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California Air Resources Board
P.O. Box 2815
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Submitted electronically via: <https://ww2.arb.ca.gov/public-comments/public-comments-regarding-auto-acceleration-mechanisms-low-carbon-fuel-standard>

RE: POET COMMENTS ON MAY 23, 2023 LCFS AUTO-ACCELERATION MECHANISM WORKSHOP

Dear Dr. Laskowski:

POET appreciates the opportunity to provide comments on the May 23, 2023 Public Workshop on an Auto-Acceleration Mechanism and Step Down Benchmark Considerations for the Low Carbon Fuel Standard.

I. ABOUT POET

POET is deeply committed to reducing greenhouse gas (GHG) emissions and developing cleaner, affordable alternative fuels in California and the United States. POET is the world's largest biofuels producer and currently operates 34 biorefineries capable of producing three billion gallons of starch and cellulosic ethanol. Renewable, clean-burning biofuels like those produced by POET cut carbon emissions by an average of 46 percent compared to gasoline,¹ which can have an enormous impact on reducing the amount of GHG in the atmosphere. POET continues to innovate and further reduce its products' GHG emissions.

POET strongly supports CARB's dedication to the decarbonization of the transportation sector and is committed to continuing to deliver increasingly lower-carbon, sustainable biofuels that will play an integral role in supporting the achievement of California's climate goals. POET has previously provided extensive and detailed data and information to CARB regarding the significant climate, as well as air quality and economic benefits that low-carbon, sustainable biofuels provide for California. (For reference, some of this information is again included below).

¹ Scully, Melissa *et al*, *Carbon intensity of corn ethanol in the United States: state of the science*, 2021 Environ. Res. Lett 16 043001, 4 (2021), <https://iopscience.iop.org/article/10.1088/1748-9326/abde08>.

II. SPECIFIC COMMENTS ON THE MAY 23 WORKSHOP

As presented at the May 23 workshop, the objectives for the LCFS rulemaking include 1) updating the program to support increased low-carbon fuel supply as identified in the 2022 Scoping Plan Update; and 2) to provide long-term price signals and increase regulatory clarity for the market to support deeper transportation sector decarbonization. A near-term compliance target step-down and a well designed auto-acceleration mechanism can help achieve these objectives most effectively if CARB ensures that the LCFS program continues to appropriately recognize and accurately account for the significant benefits that sustainable biofuels can deliver for California's transportation sector decarbonization goals.

POET supports the consideration of an auto-acceleration mechanism as part of the upcoming LCFS rulemaking. However, such a mechanism will only be successful in helping to promote achievement of more stringent 2030 (and future year) carbon intensity reduction targets if the LCFS program is optimally designed to drive ongoing and maximal investment in all low-carbon fuels and technologies, including plant-based biofuels. To meet its ambitious climate goals, California cannot afford to constrain the role that proven and constantly innovating low-carbon fuels can deliver – especially as GHG reductions in the transportation sector will need to increase significantly in coming years. As such, it is crucial that CARB – in addition to considering incorporation of an auto-acceleration mechanism – take the necessary steps as part of the upcoming rulemaking to ensure that plant-based biofuels continue to play a central role moving forward.

III. LOW-CARBON PLANT-BASED BIOFUELS MUST CONTINUE TO PLAY A CENTRAL ROLE MOVING FORWARD

Sustainable biofuels have delivered major support to California's efforts to drive down emissions in the transportation sector, and it is critical to ensure that plant-based biofuels continue to play a central role moving forward.

a. Environmental Benefits of Biofuels

i. Air Quality and GHG Emissions

Biofuels are readily available to support CARB's efforts to decarbonize the transportation sector while also providing immediate air quality and public health benefits to California and its residents.

The Scoping Plan acknowledges that liquid petroleum fuel will remain in California's transportation fuel mix for decades to come, as sales of gasoline-fueled cars will not end overnight and internal combustion vehicles will remain on the road for many years.² CARB should incentivize the reduction of gasoline's carbon intensity (CI) in this legacy fleet, and we urge CARB to look to biofuels to achieve these reductions. Recent research demonstrates that corn bioethanol has a 46 percent average lower CI than gasoline,³ which means that as long as there are gasoline-fueled cars on the road in California, incentives to increase blending of bioethanol into that fuel

² 2022 Scoping Plan for Achieving Carbon Neutrality (Nov. 16, 2022), p. 190.

