HEADQUARTERS
4615 N. Lewis Ave.
Sioux Falls, SD 57104
Ph: (605) 965-2200
poet.com

August 8, 2022

Dr. Cheryl Laskowski
Branch Chief, Transportation Fuels
California Air Resources Board
P.O. Box 2815
Sacramento, CA 95812
[submitted electronically]

RE: POET COMMENTS IN RESPONSE TO JULY 7, 2022 LCFS WORKSHOP

Dear Dr. Laskowski:

POET appreciates the opportunity to provide comments in response to the California Air Resources Board's (CARB) July 7, 2022 Low Carbon Fuel Standard (LCFS) Workshop. POET strongly supports CARB's dedication to the decarbonization of the transportation sector and believes low-carbon fuel will play an integral role in CARB's overall decarbonization strategy.

Our comments cover a myriad of issues that we respectfully ask CARB to consider as it seeks to update the LCFS program. These include:

- Recognizing that plant-based biofuels must continue to play a central role moving forward;
- Incentivizing sustainable low-carbon farming practices;
- Recognizing off-site renewable energy production for bioethanol plants;
- Updating modeling to reflect the best available science related to corn starch bioethanol;
- Updating the CA-GREET model to reflect best-available science on land use change; and
- Approving the sale of E15 as a fuel in California.

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 33 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' greenhouse gas emissions.

II. RECOGNIZE THAT PLANT-BASED BIOFUELS MUST CONTINUE TO PLAY A CENTRAL ROLE MOVING FORWARD

Since 2011, the LCFS has been a critical component of California's nation-leading efforts to reduce GHG emissions and achieve carbon neutrality. The LCFS has also served as the gold standard for other jurisdictions, with similar programs currently in place in Oregon and British Columbia, a program recently finalized for all of Canada, and a new program under development in Washington.

POET supports the LCFS and commends CARB for its tireless work to administer the program. We also support CARB's work to further refine the LCFS as part of the broader effort to draft, and then implement, the 2022 Climate Change Scoping Plan. To that end, and in response to some recent concerns regarding biofuels, we urge CARB to recognize that plant-based biofuels have been a cornerstone of the LCFS and must 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's Proposed Scenario 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 those cars 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 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, CO_2 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 find air

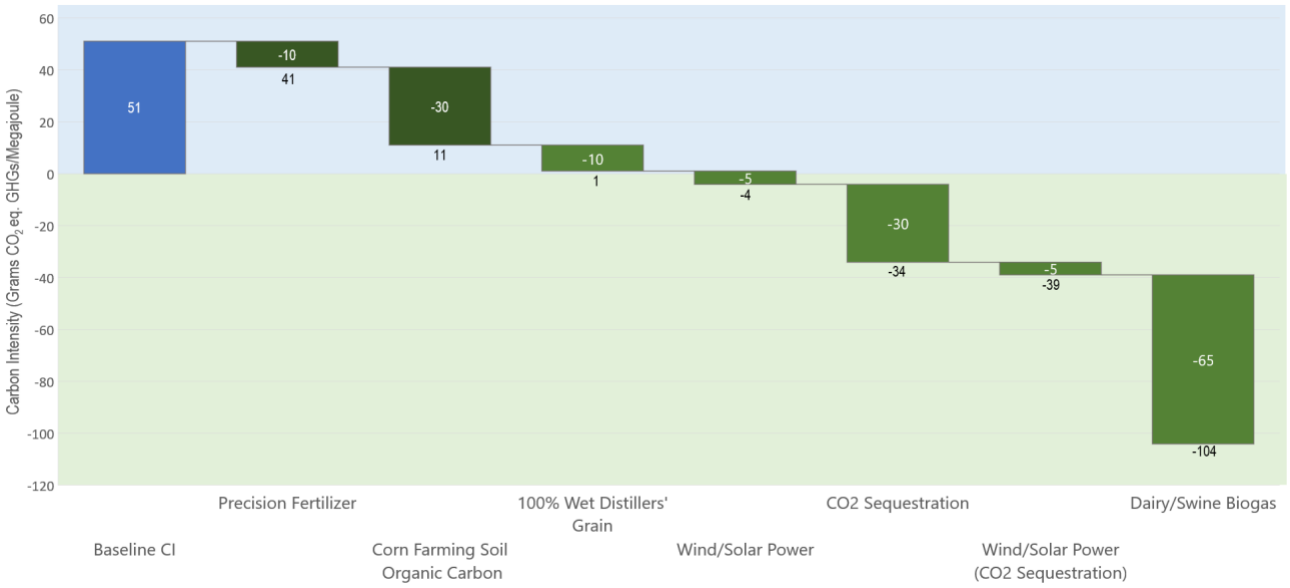
[1] Scully, Melissa *et al*, *Carbon intensity of corn ethanol in the United States: state of the science*, 2021 Environ. Res. Lett 16 043001, 4 (2021), https://iopscience.iop.org/article/10.1088/1748-9326/abde08.
[2] *Draft 2022 Scoping Plan*, p. 83, https://ww2.arb.ca.gov/sites/default/files/2022-05/2022-draft-sp.pdf.
[3] Scully, *supra* note 1.

