Via Email: OregonCleanFuels@deq.state.or.us

May 7, 2021

Ms. Cory-Ann Wind
Oregon Clean Fuels Program Manager
Department of Environmental Quality
700 NE Multnomah Street, Suite 600
Portland, OR 97232-4100

Re: Comments on Draft Long Term Illustrative Compliance Scenarios for the Oregon Clean Fuels Program

Dear Ms. Wind,

The Renewable Fuels Association (RFA) appreciates the opportunity to submit these comments regarding the draft long term illustrative compliance scenarios that were developed by ICF International (ICF) in connection with the planned expansion of the Oregon Clean Fuels Program (CFP) after 2025. The CFP currently requires a 10% reduction in the carbon intensity (CI) of transportation fuels by 2025 (relative to a 2015 baseline), and a March 2020 executive order by Governor Brown would expand the reductions to 20% by 2030 and 25% by 2035.

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 forum for industry leaders and supporters to discuss ethanol policy, regulation, and technical issues. RFA's 300-plus members are working to help America become cleaner, safer, more energy secure, and economically vibrant.

Overall, RFA believes the CFP has been effective in reducing greenhouse gas (GHG) emissions from the use of transportation fuels in Oregon, and we would support an expansion of the program, provided that it is technology- and feedstock-neutral and is based on performance toward reducing GHG emissions. RFA's comments address the following issues specific to the draft illustrative compliance scenarios:

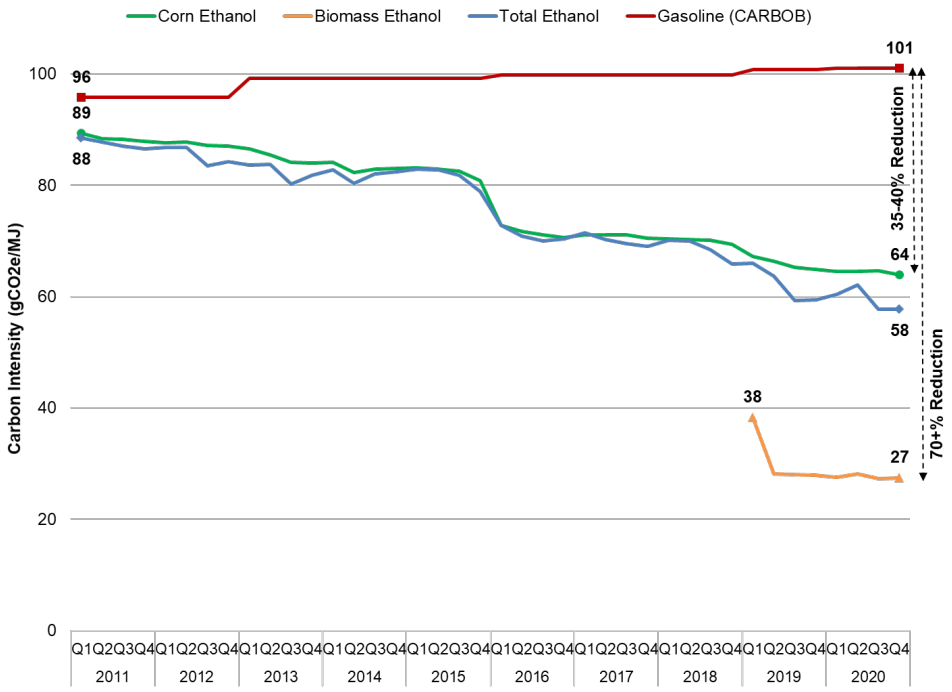
- Continued improvement in the CI of ethanol needs to be taken into account;
- Mid- and high-level ethanol blends can facilitate compliance with the CFP;
- There is uncertainty regarding the availability of low-CI biomass-based diesel;
- Economics do not appear to have been taken into account in the development of the scenarios; and
- The calculations underlying the scenarios are not transparent.

Incorporation of Continued Improvement in the CI of Ethanol

The illustrative compliance scenarios assume that the CI of ethanol consumed in Oregon will decline through 2023 at a pace consistent with past reductions, but that there will be no further improvements from 2024 to 2035. That is contrary to past experience in both the Oregon CFP and California Low Carbon Fuel Standard (LCFS), as well as new research on the CI of ethanol.