³ Scully, *supra* note 1.

will immediately advance California’s decarbonization efforts. The LCFS must continue to incentivize lower-carbon biofuels, just as it has for over a decade.

The LCFS also plays an important role in driving innovation that will further reduce the CI of biofuels and, accordingly, of the transportation sector. There have been many advances with respect to the GHG impact of biofuels over the past decade, including emissions reductions associated with improved production methods, CO₂ utilization and sequestration, climate-smart farming practices, and co-products that reduce waste and provide additional benefits. The LCFS provides a major incentive to continue these innovations.

Biofuels not only drive down the CI of the transportation sector but also provide air quality benefits as they displace liquid petroleum fuels. Recent analyses from leading national experts from Harvard find air quality and public health benefits from higher biofuel blends in gasoline, including reductions in particulate matter (PM), carbon monoxide (CO), and total hydrocarbons (THC).⁴ This study is the first large-scale analysis of data from light-duty vehicle emissions that examines real-world impacts of bioethanol-blended fuels on regulated air pollutant emissions. The study found that CO and THC emissions were significantly lower for higher bioethanol fuels for port fuel injected engines under cold-start conditions. THCs include VOCs, meaning that both primary ozone precursors decreased with higher bioethanol blends. The study found no statistically significant relationship between higher bioethanol blends and NO_x emissions. These improvements to air quality can benefit all Californians, but the research shows that the associated health benefits may be most significant in disadvantaged communities in areas of high traffic density and congestion.⁵ Additionally, CARB recently published a Multimedia Evaluation of E11-E15 Tier 1 Report with conclusions consistent with the these analyses.⁶

These benefits are directly attributable to biofuels, proving that biofuel should play a key role in helping CARB meet the state’s climate goals, improving public health, and achieving federal and state air quality standards. CARB recognized the role of bioethanol in the LCFS program’s success during the December 7, 2021 Public Workshop on Potential Future Changes to the LCFS program. As CARB noted, bioethanol has effectively displaced fossil fuels to reduce net GHG emissions. In 2020, bioethanol was the largest source of LCFS compliance by volume and the second-largest source by number of credits. Bioethanol has accomplished all of this, and even levels of production that allow the U.S. to export bioethanol, without any noticeable impact on corn acres in the U.S. or on food prices.

Further, bioethanol is poised to make even greater contributions to the LCFS program moving forward. As the chart below shows, bioethanol has the ability to become a zero-carbon fuel with technologies already being implemented or on the cusp of commercialization.

⁴ See Kazemiparkouhi, Fatemeh et al., *Comprehensive US database and model for ethanol blend effects on regulated tailpipe emissions*, SCIENCE OF THE TOTAL ENVIRONMENT (March 2022), <https://www.sciencedirect.com/science/article/pii/S0048969721065049?via%3Dihub>.

⁵ See Attachment A, Tufts University Department of Civil and Environmental Engineering, *Air Quality and Public Health Comments to RFS* (Feb. 3, 2022).

⁶ *Multimedia Evaluation of E11-E15 Tier 1 Report* (June 4, 2020), https://ww2.arb.ca.gov/sites/default/files/2022-07/E15_Tier_I_Report_June_2020.pdf.



While POET is aware that there is disagreement over aspects of bioethanol’s CI, several things are clear: bioethanol has played a key role in the LCFS program’s success, bioethanol producers have worked and continue to work hard to lower their product’s CI in ways that meaningfully reduce national and global GHG emissions, and bioethanol is poised to remain a key element of the low-carbon fuels market for decades to come.

