Dr. Cheryl Laskowski
Branch Chief, Transportation
California Air Resources Board
P.O. Box 2815
Sacramento, CA 95812

RE: Recommended LCFS Rulemaking Issue- Recognizing Climate Smart Agriculture (CSA) within CA-GREET and Establishing CSA Verification Protocols

(Comment submitted electronically via Comment Submittal Form at https://www.arb.ca.gov/lispub/comm/iframe_bcsubform.php?listname=lcfs-wkshp-jul22-ws&comm_period=1)

////////////////

August 8, 2022

Leonardo Bastos

Bayer Crop Science
Commercial Operations
Ecosystems Business

Postal address:
800 N Lindbergh Blvd
St Louis, 63141, MO
USA

Tel. +1 314 701 6026

Leonardo.Bastos@bayer.com

www.bayer.com

Dear Dr. Laskowski,

This comment letter is submitted by Bayer Crop Science ("Bayer"). Bayer is a global enterprise with core competencies in the life science fields of health care and crop science. Bayer's products and services are designed to help people and the planet thrive by supporting efforts to master the major challenges presented by a growing and aging global population. Bayer is pioneering low carbon farming solutions that are already delivering carbon intensity reductions to renewable fuels utilized as transportation fuels in California. However, these reductions have not yet gained recognition by the California Air Resources Board ("CARB") as creditable pursuant to the Low Carbon Fuel Standard ("LCFS"). We are writing to recommend that CARB recognize farming practices and other methods of climate smart agriculture ("CSA") into the LCFS.

Summary of Recommended Process

We appreciate that there has been a robust discussion between agricultural stakeholders and CARB regarding the benefits of CSA for several years, and that POET and Farmers Business Network gave a joint presentation at the October 14,

2020, LCFS workshop regarding the GHG benefits that can be achieved through sustainable farming practices.[1] We also appreciate that CARB and the State of California fully recognize the unmatched potential of soil as a long-term carbon sink. We are aware, however, that CARB has expressed concerns regarding: 1) the challenge of LCFS program oversight of pathway scores based on farm or field level activities, 2) the diversity of recommended CSA practices and verification processes that industry has proposed, and 3) the imperative to maintain LCFS program integrity by ensuring that LCFS credits are correctly attributed to actual carbon intensity reductions.

While Bayer is one pioneer in CSA that is rapidly mobilizing farmers and already delivering results, we recognize that other companies and stakeholders are also actively pursuing other approaches. Given the complexity of this area, we candidly advise that we are not prepared to present a comprehensive regulatory proposal at this stage of the rulemaking that can both tap the carbon potential of CSA and address the valid issues that CARB has raised. We therefore look forward to extensive engagement with CARB and other LCFS stakeholders in working to develop regulatory provisions that can be developed during this rulemaking and will lay the foundation for recognition of CSA upon the effective date of the new regulation.

The remainder of this comment letter provides first an overview of Bayer's specific work on Carbonview, an industry-first digital carbon footprint measurement for agriculture; and then briefly summarizes some of the leading scientific analysis that establishes that to achieve California's goal of carbon neutrality by 2045, the State must unleash the power of soil as a vast carbon sink. At the outset, we would note that crop-based biofuels have been substantial credit generators since the inception of the LCFS, and have the potential to deliver even great reductions in future years through the broad implementation of CSA practices.

[1] See CARB 2020 LCFS Workshop Archive at https://ww2.arb.ca.gov/resources/documents/lcfs-meetings-workshops-archive, FBN/POET presentation at https://ww2.arb.ca.gov/sites/default/files/2020-10/101520presentation_fbn-poet.pdf

Project Carbonview

Carbonview is a seamlessly connected data solution conceptualized by Bayer. It is a first-of-its-kind technology solution that will help farmers in the United States drive more sustainable supply chains and mitigate the impact agriculture has on the environment by aggregating the carbon footprint of end products. Carbonview is the latest example of Bayer's unique focus on connecting the farmer more deeply into the value chain to better capture their carbon contribution and drive the entire value chain to net-zero carbon emissions. Through this solution, farmers are empowered to connect to more sustainable supply chains that benefit their farming operations while minimizing carbon emissions.