The average carbon intensity of ethanol used in California has fallen substantially since 2011, as ethanol producers have adopted new technologies and the California Air Resources Board has improved its modeling. The average CI of all ethanol used in California declined steadily from 88 grams of carbon dioxide equivalent per megajoule (gCO2e/MJ) in 2011 to 58 gCO2e/MJ in the fourth quarter of 2020, and is now 43% below that of gasoline blendstock (CARBOB) (Exhibit 1).[1] The CI of corn-based ethanol alone has fallen from 89 to 64 gCO2e/MJ over the same period and is 37% below gasoline; this could be further reduced by approximately 12 gCO2e/MJ if the California Air Resources Board (CARB) were to adopt the estimates used by Oregon related to land-use change.

Exhibit 1: Carbon Intensity of Ethanol and Gasoline Used in California



Source: RFA analysis of California Air Resources Board data

A similar pattern has been observed for ethanol used toward the Oregon CFP. The CI of ethanol used in Oregon has fallen from 63 gCO2e/MJ in 2016 to 55 gCO2e/MJ in 2020 (through the third quarter).[2] The ethanol used in Oregon is predominantly made

[1] California Air Resources Board. (2021). *Low Carbon Fuel Standard Reporting Tool Quarterly Summaries.* https://www.arb.ca.gov/fuels/lcfs/lrtqsummaries.htm

[2] Oregon Department of Environmental Quality. (2020). *Oregon Clean Fuels Program Quarterly Data Summaries*. https://www.oregon.gov/deq/ghgp/cfp/Pages/Quarterly-Data-Summaries.aspx

from corn. (California data was used for Exhibit 1 since it is available for twice as long a time period and since it can be disaggregated among sources of ethanol.)

It is notable that in the illustrative compliance scenarios conducted in connection with the 2018 amendments to the California LCFS, CARB assumed that the CI of starch (i.e., corn) ethanol would fall by 26 gCO2e/MJ, or 37%, between 2020 and 2030.[3]

Additionally, recent research demonstrates the improvements that have occurred in the CI of U.S.-produced ethanol over the last 15 years. According to an analysis published this month in the journal *Biofuels, Bioproducts and Biorefining,* scientists at the Department of Energy's Argonne National Laboratory determined that the carbon footprint of corn ethanol fell by 23% between 2005 and 2019, as farmers and ethanol producers adopted new technologies and improved efficiency. By 2019, the researchers found, corn ethanol reduced lifecycle GHG emissions by 44-52% compared to gasoline.[4]

These findings dovetail with a paper published earlier this year in *Environmental Research Letters* by researchers from Environmental Health & Engineering, Harvard University and Tufts University, which looked at estimates of corn ethanol's lifecycle GHG emissions from 1990 to 2020 and determined that the "central best estimate" of the current CI of corn ethanol is 46% lower than that of gasoline.[5]

Moreover, the market signals from the Oregon CFP, together with the California LCFS, provide the incentive for ethanol producers to reinvest in technologies and processes that further reduce CI, thereby allowing ethanol to contribute even more substantial GHG reductions under the CFP. Specifically, the following new and emerging biorefinery technologies could substantially reduce the CI of ethanol:

- Carbon capture and sequestration (CCS), particularly given the federal credit provided under Section 45Q of the Internal Revenue Code;
- Conversion of cellulosic kernel fiber;
- Substituting biogas for fossil natural gas for thermal energy needs; and
- Substituting renewable electricity for fossil electricity.