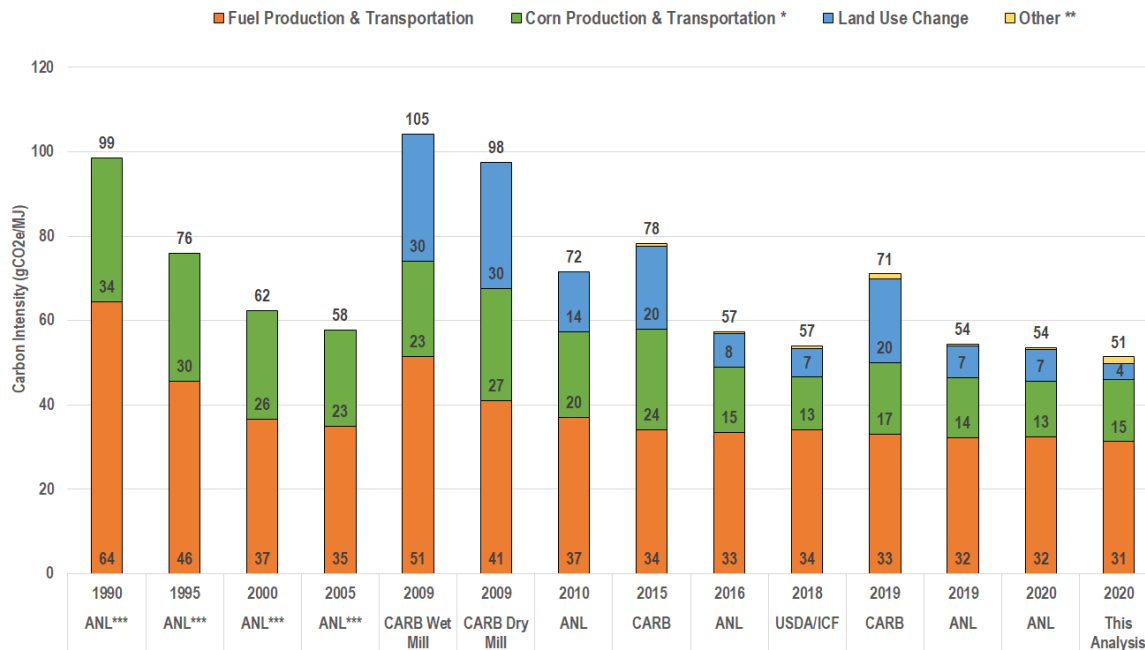
ii. Land Use Change

POET acknowledges that there has been much debate about the effect that biofuels have on land use change (LUC), but we respectfully contend that those concerns are misplaced. Fears about the impact of biofuels on LUC are invariably based on outdated research, a misinterpretation of valid data, or the use of invalid data. The best available scientific literature concludes that the CI value for corn bioethanol’s LUC is approximately 4 gCO₂e/MJ, including direct and indirect LUC (ILUC).⁷ That CI value is significantly lower than California’s LCFS 2019 iteration of GREET (CA GREET3.0). Some studies even indicate that biofuel production does not induce any ILUC.⁸

Since 2008, scientific assessments of LUC associated with bioethanol production have changed substantially. Most of these studies have shown downward trends in LUC carbon impacts, as illustrated in the figure below:

⁷ Scully, *supra* note 1 at pg. 4.

⁸ Kim S, Dale BE. 2011. *Indirect land use change for biofuels: Testing predictions and improving analytical methodologies*. BIOMASS AND BIOENERGY, 35(7):3235-3240. 10.1016/j.biombioe.2011.04.039; Kline KL, Oladosu GA, Dale VH, McBride AC. *Scientific analysis is essential to assess biofuel policy effects: In response to the paper by Kim and Dale on “Indirect land-use change for biofuels: Testing predictions and improving analytical methodologies”*. (10):4488-4491. 10.1016/j.biombioe.2011.08.011.



* Corn Production & Transportation includes farming, feedstock transport, and co-product credit.