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] The 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 NOx 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 continued to be 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* Attachment A, Kazemiparkouhi, Fatemeh et. al, *Comprehensive US database and model for ethanol blend effects on regulated tailpipe emissions* (2022), under review.
[5] *See* Attachment B, 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.



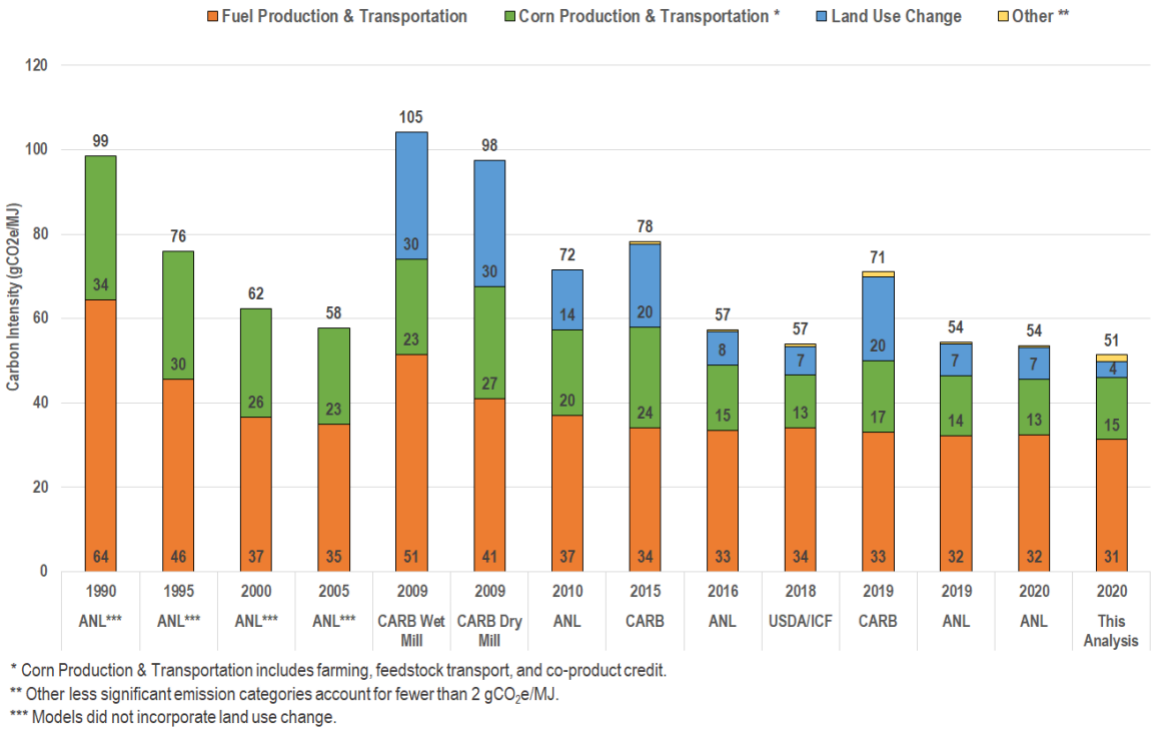
While POET is aware that there is disagreement over aspects of bioethanol's CI, several things are clear: bioethanol has played a key role in the LCFS program's success, bioethanol producers have worked and continue to work hard to lower their product's CI in ways that meaningfully reduce national and 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 gCO_2e/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 gCO_2e/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. POET and others are reviewing the study, and the Department of Energy recently published a rebuttal: https://greet.es.anl.gov/publication-comment_environ_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: 10:191. 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