In fact, two major groups organizing large-scale CCS projects for the ethanol industry have been gaining momentum in recent months. Summit Carbon Solutions announced that 30 biorefineries across Iowa, Minnesota, North Dakota, South Dakota and Nebraska have agreed to join its network since its formal launch in February, with a

[3] California Air Resources Board. (2018). *Illustrative Compliance Scenario Calculator.* https://ww2.arb.ca.gov/our-work/programs/low-carbon-fuel-standard/lcfs-regulation

[4] Lee, U., Kwon, H., Wu, M. and Wang, M. (2021). Retrospective analysis of the U.S. corn ethanol industry for 2005–2019: implications for greenhouse gas emission reductions. *Biofuels, Bioprod. Bioref.*. https://doi.org/10.1002/bbb.2225

[5] Scully, M. J., Norris, G. A., Falconi, T. M. A., & MacIntosh, D. L. (2021). Carbon intensity of corn ethanol in the United States: state of the science. *Environmental Research Letters.* https://iopscience.iop.org/article/10.1088/1748-9326/abde08.

total committed carbon dioxide volume of 8 million metric tons per year.[6] In March, Valero and BlackRock announced that they are partnering with Navigator Energy Services to develop a CCS pipeline across Nebraska, Iowa, South Dakota, Minnesota and Illinois, and in a subsequent earnings call Valero noted the potential for a "70 to a 40 CI reduction" (i.e., a reduction of 30 gCO2e/MJ from CCS) and specifically referred to the Oregon CFP.[7]

The adoption of such technologies, together with the incorporation of soil carbon sequestration and other carbon-efficient farming practices into lifecycle analysis models, could make corn ethanol carbon-neutral or even carbon-negative in the next 5-10 years.

Finally, it is noteworthy that the illustrative compliance scenarios assume the CI of electricity will decline 7.2 gCO2e/MJ each year until it reaches zero in 2035. Additionally, the CI of biodiesel is assumed to decline 40% by 2035. As substantiated above, the CI of ethanol is declining, so this should be recognized in the scenarios in order to provide a consistent methodology across sources of energy used in transportation. Unfortunately, since the Excel file containing the scenarios results not contain formulas, it was not possible to determine how a change in the CI assumption for ethanol would affect the volumes of ethanol and other fuels used in the future.

Ability of Mid- and High-Level Ethanol Blends to Facilitate Compliance

RFA appreciates that the illustrative compliance scenarios reflect extensive future utilization of E15 in Oregon. The use of E15 reduces the CI of finished gasoline, and E15 is typically priced at a discount to E10. However, Oregon's Renewable Fuels Standard currently only allows the sale of gasoline containing 9.2-10% ethanol by volume (except for E85 flex fuel). As the scenarios show, approval to sell E15 will be crucially important to regulated parties seeking to comply with the CFP's more stringent future standards. Indeed, future CFP targets may be out of reach if E15 is not available as a compliance option. Thus, we encourage state regulators and lawmakers to work together to quickly adopt the changes necessary to allow fuel blenders and marketers to offer E15.

The ability of E15 consumption to ramp up and help meet CFP compliance targets is supported by recent market and regulatory developments. Notably, E15 sales in Iowa and Minnesota (the two states that report sales) have increased substantially since the EPA issued a rule in May 2019 allowing retailers to sell E15 year-round. Volumes in Iowa jumped 71% from 2018 to 2020, while those in Minnesota increased 25%.[8] In fact, Iowa E15 volumes increased 24% in 2020 alone, despite a 14% decline in overall gasoline sales (including blended ethanol) due to the pandemic.[9]

---

[6] Summit Carbon Solutions. (2021, April 29). Summit Carbon Solutions Announces Expansion into Nebraska and Consultant Partnerships [Press release]. https://www.summitcarbonsolutions.com/news/scsexpansionannouncement

[7] *Valero Energy Corporation (VLO) CEO Joe Gorder on Q1 2021 Results - Earnings Call Transcript.* Seeking Alpha. (2021, April 22). https://seekingalpha.com/article/4420685-valero-energy-corporation-vlo-ceo-joe-gorder-on-q1-2021-results-earnings-call-transcript.