** Other less significant emission categories account for fewer than 2 gCO₂e/MJ.

*** Models did not incorporate land use change.

Most LUC estimates are now converging on substantially lower estimates than those established through CARB’s prior analysis in the March 2015 Staff Report on ILUC values.⁹ Reliable analyses of LUC impacts generally draw from the GTAP agro-economic model and have consistent approaches to the economic baseline year (2004), incorporation of yield price elasticity (of approximately .25), and, significantly, address the concept of land intensification.¹⁰ Scientific literature supports the conclusion that land intensification—defined as the production of greater volumes of a crop or multiple crops on existing land—is a key factor in appropriately assessing LUC.¹¹ From 2005 to 2012, a period in which the United States experienced a significant increase in bioethanol production, the surge in harvested crop was due primarily to land intensification rather than conversion of land to agricultural uses.¹²

⁹ A recent study by Lark, et al., estimates a higher LUC value for corn starch bioethanol. Rebuttals were recently published by Environmental Health & Engineering, <https://www.pnas.org/doi/10.1073/pnas.2213961119>, and the Department of Energy, https://greet.es.anl.gov/publication-comment_enviro_outcomes_us_rfs. See Lark, Tyler et al., *Environmental Outcomes of the US Renewable Fuel Standard*, PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES (PNAS) (2022), <https://doi.org/10.1073/pnas.2101084119>.

¹⁰ See, e.g., Rosenfeld J, Lewandrowski J, Hendrickson T, Jaglo K, et al., *A Life-Cycle Analysis of the Greenhouse Gas Emissions from Corn-Based Ethanol*, ICF (2018); Taheripour F, Zhao X, Tyner WE, *The impact of considering land intensification and updated data on biofuels land use change and emissions estimates*. BIOTECHNOL. BIOFUELS, (2017) DOI: 10.1186/s13068-017-0877-y.

¹¹ Scully, *supra* note 1 at pg. 7.

¹² Babcock BA, Iqbal Z, *Using Recent Land Use Changes to Validate Land Use Change Models*, CARD Staff Reports (2014); Taheripour F, Cui H, Tyner WE, *An Exploration of agricultural land use change at the intensive and extensive margins: implications for biofuels induced land use change*, BIOENERGY AND LAND USE CHANGE:19-37 (2017a).

b. Consumer Benefits of Biofuels

Real-world evidence and economic analyses both show that increased bioethanol blends lower the cost of gasoline for consumers. In states where gasoline blended with 15% bioethanol (E15) is available for sale (31 states today), E15 has sold this year for as much as \$1 less per gallon compared to regular gasoline blended with only 10% bioethanol (E10).¹³ A recent economic analysis found that similar benefits could be realized by California if E15 is authorized for sale in the state.¹⁴ Similarly, gasoline blended with 51-83% bioethanol (E85) has sold for \$2-\$3 less per gallon compared to regular gasoline. In each case, the LCFS provides incentives for those increased bioethanol blends and the associated consumer cost-saving benefits, which are of particular importance at this time in light of the historically high transportation fuel costs that Californians have recently experienced.

c. Biofuels and Food Supplies

Biofuel production in the United States does not meaningfully reduce supplies of food for a number of reasons. It is a common misconception that bioethanol production diverts corn from dinner plates to gas tanks. Corn-based bioethanol is made from field corn, a different type of crop than the sweet corn that is produced for human consumption.¹⁵ Furthermore, the bioethanol process results in a wide variety of co-products, perhaps the most significant of which is high-quality animal feed that contributes directly to the production of chicken, beef, pork, and other nutritious food. Specifically, one bushel of corn produces 2.8 gallons of bioethanol as well as 17-18 pounds of distillers dried grains (DDGS), a highly nutritious animal feed. That feed is supplied to food producers here in the U.S. and around the world. The renewable CO₂ from bioethanol production is also critical for meat processing, beer and soda carbonation, and water treatment.

