. land use change GHG emissions means that we can only do a limited comparison with estimates from other models that evaluate all lifecycle stages and/or project scenarios into the future.”¹⁷

In discussing a chart that synthesized the estimates obtained from the literature review, the DRIA states, “Figure 4.2.3-1 provides an overview of the lifecycle GHG estimates in our literature compilation. This chart only includes studies that report the full well-to-wheel emissions associated with each pathway.”¹⁸ However, the study by Lark *et al.* is clearly an outlier, as can be seen in the reproduction of Figure 4.2.3-1 below (Exhibit 2). And, again, Lark et al. did not perform a “full well-to-wheel emissions” analysis; rather, the study simply attached its hypothetical LUC emissions estimate to direct, well-to-wheels (i.e., supply chain) emissions estimates from other studies—some of which are more than 10 years old. Contrary to Lark, the vast majority of estimates that were reviewed indicated that GHG emissions from corn ethanol are significantly below those from gasoline.

Exhibit 2: DRIA Figure 4.2.3-1: Lifecycle GHG Emissions Estimates by Pathway



Source: EPA DRIA

More importantly, the methods used in the study by Lark *et al.* have been critiqued or refuted by the USDA; researchers from Argonne National Laboratory (Argonne), Purdue

¹⁷ EPA, *Draft Regulatory Impact Analysis*, 143.

¹⁸ EPA, *Draft Regulatory Impact Analysis*, 165.

University and the University of Illinois system¹⁹; and even the EPA itself.²⁰ In a technical memorandum submitted to the docket for the proposed rule, USDA stated, “Based on our review of Lark et al. 2022, we identified three major methodological flaws with the soil carbon calculations:

- Failure to account for cropland-to-cropland conversions that would occur from the increase in corn ethanol demand. This could include, for instance, the transition of land that is moving in-and-out of other row crops into corn production.
- The (mis)classification of [Conservation Reserve Program] land as native or longer-term grasslands in the soil carbon calculations.
- The carbon response functions used by Lark et al. (2022), from Poeplau et al. 2011, are misapplied and overestimate emissions from grassland-to-cropland conversions.”²¹

USDA ended by saying, “[O]ur review concludes that the Lark et al. 2022 significantly overestimated soil carbon losses associated with biofuel production and did not clearly demonstrate a link to the RFS.”

Going further, Taheripour *et al.* determined, “The overestimated emission factors and overestimated land conversion in Lark et al. led to overestimated [LUC] emissions for corn ethanol.”²² They also assert that Lark et al. overestimated GHG emissions in another way: “[W]hen Lark et al. added their N₂O emissions to EPA’s results and the GREET results for both CARB and Argonne in Figure 3 of their study, they accounted for the N₂O emissions that GREET and EPA had already accounted for. . . . By adding them to the GHG emissions from land use change again, we maintain that N₂O emissions, as they are presented in Figure 3, are indeed double counted in Lark et al.”

In summary, Lark *et al.* disproportionately attributes purported LUC to corn ethanol and then grossly overestimates the GHG emissions associated with those purported LUCs.

In light of this, EPA should have evaluated the selected studies more carefully to determine which were most rigorous and plausible.

More specifically, RFA would recommend that EPA adopt the GREET model developed by Argonne for LCA, as it is considered the gold standard for estimating the GHG emissions from transportation fuels, including both direct *and* indirect emissions. GREET has been utilized extensively by federal, state, and international agencies. Most notably, the EPA used GREET emission factors in the LCA that was conducted for the 2010

¹⁹ Taheripour, F., S. Mueller, H. Kwon, M. Khanna, I. Emery, K. Copenhaver, and M. Wang, “Comments on ‘Environmental Outcomes of the US Renewable Fuel Standard,’” March 21, 2022. https://greet.es.anl.gov/publication-comment_environ_outcomes_us_rfs.

²⁰ U.S. Environmental Protection Agency. *Biofuels and the Environment: Third Triennial Report to Congress (External Review Draft)*. Washington, D.C. 2022. <https://cfpub.epa.gov/ncea/biofuels/recordisplay.cfm?deid=353055>

²¹ U.S. Department of Agriculture, “Review of Recent PNAS Publication on GHG Impacts of Corn Ethanol,” December 14, 2022. <https://www.regulations.gov/comment/EPA-HQ-OAR-2021-0427-0441>

²² Taheripour, F., S. Mueller, H. Kwon, M. Khanna, I. Emery, K. Copenhaver, M. Wang, “Response to comments from Lark et al. regarding Taheripour et al. March 2022 comments on Lark et. al. original PNAS paper,” May 25, 2022. https://greet.es.anl.gov/publication-comment_environ_outcomes_us_rfs

RFS2 rulemaking, and the model has been adapted by the California Air Resources Board for the state's Low Carbon Fuel Standard and by the Oregon Department of Environmental Quality for its Clean Fuels Program.