Despite recent unfounded arguments to the contrary, bioethanol's environmental benefits come at no cost to California consumers. In fact, those benefits come with cost savings.

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 in recent months for as much as $1 less per gallon compared to regular gasoline blended with only 10% bioethanol (E10). A recent economic analysis found that similar benefits could be realized by California if E15 is authorized for sale in the state.[13] Similarly, gasoline blended with 51-83% bioethanol (E85) has sold in recent months 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 benefits.

A recent letter to CARB claimed, without support, that the LCFS is among a set of policies that impose a societal cost, measured in dollars per gallon and dollars per metric ton of GHG emission reduction. Such a cost simply cannot be attributed to the LCFS. The LCFS does, in fact, provide monetary incentives for low-carbon renewable fuel producers, but the program is structured such that those incentives are funded by higher-carbon fuel producers. Accordingly, the LCFS serves to reduce GHG emissions in two ways at once, penalizing higher-carbon fuels and rewarding lower-carbon fuels (like biofuels), all without imposing any new taxes and while saving Californians money at the pump. Additionally, surplus money generated from the LCFS program can be invested in California's transition to clean transportation.

c. Biofuels and Food Supplies

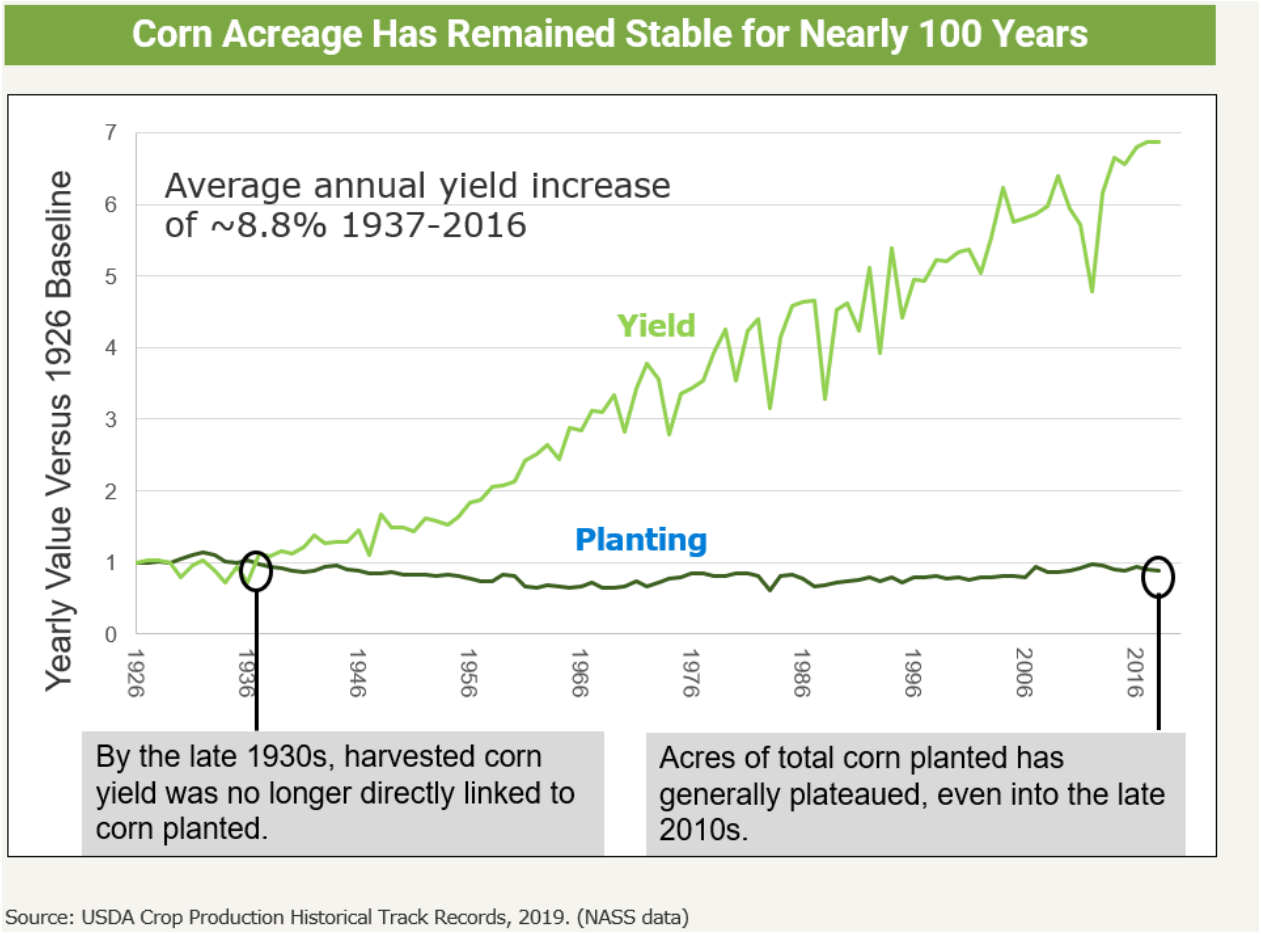
Recent debates have focused on concerns that biofuel production has a negative impact on food supplies and costs. While we respectfully acknowledge different opinions on this issue, the facts should put these concerns to rest.

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.[14] 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 CO_2 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.

---

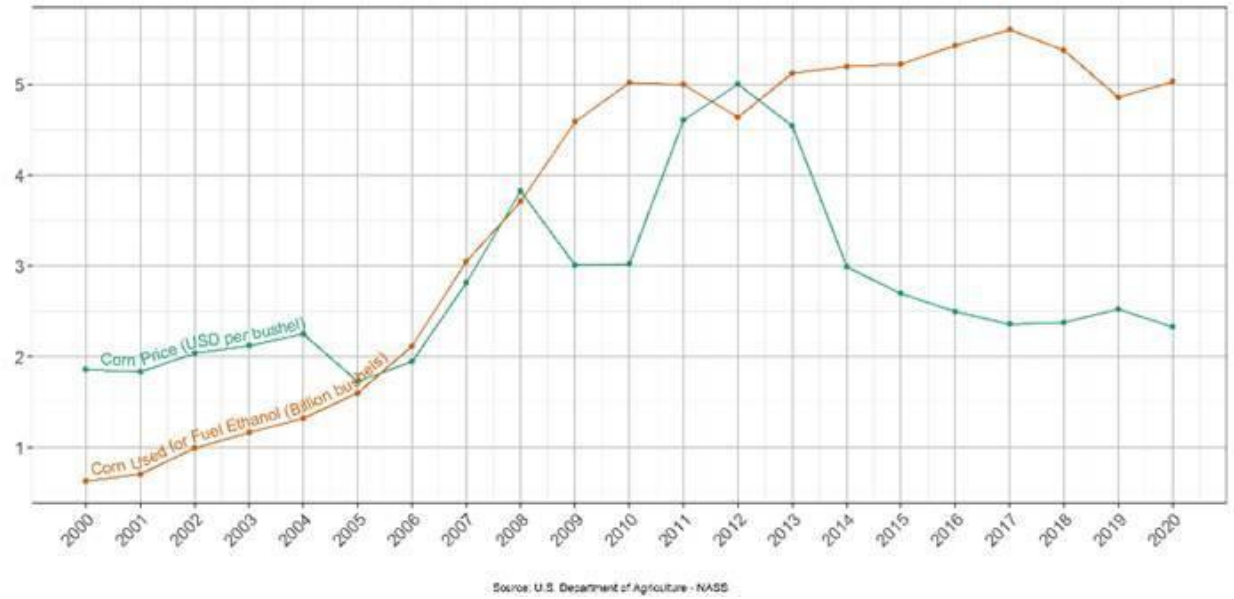
[13] *See* Attachment C, *Evaluation of Potential E15 Salfes in California*, EDGEWORTH ECONOMICS (April 5, 2022).
[14] *See* https://growthenergy.org/choice-at-the-pump/setting-the-record-straight/.