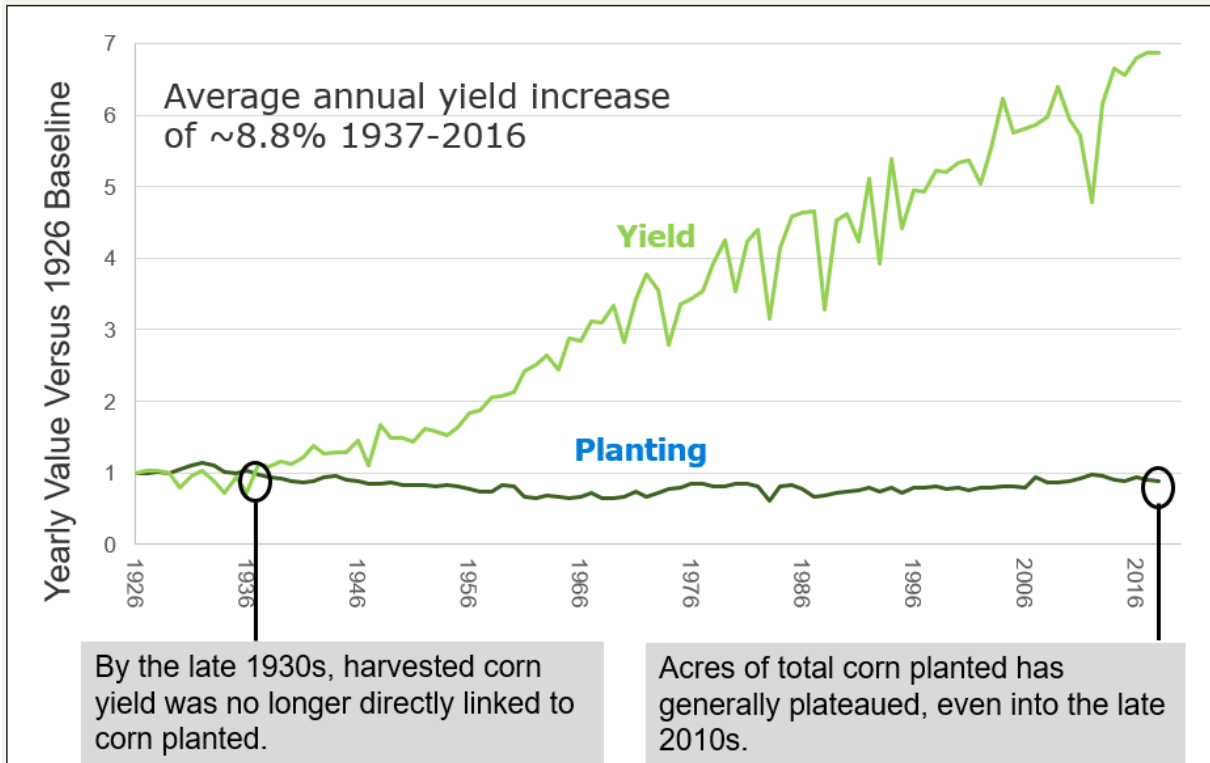
Finally, as discussed above, farming practices like crop intensification and cover cropping have significantly improved the yield of all crops, further negating the impact of biofuel production on food crops. As USDA and numerous others have noted, yields have and continue to climb while acreage has remained unchanged for the last century.

¹³ *Nationwide E15 Would Save Drivers Over \$20 Billion in Annual Fuel Cost*, GROWTH ENERGY (Oct. 17, 2022), <https://growthenergy.org/2022/10/17/study-access-to-e15-fuel-would-save-drivers-over-20-billion-in-annual-fuel-costs/>.

¹⁴ See Attachment B, *Evaluation of Potential E15 Sales in California*, EDGEWORTH ECONOMICS (April 5, 2022).

¹⁵ See <https://growthenergy.org/choice-at-the-pump/setting-the-record-straight/>.