Regarding indirect emissions, the most scientifically robust model-derived estimates of emissions from hypothetical indirect land use change (ILUC) associated with corn ethanol are integrated into GREET. The Carbon Calculator for Land Use Change from Biofuels Production (CCLUB) is used to estimate ILUC emissions within the GREET/CCLUB/Global Trade Analysis Project (GTAP) modeling array. The use of CCLUB within this array has advantages over other approaches since CCLUB's LUC estimates are taken from the latest version of Purdue University's GTAP model and its emission factors are based on actual field measurements incorporated into the CENTURY/DAYCENT tools for measuring site-level carbon fluxes. (GREET, CCLUB and GTAP are also discussed in the DRIA.)

EPA indicated that the final rule would reflect additional information from the Agency's ongoing process to update its LCA modeling framework. While we would again urge EPA to adopt GREET, if it does not do so it should at a minimum correct the issues discussed above. Moreover, if EPA anticipates using the LCA update as the basis for changes to the RVOs in the final rule, there should be notification and an opportunity to provide comments on the changes in advance.

For context, the RFS has been tremendously successful in reducing GHG emissions by replacing petroleum with low-carbon, renewable alternatives. Under the RFS as expanded by the Energy Independence and Security Act of 2007 (EISA), the use of renewable fuels use has already resulted in the avoidance of more than 1.2 billion metric tons of GHG emissions from the transportation sector.²³

VIII. EPA should modify the proposed program for renewable electricity RINs (eRINs) to ensure that a level playing field and consistent approach to RIN generation are maintained for all renewable fuel pathways under the RFS.

Consistent with EISA, RFA agrees that there can be a role in the RFS for RINs associated with electricity that is produced from qualifying renewable biomass and used as transportation fuel. However, it is critical that EPA maintain a level playing field for all renewable fuel pathways. Renewable electricity should be held to the same standards and requirements as the renewable fuels that have traditionally been used to satisfy RFS requirements, especially given that the Agency envisions a significant role for eRINs in complying with the 2024 and 2025 standards. Unfortunately, the proposed regulatory program for renewable electricity and eRINs is not equitable. EPA is proposing to create a novel and overly complex regulatory program for renewable electricity that is wholly inconsistent with RIN generation methods for all other renewable fuel pathways.

²³ Unnasch, S., D. Parida, and B. D. Healy. *GHG Reductions from the RFS2 – A 2022 Update*. Life Cycle Associates Report LCA.6145.238.2023, 2023. Prepared for Renewable Fuels Association (forthcoming).

RFA has several concerns with EPA's proposal. First, eRINs would be generated by original equipment manufacturers (i.e., electric vehicle manufacturers), and EPA stated that it expects this regulation would "incentivize increased vehicle electrification."²⁴ However, this is inconsistent with the existing system for liquid biofuels and renewable compressed/liquefied natural gas (CNG/LNG), in which RINs are generated by the renewable fuel producer and "attached" to the renewable fuel. When the original regulations implementing the RFS were being developed, EPA determined that the renewable fuel producer was the party best situated to generate the instrument that would be used for tracking compliance with RFS requirements (i.e., the RIN credit). We do not believe EPA has sufficiently justified its decision to depart from this approach, and we question both the legal basis and marketplace rationale for doing so. EPA's eRIN proposal may be viewed as inconsistent with the statutory purpose of the RFS, which is to support the production of renewable fuels "used to replace or reduce the quantity of fossil fuel present in transportation fuels," not the production and sale of certain vehicle technologies. Indeed, if Congress had intended for the RFS to stimulate production and sales of certain alternative fuel vehicles, it would have explicitly said so in the Energy Independence and Security Act. It would be wholly inconsistent for EPA to allow automakers to generate RIN credits as an incentive to produce electric vehicles (EVs) that can operate on renewable electricity, but not for flex fuel vehicles (FFVs) that can operate on high levels (i.e., up to 83%) of low-carbon renewable fuel.

Second, under EPA's proposal, the number of eRINs generated would theoretically represent the quantity of renewable electricity used downstream by light-duty EVs for transportation. However, the proposed eRIN generation/distribution chain does not include a mechanism for measuring actual energy usage by EVs; rather, the number of eRINs that can be generated (and separated) by vehicle manufacturers is based on a simple formula. Based on the "book and claim" accounting provisions proposed as part of the eRIN scheme, there is no way to validate that renewable electricity produced from biogas is truly used downstream as a "transportation fuel" in "motor vehicles, motor vehicle engines, nonroad vehicles, or nonroad engines..." Rather, EPA's proposal would allow an EV manufacturer to generate eRINs based on the assumption that a certain quantity of renewable electricity was used as a transportation fuel simply because the EV manufacturer caused that quantity of renewable electricity to be introduced to the grid (i.e., via a purchase agreement with the renewable electricity producer).