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:



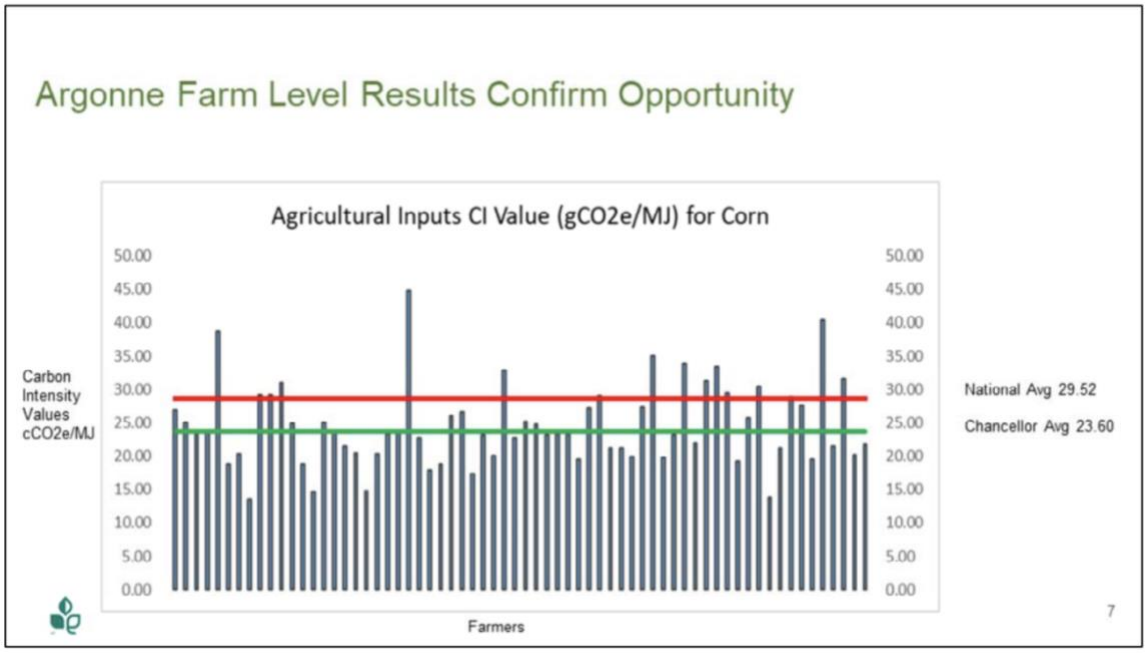
California's LCFS has incentivized biofuel production, which has driven down the CI of liquid fuels, reduced air pollution, improved Californians' health, and saved Californians money. At the same time, concerns about the impacts of biofuel production are not supported by facts or science and therefore should not distract CARB from further incentivizing biofuel production. 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.