Corn Acreage Has Remained Stable for Nearly 100 Years

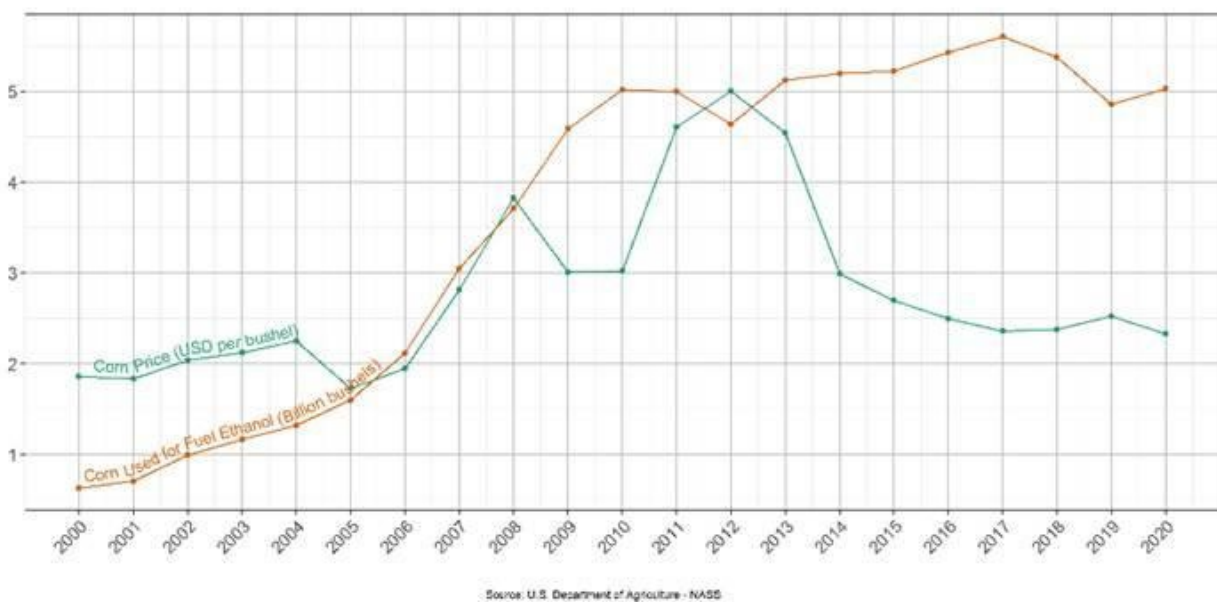


Source: USDA Crop Production Historical Track Records, 2019. (NASS data)

Empirical data show that the price of food is closely correlated with the cost of crude oil rather than field corn. The graph below using FAO EIA data shows this significant correlation between food and oil prices:



The below graph compares overall corn prices with prices of corn used for bioethanol, showing that there is no statistically significant correlation between bioethanol prices and food prices:



California’s LCFS has incentivized biofuel production, which has driven down the CI of liquid fuels, reduced air pollution, improved Californians’ health, and saved Californians money. At the same time, concerns about the impacts of biofuel production are not supported by facts or science and therefore should not distract CARB from further incentivizing biofuel production. We appreciate CARB staff’s ongoing commitment to carefully review and analyze the data and information that POET and others have previously and are here again providing. As CARB works to address climate change, we urge you to ensure that the LCFS and other programs recognize how important biofuels are to decarbonizing the transportation sector and reaching the state’s ambitious goals.

IV. APPROVE E15 AS A FUEL IN CALIFORNIA

A key stated rationale for this LCFS rulemaking is to “support increased low carbon fuel supply.” In addition to evaluating how more stringent CI reduction targets and the addition of features like an auto-acceleration mechanism can further this goal, CARB should take action as expeditiously as possible to complete the process it has begun to approve E15 as a fuel in the state. California is now one of only two locations in the nation, along with Montana, that currently do not allow the sale of E15. By expanding the market for one of the largest sources of compliance by almost 50% in California, E15 would ease compliance burdens and support CARB’s goal to achieve greater GHG emission reductions in coming years under the LCFS, while also delivering air quality benefits for Californians, especially in disadvantaged communities that often experience disparate effects from mobile source emissions.

For the last several years, CARB has been undertaking a multimedia analysis of E15 to ensure that its introduction will not have unanticipated environmental consequences. On Friday, July 29, 2022, CARB posted the multimedia evaluation of E15 blends Tier 1 report. As discussed above, the

results of the analysis show positive net environmental impacts due to E15, such as reductions in PM emissions. So these additional environmental benefits can be realized, CARB should immediately undertake an update to its fuel specifications to allow for the sale of E15 in California.

V. CONCLUSION

At POET, our mission is to cultivate a world in harmony with nature, where everyone has equal access to affordable, environmentally conscious fuel choices. We are constantly innovating to make biofuel production more efficient while developing more renewable bioproducts that will pave the way to a smarter, more sustainable future.

POET appreciates the opportunity to comment and looks forward to working with CARB to make the LCFS a continued success for California. If you have any questions, please contact me at Janie.Kilgore@POET.COM or (202)756-5603.

Sincerely,



Janie Kilgore

Associate Regulatory Counsel