EPA does not allow this sort of "book and claim" accounting for other purposes under the RFS. For example, a corn ethanol facility that wishes to expand production under the Efficient Producer petition process is not allowed to include the use of renewable natural gas (RNG) or renewable electricity in its lifecycle carbon intensity calculations unless the producer demonstrates to EPA that the renewable electricity and/or RNG transmission lines are directly connected to the ethanol plant. In other words, the corn ethanol producer cannot simply enter into a purchase agreement with a renewable electricity or RNG producer

²⁴ 87 Fed. Reg. at 80633.

thousands of miles away and then claim a GHG benefit when the renewable electricity enters the grid or when the RNG is injected into a common carrier pipeline. Yet, this is exactly what is being proposed for EV manufacturers. If EPA moves forward with its “book and claim” accounting provisions for EV manufacturers, it should allow renewable fuel producers to benefit from the same accounting methods for the purposes of pathway petitions.

IX. In light of EPA’s new guidance on cellulosic ethanol from corn kernel fiber, the Agency should re-evaluate its estimates of liquid cellulosic biofuel volumes.

EPA’s extensive effort to accommodate eRINs also stands in sharp contrast to its treatment of cellulosic ethanol. The Agency projects that 1.2 billion eRINs will be used for RFS compliance in 2025, compared to a paltry 5 million ethanol-equivalent gallons of liquid cellulosic biofuels. While EPA’s proposal goes to great lengths to accommodate renewable electricity and ease the process for eRIN generation, the Agency continues to overcomplicate the process for generating cellulosic biofuel RINs from certain cellulosic feedstocks, including corn kernel fiber.

The fact that EPA projects there will be zero volume of liquid cellulosic biofuels in 2023, just 3 million gallons in 2024, and just 5 million gallons in 2025 is evidence of how broken the system is 15 years after the enactment of EISA, and eight years after EPA issued rules allowing cellulosic biofuel RIN generation from corn kernel fiber feedstock. Additionally, EPA’s contention that output from consistent producers should be assessed at the -3rd percentile is punitive; the percentile is negative only because of the inclusion of 2020, during which pandemic-related lockdowns caused an unprecedented drop in transportation fuel consumption.²⁵ EPA’s low-ball estimates of liquid cellulosic biofuel appears to contradict the recent guidance²⁶ on cellulosic ethanol from corn kernel fiber issued by the Agency, which the industry interpreted as an encouraging signal that EPA would soon resume approval of qualifying D3 RIN generation pathway requests from producers of corn kernel fiber ethanol. It also stands in contrast to the 168 million gallons of grain fiber-based ethanol that have been used in California during the last four quarters for which data are available.²⁷ It especially stands in contrast to the billions of eRINs that EPA anticipates will be generated based on a formula rather than actual usage. As it considers final cellulosic biofuel RVO levels, RFA strongly encourages EPA to re-evaluate its assumptions about available supplies of liquid cellulosic biofuel, and associated D3 RINs, in the 2023-2025 timeframe.

In a related way, RFA has concerns about how EPA’s proposed definition of “produced from renewable biomass,” which is connected to its eRIN program, could

²⁵ EPA, *Draft Regulatory Impact Analysis*, 319.

²⁶ EPA, “Guidance on Qualifying an Analytical Method for Determining the Cellulosic Converted Fraction of Corn Kernel Fiber Co-Processed with Starch.” EPA-420-B-22-041. September 2022.

²⁷ California Air Resources Board, “Low Carbon Fuel Standard Reporting Tool Quarterly Summaries.” <https://ww2.arb.ca.gov/resources/documents/low-carbon-fuel-standard-reporting-tool-quarterly-summaries>

unintentionally exclude future renewable fuels (eFuels) from the RFS program if they are made from biogenic CO₂. This would hinder the development of extremely low-carbon (or potentially carbon-negative) fuels and would run counter to the intent of EPA's biointermediate provisions. Accordingly, EPA should develop a workable definition of "produced from renewable biomass" that would allow fuels to qualify under the RFS program if producers can demonstrate that either the mass or the energy in the fuel is ultimately sourced from renewable biomass.

X. Other Issues

a. Incorporation of Carbon Intensity into RFS Program

EPA requested comment on whether the Agency should incorporate a measure of the carbon intensity of each biofuel into the RFS and, if so, what the best approach would be. Corn ethanol reduces lifecycle GHG emissions by 44-52% compared to gasoline, so a program that properly recognizes this and places a value on the reduction would be of substantial interest to ethanol producers.²⁸ However, the structure of the RFS does not lend itself well to accomplishing this.