III. INCENTIVIZE SUSTAINABLE LOW-CARBON FARMING PRACTICES

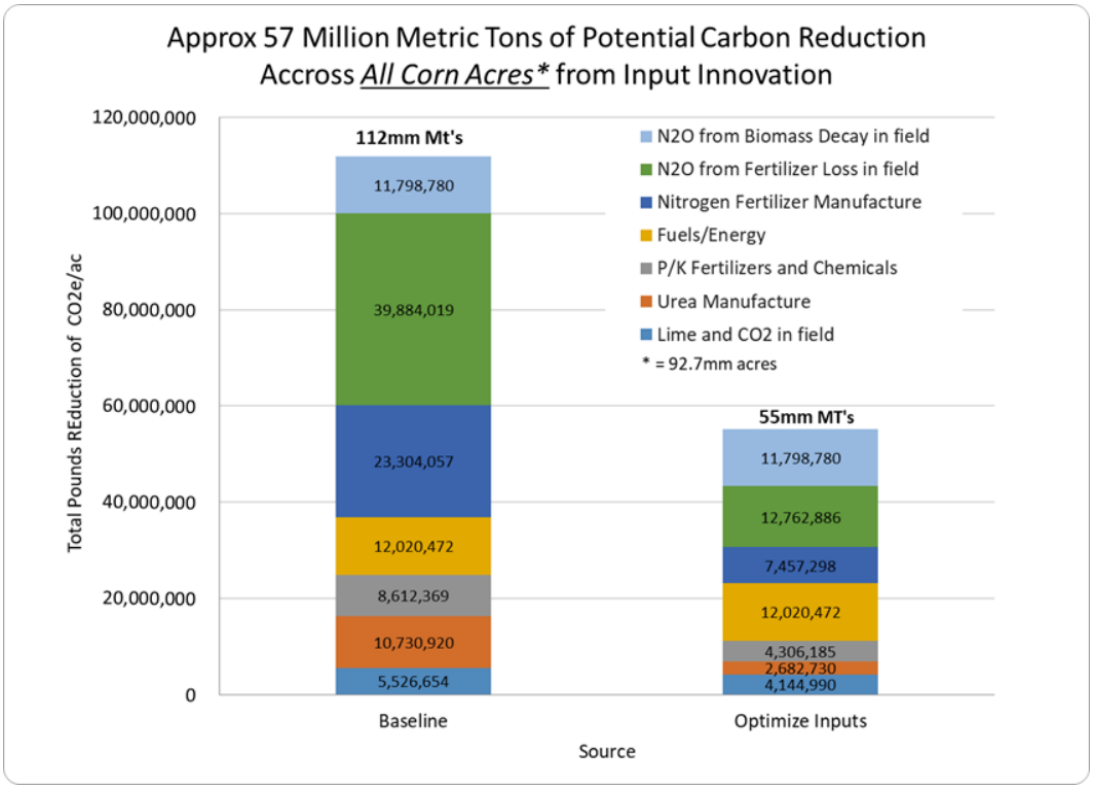
In previous workshops, CARB noted that many stakeholders had requested consideration of site-specific agricultural inputs in fuel pathway lifecycle analyses. POET, in fact, presented on this topic at a CARB workshop in October 2020. POET is among the stakeholders who believe that CARB is in a position to incentivize enormous changes in the agricultural supply chain that would lead to significant reductions in agricultural GHG emissions. By allowing site-specific agricultural inputs, CARB can encourage reduced agricultural GHG emissions through readily available technologies such as better tillage practices and nitrogen and biodiversity management, as well as incentivize the agricultural supply chain to reduce GHG impacts in new and innovative ways.

POET worked with the Farmers Business Network and Argonne National Labs to create Gradable, a program to encourage sustainable farming, validate data inputs, and calculate CI scores for agricultural inputs. POET believes that if coupled with a source of value for carbon, the Gradable program could enable reductions in agricultural emissions associated with biofuel production by 50 percent or more.