Carbonview will initially enable U.S. ethanol producers to track carbon emissions across the entire supply chain – from planting through production – and implement more sustainable business practices by providing the data needed to make more informed purchasing decisions and reduce their carbon emissions. For farmers who opt into the program, Carbonview streamlines on-farm data collection with Bayer's Climate FieldView™ application and connects it with delivery and transportation data captured from the ethanol producers facility. Through the Climate FieldView™ platform, farmers continue to own their data and choose who to share their data with. Carbonview, a cloud agnostic solution currently built on AWS, allows permissioned access to on-demand product transaction and crop exchange market data from the ethanol production facilities to evaluate the carbon impact of sourcing and purchasing decisions. While Carbonview was developed to reduce the CI of ethanol, Bayer is developing and implementing CSA solutions that have the potential to deliver CI reduction across all types of cultivated plants.

Leo Bastos, Global Commercial Ecosystems Lead, Bayer Crop Science, has described the project as follows:

> *"We are very excited to launch a solution to help transform the food and agriculture value chain by paving the way for a more resilient,*

regenerative and net-zero carbon future. While FieldView™ helps farmers make more informed decisions on their own operations, Carbonview will make it possible for them to drive sustainability improvements across the entire value chain. The integration of our leading digital and data science under Carbonview will give farmers greater choice and resources to be compensated for more productive and sustainable decisions on-farm."[2]

The Link Between LCFS Policy Design and Global Agricultural Practices

The LCFS has been remarkably successful in decarbonizing California's transportation sector by creating a market-based incentive for low carbon fuels. In the ethanol sector, the program has not only incentivized the use of ethanol but also created an incentive for individual ethanol facilities to make the lowest carbon ethanol possible by utilizing low carbon energy sources, maximizing yields, implementing new technologies, and finding efficiencies wherever possible. As a result, the average carbon intensity of ethanol in California has been reduced 33% during the last decade of the program.[3]

The substantial additional opportunity available to California via the LCFS and applicable to all biofuels is to similarly incentivize the lowest carbon feedstock possible by utilizing grain produced using regenerative agricultural practices, such as no-till, strip tillage, and cover crops. Based on the performance data Bayer has gathered through FieldView, over 30% in feedstock CI reductions can be achieved through the implementation of CSA practices. To the extent that CARB continues to follow its current approach that "corn is corn" and treats grains as fungible commodities that cannot generate additional credits reflecting carbon smart

[2] For additional information, see Bayer Press Release RE: Carbon View, December 8, 2021, https://media.bayer.com/baynews/baynews.nsf/id/Bayer-launch-Project-Carbonview-industry-first-digital-carbon-footprint-measurement-solution

[3] Renewable Fuels Association, "The California LCFS and Ethanol: A Decade of Reducing Greenhouse Gas Emissions," (2021) at p.4, available at https://ethanolrfa.org/file/9/RFA-LCFS-Report_PDF.pdf

agricultural practices, CARB will continue to unintentionally forego the world's most substantial carbon sink opportunity. CARB will also inadvertently fail to harness the market power of the LCFS program that has delivered over $10 billion in LCFS credit value to low carbon fuels over the past decade. This strong market signal that the LCFS program sends to agricultural producers presents California with the remarkable opportunity to serve as a catalyst and work with groundbreaking companies like Bayer to accelerate the decarbonization of American and global agricultural practices.

California Policy Requires Decarbonization of the Transportation Sector

Pursuant to SB 32 and AB 197, California must reduce its GHG emissions 40% below 1990 levels by 2030 necessitating dramatic GHG reductions compared to current policies. Transportation emissions are the dominant GHG emissions source, constituting 41% of California's total GHG emissions of 425.3 $MMTCO_2e$. Transportation GHG emissions have clearly emerged as the most difficult sector to decarbonize with transportation's rising from 35% of California's GHG emissions in 2015 to 41% in 2018.[4]

Pursuant to Governor Brown's Executive Order B-55-18, California has a statewide goal to achieve carbon neutrality as soon as possible, and no later than 2045, and to achieve and maintain net negative emissions thereafter in addition to statewide targets of reducing GHG emissions including SB 32 and AB 197.[5] In addition, the Executive Order provides that, "The California Air Resources Board shall work with relevant state agencies to ensure future Scoping Plans identify and recommend measures to achieve the carbon neutrality goal." In a recent letter to CARB Chair Randolph, Governor Newsom expressed his desire to work with the Legislature to