EISA specified a GHG "threshold" approach for renewable fuels to qualify toward the component standards within the RFS. The idea has been raised to base the number of RINs generated for each physical gallon of renewable fuel on its carbon intensity (CI) score, but this would be an indirect mechanism for placing a value on carbon reduction. Moreover, as discussed in Section VII, the Agency has been reticent to assign specific, unique CI scores for each renewable fuel pathway and to update those on a frequent basis. A clean fuel program would be a better framework for accomplishing this, and the RFA is on record as supporting a properly designed, technology-neutral program at the federal or state level.

b. Sustainable Aviation Fuel

Ethanol's high-octane, low-carbon properties make it an attractive candidate for further processing into sustainable aviation fuel (SAF). Opening the RFS to SAF produced from ethanol that is made from qualifying biomass (including corn) is consistent with the goals and requirements of the program. EPA should closely monitor the pace of SAF technology development and investment and ensure that sufficient RFS pathways exist to facilitate commercialization. As volumes start becoming available at commercial scale, the agency should consider extending RFS obligations to petroleum-based jet fuel along with gasoline and diesel (i.e., incorporating jet fuel into future RVOs).

The regulations EPA finalized last year for the use of biointermediates to produce qualifying renewable fuel were a constructive step. However, certain improvements are

²⁸ Lee, U., H. Kwon, M. Wu, and M. Wang. "Retrospective Analysis of the U.S. Corn Ethanol Industry for 2005 – 2019 : Implications for Greenhouse Gas Emission Reductions." *Biofuels, Bioproducts and Biorefining* 15, no. 5 (September 2021): 1318–31. <https://doi.org/10.1002/bbb.2225>.

needed to avoid unnecessarily constraining the markets for ethanol-based SAF. Most notably, as discussed in RFA's comments in response to the proposed rule establishing the 2020-2022 RVOs, which also contained the proposed regulations regarding biointermediates, EPA should not require that producers only ship undenatured ethanol to a single renewable fuel (in this case, SAF) processor.

We understand the intent behind this "many-to-one" limitation by EPA, but the U.S. Department of Treasury's Alcohol and Tobacco Tax and Trade Bureau (TTB) already maintains stringent reporting and tracking requirements for undenatured alcohol, ensuring that supply chain integrity is maintained for producers who ship to more than one customer. In addition, unlawful and fraudulent activities associated with RIN generation under the RFS program have been confined to the biodiesel industry, and there have been no fraud cases involving ethanol producers.

c. Potential Future Shortfalls in Meeting the Cellulosic Biofuel Standard

EPA incorporated fairly aggressive assumptions about eRIN generation in setting the cellulosic biofuel RVOs for 2024 and 2025. Therefore, EPA should put in place a mechanism for addressing a *significant* shortfall in cellulosic biofuel (D3) RIN generation relative to the RVOs, if one should occur, in order to avoid noncompliance by obligated parties and disruption to the RFS as a whole.

EPA stated it believes that it "retain[s] the ability to use the cellulosic waiver authority to reduce the cellulosic biofuel volumes we are establishing in this rule if necessary via a subsequent rule."²⁹ The Agency continued, "In such a scenario EPA would make available cellulosic waiver credits to obligated parties."

Using its waiver authority would be appropriate if the RVOs cannot be met. However, RFA strongly believes that EPA (1) should not issue any cellulosic waiver credits (CWCs) if the D3 carryover RIN bank is sufficient to offset the shortfall, and (2) if the D3 RIN bank is insufficient to meet the shortfall, the number of CWCs issued should be limited to the difference between the cellulosic biofuel RVO for the year and the number of D3 RINs available (i.e., current year D3 RINs generated plus the D3 RIN bank).

XI. Severability

The new provisions for the generation of RINs from renewable electricity (eRINs) need to be severable from the remainder of the rule establishing the RVOs for 2024 and 2025. EPA raised a scenario in which "a reviewing court were to set aside the eRIN program."³⁰ Given the possibility of a lawsuit over the provisions, EPA needs to ensure that they are not only severable, but the associated volumes within the cellulosic biofuel,

²⁹ 87 Fed. Reg. at 80624.

³⁰ 87 Fed. Reg. at 80591.

advanced biofuel and total renewable fuel standards for 2024 and 2025 would also be excised until any legal challenges are settled.

XII. Draft Regulatory Impact Analysis

This section offers RFA's comments on some elements of the DRIA, since much of the analysis used to inform EPA's proposed volumes for the 2023-2025 RVOs is contained in the document.

a. Fuel Costs

EPA's analysis of the impact of ethanol usage on gasoline prices has three shortcomings: it doesn't reflect ethanol's replacement value in E15, it doesn't reflect the most recent parameters for ethanol production costs, and it doesn't reflect the impact of ethanol displacing 10.4% of U.S. gasoline volumes on market prices of crude oil and gasoline.

1. Ethanol's Replacement Value

EPA analyzed the value of ethanol compared to a No RFS Baseline for three ethanol blend levels offered at retail stations: E10, E15 and E85. For E10, EPA estimated an ethanol replacement value based on cost savings to refiners from producing sub-octane blendstocks for oxygenate blending (BOBs) net of the additional cost of Reid vapor pressure (RVP) control in reformulated gasoline areas.