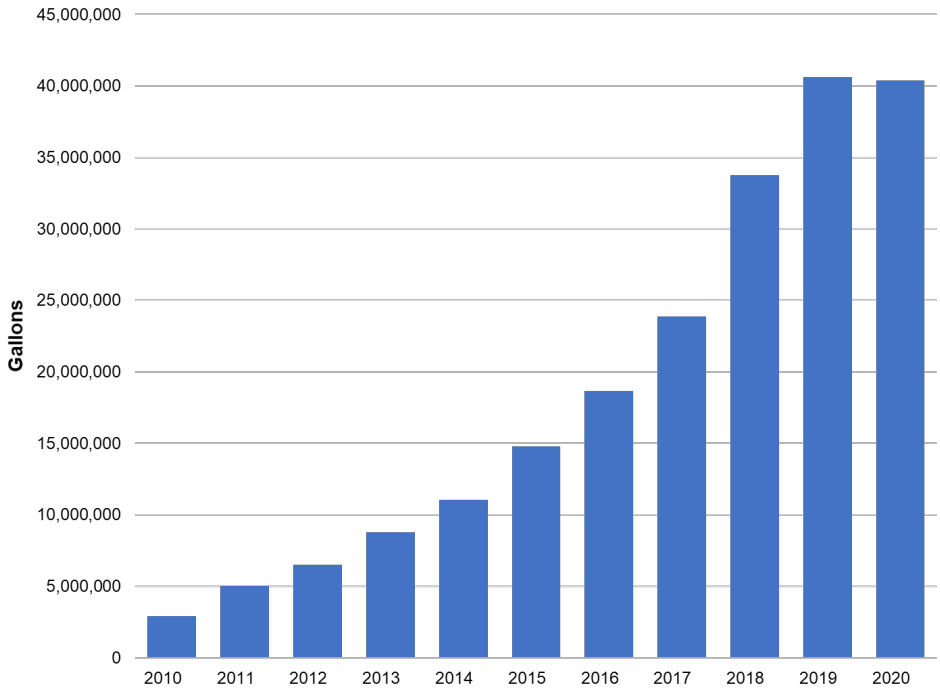
[8] Minnesota Department of Commerce. (2021). *2020 Minnesota E85 + mid-blends station report*. https://mn.gov/commerce-stat/pdfs/e85-fuel-use-2020.pdf

[9] Iowa Department of Revenue. (2021). *2020 Retailers motor fuel gallons annual report*. https://tax.iowa.gov/report-category/retailers-annual-gallons

Also supporting the future expansion of E15, the USDA conducted two rounds of awards under its Higher Blends Infrastructure Incentive Program (HBIIP) in 2020 and early 2021 to fund the upgrading or installation of equipment compatible with ethanol blends above E10 at retail stations and fuel terminals. In January, the EPA issued proposals to facilitate the demonstration of underground storage tank compatibility with higher-level blends and to ensure the compatibility of tanks that are installed and components that are replaced in the future. Such measures, along with the incentive the Oregon CFP provides to lower-CI fuels, justify the illustrative compliance scenarios reflecting increasing E15 usage starting in 2025 and full adoption starting in 2030—and it is possible that the timing of state E15 approval will allow adoption to occur even sooner.

Moreover, ethanol blends beyond E15 can contribute further to compliance with the CFP. Consumption of E85 flex fuel (fuel containing up to 85% ethanol) has surged under the California LCFS. Volumes have increased more than tenfold since 2010 (Exhibit 2).[10] Even with COVID-related market disruptions, E85 use in 2020 declined less than 1% from 2019's record level.

Exhibit 2: E85 Consumption in California



Source: California Air Resources Board

As discussed below, the assumptions in the Excel file for the illustrative compliance scenarios mention flex-fuel vehicles (FFVs) using E85 for "25% of miles," but it does not appear that this was included in the calculations. Additionally, the assumptions regarding how many FFVs will be in Oregon's vehicle population and how many miles they will travel annually are not clear. It is recommended that the scenarios incorporate the use of E85,

[10] California Air Resources Board. (2021). *Alternative fuels: annual E85 volumes*. https://ww2.arb.ca.gov/resources/documents/alternative-fuels-annual-e85-volumes

either through the mechanism mentioned in the Excel file or by assuming that consumption will follow a trajectory similar to that experienced in California (adjusted for relative fuel volumes).

Finally, given that CFP expansion will be implemented through 2035, it should be noted that mid-level blends such as E30 could be adopted during the timeframe reflected in the scenarios. The usage of E30 in high-compression engines has the potential to contribute to automakers meeting corporate average fuel economy requirements.