Gradable's trial involving 64 area farms supplying corn to POET–Chancellor resulted in a 25% reduction in GHG emissions from corn cultivation and farm energy use compared to the assumptions embedded in CA-GREET:



Gradable illustrates that CI values are highly sensitive to different agronomic practices, even within the same area with similar soil types and weather patterns. This suggests that if farmers had the incentive to engage in such practices, widespread adoption of low-CI farming practices could readily result in CI reductions. The prospect of extrapolating these lessons to the entire industry is worthy of CARB's focus in this rulemaking process. The below graphic illustrates the potential carbon reduction possible with sustainable farming techniques.



POET believes that allowing site-specific inputs for the categories in the graph above would incentivize sustainable farming practices, dramatically reducing bioethanol's CI score. However, POET acknowledges that CARB is resource-constrained and has many priorities regarding the LCFS program. To provide the greatest immediate environmental benefit with a manageable amount of effort, POET suggest that CARB first focus on adding one or two site-specific farming inputs that would result in significant CI reductions, under a Tier 2 Pathway that would require a certain level of machine-derived data, to minimize the verification efforts. Because current fertilizer application makes up a substantial percentage of the CI score for farming, and therefore improved fertilizer use would provide a substantial climate benefit, POET recommends that CARB allow for site-specific nitrogen inputs for fertilizer in the LCFS. In subsequent rulemakings, CARB can continue to build out the LCFS program to include additional site-specific agricultural inputs.

CARB has expressed concern that allowing site-specific agricultural inputs could result in a leakage problem where projects with low-CI farming practices would report site-specific data while projects with higher emissions would report average values. The LCFS program's success illustrates that industry will follow market incentives toward compliance. To that end, POET recommends that feedstocks not participating in the sustainable farming program be assigned a CI value of the default CA-GREET score with an appropriate adder or multiplier value to correct for leakage. This will send the appropriate market signal to farmers, incentivizing them to adopt individualized scoring and the accompanying sustainable farming techniques that reduce scores. Even in the absence of a multiplier or adder, however, POET believes that average CI values for farming practices will decrease as lower CI farming practices are adopted.

IV. RECOGNIZE OFF-SITE RENEWABLE ENERGY PRODUCTION FOR BIOETHANOL PLANTS

California's current LCFS regulations prohibit use of indirect accounting mechanisms to demonstrate production of fuel using low-CI process energy.[15] Instead, the regulations require that renewable energy generation equipment be "directly connected through a dedicated line" to the fuel producer's facility.[16] This is technically infeasible for many producers, stymies their use of low-CI electricity to produce lower-CI fuels, and encourages the construction and installation of small-scale energy generation equipment that may be less efficient and in the aggregate take up more land area than larger-scale projects.

To drive growth in efficient renewable energy generation and facilitate lower-CI fuel production, CARB should remove this regulatory barrier. POET recommends that CARB allow producers to demonstrate use of low-CI process energy through means such as power purchase agreements and book-and-claim accounting. Recognition of off-site renewable energy production as a means to reduce GHG emissions is common in carbon markets. CARB should use its authority to encourage more renewable energy use in the transportation supply chain, not just with respect to certain fuel types. This would incentivize the generation of low-CI energy through large-scale renewables projects.

V. UPDATE MODELING TO REFLECT THE BEST AVAILABLE SCIENCE WITH RESPECT TO CORN STARCH BIOETHANOL

POET wholeheartedly agrees with CARB's commitment to using the best available science and data. To further this commitment, POET believes that CARB should implement two additional model changes in the LCFS.

a. CARB Should Allow User-Defined Process Chemical Usage for Bioethanol Pathways

CARB should modify its Tier 1 simplified calculator's treatment of process chemicals used in bioethanol pathways. The current CARB calculator does not allow the pathway applicant to specify use of low-CI process chemicals, which distorts the CI value of companies that employ novel and environmentally-friendly technologies. For example, POET's patented BPX process uses a less carbon-intensive group of chemicals than most bioethanol producers. A simple change to the Tier 1 calculator to allow user-defined process chemical usage could cure this inaccuracy. This modification would be consistent with the calculator's accommodation of a variety of other user-defined inputs from denaturant to feedstock transportation distance, and it would further incentivize innovative carbon reduction processes. As with all CI inputs, verification requirements would apply to user-defined process chemical usage, allowing the verifier and CARB to ensure claimed CI reductions are accurate.