However, for E15, ethanol is not assumed by EPA to have a similar replacement value. EPA states, "Blending ethanol into gasoline for E15 is different than blending for E10 because we believe that refiners do not make a separate E15 BOB; thus, E10 BOBs are blended with ethanol to produce E15."³¹ The way that EPA conducted its analysis, the value associated with the volume of E10 sold at retail was evaluated, and then E15 was assumed to be a separate segment of the market. This means that in EPA's analysis E15 volumes are separate and additive to E10 volumes, and the BOB volumes that are used in E15 are additive to the BOB volumes used to produce E10. Yet, EPA indicates that the same BOBs are used for E15 as for E10. This means that the refiners are able to enjoy the same reduction in production cost by reducing the octane content of the BOBs, whether the final fuel is E10 or E15. In other words, ethanol's replacement value should be viewed the same way for both E10 and E15. In addition, more terminals are offering pre-blended E15 today and there is evidence in the marketplace that some refiners are further reducing the octane of gasoline BOBs to take advantage of the extra octane in E15. That is, some retail stations today are selling E15 with 87 AKI octane (Exhibit 3).

Regarding RVP, E15 has been afforded the same 1-psi waiver as E10 in summertime conventional gasoline for the last four years, as a result of a 2019 EPA

³¹ EPA, *Draft Regulatory Impact Analysis*, 64.

rulemaking (vacated in 2021 by the D.C. Circuit Court of Appeals) and a series of emergency waivers issued by EPA in 2022. There is considerable uncertainty at the moment whether there will be parity in the treatment of E10 and E15 during the 2023-2025 timeframe. (This is not an issue in the wintertime or for reformulated gasoline areas.) As EPA noted in the DRIA, a group of Midwest governors petitioned the Agency in 2022 to forgo the 1-psi waiver, which would result in the same BOBs being used for E10 and E15 in those states. Additionally, there is a new legislative push supported by both renewable fuels and petroleum organizations, including RFA and the American Petroleum Institute, that would permanently provide equal regulatory treatment for all gasoline blends containing 10% ethanol or more, including E15.

Exhibit 3: Pump Labels at Midwest Retail Station Offering 87-AKI Regular E15



Source: RFA, Feb. 6, 2023

Given this uncertainty, it would make sense for EPA to analyze three scenarios: one in which the BOBs used in E10 and E15 are the same nationally, one in which the BOBs used in E10 and E15 are the same in the Midwest states that have petitioned EPA for an exemption from the 1-psi waiver, and one in which a lower-RVP summertime conventional BOB would need to be used for E15 because no legislative or regulatory solution occurs. EPA could decide whether to show the scenarios individually or develop a weighted average of the results based on a determination of the probabilities of each one occurring. However, only the last scenario is currently analyzed by EPA, and it results in a severe

conclusion: “[W]e project that without the RFS program in place, the fuels market would not offer E15 for sale.”³²

In reality, it is likely that some sales of E15 would continue to occur, given that [1] there were 2,458 retail stations selling E15 in 2021 according to EPA and the number is known to have increased last year, [2] ethanol is typically priced competitively with gasoline blendstock, [3] the lack of a 1-psi waiver for E15 is not an issue in reformulated gasoline areas, and [4] the process has begun for approving E15 sales in California, where the LCFS value for fuel with higher renewable content could help overcome the assumed low RIN value. Although not discussed separately here, to the extent that E85 is produced using the same BOBs as E10, refiners’ costs would also be reduced on that volume of BOBs, and similar to E15 it would be unlikely that E85 volumes would be reduced to negligible levels in the No RFS Case given that there were 4,063 stations offering it in 2021 and the Low Carbon Fuel Standard has spurred substantial growth in California E85 consumption.³³

Ethanol’s replacement value in E15 also needs to flow through to the analysis in Chapter 10: Estimated Costs and Fuel Price Impacts. In Table 10.4.1-1a, a blending cost of -\$0.65/gallon (thus, a credit in that amount) is applied to E10. However, there is no similar credit for E15, which should be adjusted for the considerations discussed above.

RFA pointed out this disparity in its comments on the proposed rule for the 2020-2022 RVOs, and in its Response to Comments EPA acknowledged, “The commenter correctly pointed out the need to account for the E10 ethanol blending value for the blendstock for Oxygenate Blending (BOB) gasoline material which is blended with ethanol to produce E15 and E85, and which was not included in the cost analysis conducted for the proposed rule. This ethanol blending value is now included in the cost analysis for E15 and E85 for the final rulemaking.”³⁴ Accordingly, EPA should incorporate a negative blending cost (i.e., a positive credit) in its cost estimates for E15 and E85 in the final rule.

Additionally, it is unclear whether EPA underestimated the ethanol marginal replacement cost in Table 10.1.3.1.1-6. For the alkylate-centric replacement cost that EPA utilized in its analysis, the average replacement cost was shown as 68.65 cents/gallon. However, the component estimates in the preceding rows appear to imply that the average should be higher. Without knowing the weighting factor applied to each component estimate, it is not possible to know if the average is correct, but the EPA should recheck the calculation.