Uncertainty Regarding the Availability of Low-CI Biomass-based Diesel

Biomass-based diesel (BBD) is expected to have an important role in the decarbonization of Oregon's transportation fuel supply, particularly for heavy-duty vehicles. Still, it appears that the illustrative compliance scenarios that incorporate BBD from low-CI feedstocks may overstate the availability of such BBD—specifically from tallow—although it is beyond the scope of these comments to conduct a thorough analysis of the future supply and demand of BBD. The low-CI subgroup of scenarios (those designated with an "A" at the end of the label) assumed 40 million gallons of BBD from corn oil and 200 million gallons of BBD from tallow will be used annually.

Distillers corn oil is a coproduct of ethanol production, and tallow is a byproduct of beef packing. Further, there are edible, technical and inedible grades of tallow, with edible and technical grades having established uses and the highest value. The rate of growth of ethanol production has slowed over the last few years (and declined in 2020 due to the pandemic), and tallow production is a function of the number of cattle slaughtered, which tends to increase slowly over time and is cyclical, and animal weights. As a result, the production of both feedstocks is unlikely to increase extensively over the next few years.

California consumed 216 million gallons of BBD from distillers corn oil and 229 million gallons of BBD from tallow annually on average in 2019 and 2020.[11] Although past reporting by the U.S. Energy Information Administration regarding the usage of different feedstocks for BBD production has been incomplete, it can be surmised from available data that California has been the destination for a large share of BBD produced from these low-CI feedstocks, due to the LCFS.

Given the supply and historical usage of tallow, it appears questionable whether in the near-to-intermediate term Oregon could attract a volume of tallow-based BBD of the same magnitude as California currently uses, particularly given that the targets for California's LCFS are also becoming more stringent. It appears that usage of 40 million gallons of BBD from distillers corn oil is more attainable, though this would also likely represent a significant share of the volume used outside of California.

The uncertainty regarding the availability of BBD from low-CI feedstocks is yet another reason for recognizing the continued improvements in ethanol's CI that are expected to occur.

[11] California Air Resources Board. (2021). *Low Carbon Fuel Standard Reporting Tool Quarterly Summaries.* https://www.arb.ca.gov/fuels/lcfs/lrtqsummaries.htm

Economics Do Not Appear to Have Been Taken Into Account in The Development of the Scenarios

It does not appear that feedstock and biofuel production economics were taken into account in developing the scenarios, based on the online presentation as well as the Excel file that was provided. The scenario outcomes appear to be mainly a function of CI assumptions and various policy combinations. It is not clear that the outcomes reflect how the required CI reductions can be achieved at the lowest cost. It is recommended that economics be considered during the process of expanding the CFP.

The Calculations Underlying the Scenarios Are Not Transparent

RFA appreciated the April 21, 2021 ICF presentation of the illustrative compliance scenarios and the associated comments by staff from the Department of Environmental Quality (DEQ). However, the Excel file that was subsequently posted on the DEQ website contained only numerical values for the scenarios rather than the underlying formulas. As a result, it was not possible to tell how the outcomes were determined, nor how sensitive they are to changes in the assumptions and any constraints.

For example, cell D23 of the "Scenarios" tab in the Excel file states, "'Ethanol' means increasing ethanol blends in gasoline eventually to E15 plus FFVs using E85 for 25% of miles." However, the "Ethanol Blend %" section of the "CARBOB-ULSD-Ethanol" tab shows a static blend rate of 15% starting in 2030 for all scenarios except 1C. It does not appear that the E85 assumption was incorporated into the blend rates, and it is not possible to determine how the trajectory of ethanol volumes (a decline after 2030) would have been affected by modifying the "Ethanol Blend %" section to reflect E85.

Additionally, it is not possible to know whether issues beyond those addressed in these comments would have been identified by reviewing the formulas used to develop the scenarios.

Conclusion

RFA supports the expansion of Oregon's Clean Fuels Program, provided that it is technology- and feedstock-neutral and is based on performance toward reducing carbon emissions. We hope that DEQ will take the comments detailed above into consideration as it moves forward in the rulemaking process.

Thank you again for the opportunity to submit these comments.

Sincerely,

Scott Richman
Chief Economist