[15] *See* 17 C.C.R. § 95488.8(h).
[16] *Id*. § 95488.8(h)(1)(B).

b. CARB Should Distinguish Between Electricity Usage in Wet and Dry DDGS Pathways

We also recommend a minor correction to the CA-GREET model's treatment of wet versus dry DDGS produced at the same facility. Specifically, the CA-GREET model distinguishes between wet and dry DDGS pathways for the use of thermal energy but does not do so with regard to electricity usage. Electricity usage for production of wet DDGS is demonstrably lower than that needed to produce dry DDGS. Accordingly, POET recommends that CARB distinguish between electricity usage in wet and dry pathways as the CA-GREET model does with thermal energy.

VI. UPDATE THE CA-GREET MODEL TO REFLECT BEST-AVAILABLE SCIENCE ON LAND USE CHANGE

As discussed above, POET understands that CARB has heard a diversity of views on LUC, but the body of scientific evidence, when vetted for evidentiary basis and analytical rigor, clearly indicates that CARB's prior LUC assessments with respect to corn starch bioethanol are too high, skewing the LCFS program's incentives. The best-available scientific literature, as outlined in section II.a.ii of this letter, supports LUC values of approximately 4 gCO_2e/MJ for corn starch ethanol, much lower than the CA-GREET's model of 19.8 gCO2e/MJ.[17]

POET strongly encourages CARB to engage in additional dialog on LUC now rather than putting off such analysis to the future. Bioethanol's CI value has wide-ranging impacts beyond the simple incentivization of bioethanol use. LUC corrections can recognize and incentivize bioethanol producers' continued efforts to reduce CI and support responsible land use, allow the LCFS program to become more stringent, and allow bioethanol-derivatives to access hard to decarbonize sectors such as aviation more easily.

VII. APPROVE E15 AS A FUEL IN CALIFORNIA AND TAKE FURTHER MEASURES TO PROMOTE FLEX FUEL VEHICLES

To maximize the potential for bioethanol to reduce greenhouse gas emissions in California, CARB should complete the process it has begun to approve E15 as a fuel in the state. California is one of only three locations in the nation that currently does not allow the sale of E15. Only Montana and the greater Phoenix metropolitan area also prohibit E15 sales, and Arizona is currently taking public comment on a rule that would eliminate the Phoenix restriction. By expanding the market for the largest source of compliance by almost 50% in California, E15 would ease compliance burdens and even allow CARB to set more stringent GHG reduction goals in coming years under the LCFS, while also delivering air quality benefits for Californians, especially among the 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

[17] Scully, *supra* note 1 at pg. 4.

PM emissions. So these additional environmental benefits can be realized, CARB should immediately undertake an update its fuel specifications to allow for the sale of E15 in California.

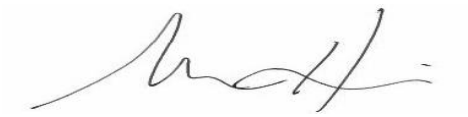
As explained above, bioethanol has historically sold at rates below petroleum-based gasoline. Bioethanol enjoys an additional price advantage in California due to the LCFS credit market and its lower CI. Thus, all consumers in the state, including those in disadvantaged communities, stand to benefit economically through access to more affordable transportation fuel options, like E15.

VIII. 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.

Sincerely,



Matt Haynie
Senior Regulatory Counsel