2. Ethanol Production Cost Assumptions

In comments on the proposed rule for the 2020-2022 RVOs, RFA pointed out that certain assumptions in the estimation of corn ethanol production costs were obsolete or

³² EPA, *Draft Regulatory Impact Analysis*, 66.

³³ California Air Resources Board, “Alternative Fuels: Annual E85 Volumes.”

<https://ww2.arb.ca.gov/resources/documents/alternative-fuels-annual-e85-volumes>

³⁴ U.S. Environmental Protection Agency. *Renewable Fuel Standard (RFS) Program: RFS Annual Rules: Response to Comments*. Washington, D.C. 2022. <https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockkey=P101562X.pdf>

otherwise incorrect. In its Response to Comments, EPA indicated that it believed that if it were to make corrections “the resulting impact on the final cost estimates would be small.”³⁵ However, it stated, “Without a newer estimate for corn ethanol plant capital costs, though, it is not clear that there would be any net decrease in production costs.”³⁶

In the DRIA for the 2023-2025 RVOs, it does appear that EPA overstated the plant capital cost at \$2.34 per gallon (2020 dollars) in Table 10.1.2.2-1. The last large-scale ethanol plant to be built was Ringneck Energy in Onida, South Dakota. It is an 80-million-gallon facility that cost \$150 million to build and was completed in 2019.³⁷ That equates to \$1.875 per gallon.

Given EPA’s prior response, RFA will forgo comment on most of the other yields and parameters contained in the table. However, the DDG yield assumption of 11.4 pounds per bushel is incorrect. Based on data from USDA, it can be readily calculated that DDGS yields are approximately 15 lbs/bu.³⁸

It might also be noted that while the assumed distillers corn oil yield of 0.77 lbs/bu is closer to the industry average, the share of facilities extracting corn oil and the average yield at those facilities have been steadily increasing over time. Based on USDA data, in 2022 the average yield across all dry mills was 0.87 lbs/bu, and if it is assumed that 95% of dry mills extract corn oil, the average yield at those facilities was 0.92 lbs/bu. According to USDA, distillers corn oil production was approximately 4.2 billion lbs in 2022.

Finally, the method EPA used to adjust corn prices for use in the production cost evaluation is questionable. EPA explained, “[W]e used a regression of corn prices and crude oil prices to estimate the corn prices at USDA crude oil prices adjusted to 2021 dollars (row #6) and the corn prices at the EIA crude oil prices (row #6), to enable an adjustment of USDA corn prices to be consistent with the EIA crude oil prices.

$$\text{Corn Price (\$/bushel)} = \text{Crude Oil Price (\$/bbl)} \times 0.0366 + 1.81”^{39}$$

However, the coefficient of determination (R-squared statistic) between corn and crude oil prices tends to be mediocre, and it is unclear how this affected the corn prices used in the analysis. (It is also possible that another functional form such as using the change in both variables would have improved the outcome.) Hopefully EPA will use updated baseline projections from USDA for the final rule, and such an adjustment will not be needed.

³⁵ EPA, *RFS Annual Rules: Response to Comments*, 163.

³⁶ EPA, *RFS Annual Rules: Response to Comments*, 162.

³⁷ Lee, Stephen. “Ringneck Energy’s Ethanol Plant Finally Is up and Running.” *Capital Journal*, June 16, 2019. https://www.capjournal.com/news/ringneck-energy-s-ethanol-plant-finally-is-up-and-running/article_e77d045a-904d-11e9-8659-1721614408dc.html

³⁸ U.S. Department of Agriculture. “Grain Crushings and Co-Products Production.” <https://usda.library.cornell.edu/concern/publications/n583xt96p?locale=en>

³⁹ EPA, *Draft Regulatory Impact Analysis*, 440.

3. Impact of Ethanol on Gasoline Prices

As a practical matter, the consumption of 13.95 billion gallons of ethanol in the U.S. in 2021 displaced the equivalent of approximately 550 million barrels of oil, based on the energy content of the gasoline refined from those barrels. Rather than looking at total historical usage, in the DRIA EPA conducted an analysis of the effect of the RVOs on petroleum consumption compared to the No RFS Case, but the approach is similar: “An important first step ... is understanding the change in both renewable fuel volumes and the associated change in the fossil fuel volume, which is calculated based on its energy content relative to the renewable fuel that it is displaced by.”⁴⁰ As shown in Table 10.4.2.1-1, EPA estimated that crude oil consumption would decrease by 2.6 billion gallons (61 million barrels) in 2023 and that this would expand to 2.8 billion gallons (67 million barrels) in 2025 as a result of the use of renewable fuels (not only ethanol) relative to the No RFS Case. This translates nearly one for one to a reduction in crude oil import volumes.

These volumes would have some impact on petroleum markets, but if renewable fuel consumption were considered in total rather than only in comparison to the No RFS case, it would be apparent that there is a significant impact on petroleum supply/demand and prices. However, EPA’s analysis fails to take the next step and analyze this impact on U.S. crude oil, gasoline and diesel prices. For ethanol, this would directly affect the gasoline terminal price (GTP) that is a component of EPA’s formula for ethanol’s blending cost. This not only affects the economics of E10 relative to gasoline, but in conjunction with the changes discussed above regarding ethanol’s replacement value, it could have a material impact on the economics of E15 and E85 as well. Instead, the gasoline price used in EPA’s analysis is based on EIA’s *Annual Energy Outlook*.

One notable study that examined the impact of ethanol on petroleum prices was published in 2019 by Dr. Philip K. Verleger, Jr. He used an econometric model to estimate the impacts of the RFS on crude oil and gasoline prices over the previous four years (2015-2018).⁴¹ Dr. Verleger determined that that by expanding fuel supplies, the RFS reduced the price of crude oil by an average of \$6/barrel from 2015 to 2018, and in turn, gasoline prices were reduced by an average of \$0.22/gallon. According to the study, the RFS was responsible for putting roughly \$90 billion back into the pockets of U.S. consumers over the previous four years, increasing discretionary income and raising the nation’s gross domestic product.

In its Response to Comments for the 2020-2022 RVOs, EPA criticized methods that Dr. Verleger used in the study. But the fact remains that EPA should consider the impact of renewable fuels on petroleum markets in more than a cursory way. If EPA took issue with the Verleger analysis, it would have had months to conduct its own analysis (potentially in conjunction with EIA), or at least to undertake a literature review.

⁴⁰ EPA, *Draft Regulatory Impact Analysis*, 480.

⁴¹ Verleger, P. “The Renewable Fuel Standard Program: Measuring the Impact on Crude Oil and Gasoline Prices,” September 2019. <https://d35t1syewk4d42.cloudfront.net/file/1949/Verleger-RFS-Impact-on-Oil-and-Gasoline.pdf>

Additionally, EPA “estimated the total cost for a typical retail station revamp to enable selling E15 to be \$108,000, and that these stations sell on average 147,000 gallons of E15 per year. When amortizing this capital cost over the gallons of E15 sold, the total cost of the revamp adds 249¢/gal to the cost of blending ethanol into E15.”⁴² To arrive at the cost estimate, the Agency “reviewed literature and conferred with EPA’s Office of Underground Storage Tanks on what might be considered ‘typical’ for E15 and E85 equipment installations for a typical sized retail station selling these blends.”⁴³ However, the “per-station volume estimates were based on data collected by USDA through their BIP program and made available to EPA.”

There are two issues with this approach. First, the capital cost and volume assumptions are from two different sources, so it is unclear whether the stations they represent are similar. Specifically, it is unclear whether the stations that average 147,000 gallons of E15 sales spent an average \$108,000 to be able to offer E15. In addition to cost offsets provided through BIP (and the subsequent HBIIP program), it is RFA’s experience based on work with numerous stations preparing to offer E15 that many spend far less than the amount EPA assumed. RFA would recommend that EPA ask USDA whether it has data on the amount that the reporting station owners actually had to spend on upgrades (net of any USDA grants).

Second, it is unclear how representative the stations in the USDA sample are. Minnesota and Iowa report E15 sales volumes. Based on Minnesota Department of Commerce data, it can be estimated that average E15 sales per reporting station were 321,000 gallons in 2021.⁴⁴ Based on Iowa Department of Revenue data, it can be calculated that average sales were at least 286,000 gallons in 2021 and more likely 393,000 gallons (the difference is due to the department reporting the combined number of stations selling E15 and E20).⁴⁵ This raises the question of whether the subset of BIP-funded stations on which USDA based its estimate is representative of the more than 2,700 stations selling E15 in the U.S.

b. Estimation of Ethanol Consumption for Analysis of Target Volumes

To project the poolwide concentration of ethanol (i.e., the blend rate), EPA compiled data on the historical number of E15 and E85 stations and then analyzed the correlation between ethanol concentration and the number stations. Specifically, the Agency “applied a least-squares regression to the ethanol concentration using the natural logarithm of the number of E15 stations and a linear term for the number of E85 stations as the independent variables.”⁴⁶

⁴² EPA, *Draft Regulatory Impact Analysis*, 65.

⁴³ EPA, *Draft Regulatory Impact Analysis*, 467.

⁴⁴ Minnesota Department of Commerce, “2021 Minnesota E85 + Mid-Blends Station Report,” https://mn.gov/commerce-stat/pdfs/e85-fuel-use-2021_25.pdf

⁴⁵ Iowa Department of Revenue, “2021 Retailers Fuel Gallons Annual Report,” April 2022. <https://tax.iowa.gov/sites/default/files/2022-04/2021%20Retailers%20Fuel%20Gallons%20Annual%20Report.pdf>

⁴⁶ EPA, *Draft Regulatory Impact Analysis*, 372.

The reason that EPA had to utilize the log form for E15 is that for both higher-level blends—but especially E15—there is a break in the uptrend apparent in the scatter plots showing the number of stations compared to the average ethanol concentration in Figure 6.5.1-2. This occurs around 2018. As noted in section II above, the blend rate has increased steadily over time except for a period in 2018 and stretching into 2019, when large-scale exemptions from the RFS were provided to small refineries. By using a technique to account for this (e.g., dummy variables or exempted volumes on the dates the grants were issued), the results of a linear regression between ethanol concentration and the number of stations might be improved.

Additionally, it should be noted that the Alternative Fuels Data Center (AFDC) has historically undercounted the number of E85 stations. RFA owns and operates the crowd-sourced website E85prices.com. This website tracks pricing data submitted by actual users or sellers of gasoline and ethanol-blended fuels and houses the most comprehensive E85 station locator in the country. There is a difference in the station approval process methodology that results in a higher count on e85prices.com, which RFA believes is more accurate. As of February 1, 2023, e85prices.com tracked 5,670 stations offering E85 in the U.S. RFA would be pleased to offer a more detailed explanation of the methodological difference and historical data on the number of E85 stations.

c. Food Costs

EPA estimated in the DRIA that the 2023-2025 RVOs would result in increases in food expenditures of approximately 0.57%.⁴⁷ However, the “methodology generally uses estimates of the impact of biofuel volumes on commodity prices (e.g., corn, soybean oil, etc.) to calculate the estimated impacts on total food expenditures.”⁴⁸ Moreover, EPA “assumed that changes in commodity prices are fully passed on to consumers at the retail level.”⁴⁹ However, this is a simplistic approach that doesn’t take into account adjustments in behavior by producers and consumers and the potential for changes/compression in margins.

A study published in 2020 by researchers at Purdue University and the National Center for Food and Agricultural Policy involved more extensive modeling of market conditions and food prices in two time periods: 2004-2011 and 2011-2016. The authors concluded, “In both time periods, the long run effects of biofuel production and policy on food prices were negligible. Changes in commodity prices do not translate directly to changes in food prices. When the ethanol RFS or both ethanol and biodiesel requirements were removed, the food price index fell by 0.04%. In other words, the RFS was responsible for only tiny changes in the overall food price index.”⁵⁰ It is also notable that the researchers

⁴⁷ EPA, *Draft Regulatory Impact Analysis*, 418.

⁴⁸ EPA, *Draft Regulatory Impact Analysis*, 415.

⁴⁹ EPA, *Draft Regulatory Impact Analysis*, 416.

⁵⁰ Taheripour, F., H. Baumes, and W.E. Tyner. “Economic Impacts of the U.S. Renewable Fuel Standard: An Ex-Post Evaluation.” *Frontiers in Energy Research* 10 (2022). <https://www.frontiersin.org/articles/10.3389/fenrg.2022.749738>.

found that the RFS increased farm incomes by more than \$1.4 billion in the first time period and \$2.4 billion in the second.

d. Air Quality

Starting in 2007, the U.S. Department of Energy (DOE) undertook a test program to evaluate the effects of mid-level ethanol blends on vehicle and fuel parameters. The research found that CO emissions were lower for E15 than ethanol-free gasoline (E0), while nitrogen oxide (NOx) and non-methane hydrocarbon (NMHC) emissions were not significantly different.⁵¹

In 2016, a literature review indicated that the use of ethanol reduces emissions of toxic compounds and is advantageous for both short- and long-term NOx emissions, and it noted that “many studies have shown the beneficial effects of ethanol blending on fuel [particulate matter] emissions.”⁵² The report concluded, “When blended into gasoline, ethanol increases the octane rating of the fuel enabling higher efficiency engines and is shown to decrease the emissions of several harmful pollutants.”

In addition, an emissions testing study by the University of California-Riverside released in 2022 showed that replacing E10 with E15 results in statistically significant reductions in the emissions of particulate matter, carbon monoxide, NMHC, total hydrocarbons (THC), and other harmful emissions.⁵³

XIII. Conclusion

RFA appreciates the opportunity to submit these comments in response to EPA’s proposed rule establishing RVOs for 2023-2025. We look forward to continued interaction with EPA as the Agency takes steps to finalize this proposal.

⁵¹ West, B.H., C. S. Sluder, K.E. Knoll, J.E. Orban, and J. Feng. *Intermediate Ethanol Blends Catalyst Durability Program*, February 2012, ORNL/TM-2011/234. <http://info.ornl.gov/sites/publications/files/Pub31271.pdf>.

⁵² Sobhani, S. “Air Pollution from Gasoline Powered Vehicles and the Potential Benefits of Ethanol Blending,” October 2016. http://energyfuturecoalition.org/wp-content/uploads/2016/12/final_clean-fuelsBOOK.pdf

⁵³ Karavalakis, G., T. Durbin, and T. Tang. *Comparison of Exhaust Emissions Between E10 CaRFG and Splash Blended E15*. June 2022. https://ww2.arb.ca.gov/sites/default/files/2022-07/E15_Final_Report_7-14-22_0.pdf