[4] California Air Resources Board, "2022 Scoping Plan Update, Kick-off Workshop," June 8, 2021, at slide 4, at https://ww2.arb.ca.gov/sites/default/files/2021-06/carb_overview_sp_kickoff_june2021.pdf .
[5] Executive Order B-55-18, available at https://www.ca.gov/archive/gov39/wp-content/uploads/2018/09/9.10.18-Executive-Order.pdf

"make carbon neutrality state law and to increase our ambition towards our 2030 climate goals."[6]

The Importance of Natural Solutions Including Soil Carbon

To identify negative emissions pathways that physically remove CO_2 from the atmosphere and strategies that can enable California to meet its goal of achieving carbon neutrality by 2045, the Lawrence Livermore National Laboratory developed a recently published report entitled, Getting to Neutral, Options for Negative Carbon Emissions in California ("Getting to Neutral Report" or "Report").[7] The Getting to Neutral Report analyzed California's carbon neutrality goal and determined that it is necessary for the State to remove 125 million metric tons ("MMT") of carbon from the atmosphere each year by 2045 in order to achieve carbon neutrality. The Getting to Neutral Report then determined the lowest cost and most productive pathways to create a negative emissions strategy and identified the three central pillars of the strategy:

1. *Capture and store as much carbon as possible through better management of natural and working lands.*
2. *Convert waste biomass to fuels and store the CO_2.*
3. *Remove CO2 directly from the air using purpose-built machines and store the CO_2.*[8]

---

[6] Office of the Governor, Letter to California Air Resources Board Chair Liane Randolph, (July 22, 2022), available at https://www.gov.ca.gov/wp-content/uploads/2022/07/07.22.2022-Governors-Letter-to-CARB.pdf?emrc=1054d6

[7] Sarah E. Baker, Joshuah K. Stolaroff, George Peridas, Simon H. Pang, Hannah M. Goldstein, Felicia R. Lucci, Wenqin Li, Eric W. Slessarev, Jennifer Pett-Ridge, Frederick J. Ryerson, Jeff L. Wagoner, Whitney Kirkendall, Roger D. Aines, Daniel L. Sanchez, Bodie Cabiyo, Joffre Baker, Sean McCoy, Sam Uden, Ron Runnebaum, Jennifer Wilcox, Peter C. Psarras, Hélène Pilorgé, Noah McQueen, Daniel Maynard, Colin McCormick, Getting to Neutral: Options for Negative Carbon Emissions in California, January, 2020, Lawrence Livermore National Laboratory, LLNL-TR-796100, at p. 29, available at https://www-gs.llnl.gov/content/assets/docs/energy/Getting_to_Neutral.pdf (hereafter "Getting to Neutral Report," footnotes omitted).

[8] Getting to Neutral Report at p. 3.

The natural solutions encompassed by the Getting to Neutral Report include farming practices that increase the amount of carbon stored in soils. The Report found that, "These approaches are among the least expensive we examined, averaging $11 per ton of CO_2 removed from the atmosphere." The Report also recognized that these strategies have important co-benefits including improved soil health.[9] The Report went on to state:

> *Natural systems are always the first option for negative emissions, both due to their concomitant advantages (soil health, ecosystem services) and to their generally lower cost… Natural systems have the advantage that their system issues are perhaps the most simple, with the source of the CO_2 being the atmosphere and the ultimate sink being the natural system itself.*[10]

The Getting to Neutral Report specifically referenced the following Soil Carbon strategies: cover cropping, mulching, no-till farming, reduced-till farming, and compost application. Regarding scale of the opportunity, the Report found that:

> *Soils have lost approximately 130 billion metric tons of organic carbon (477 billion metric tons of CO_2 equivalent) to the atmosphere globally since the advent of modern agriculture. Reversing soil organic carbon losses by altering land management would sequester atmospheric CO_2 while also potentially delivering gains in soil fertility. Estimates of the near-term carbon storage potential of agricultural soils are in the range of approximately 0.08-1.85 metric tons of carbon per hectare per year, or 0.3-6.8 tons of CO_2 equivalent per hectare per year. In theory, increasing soil carbon stocks globally at these rates could sequester 1-4 billion tons of carbon (3.7-14.7 billion tons of CO_2) per year, with the potential to offset global temperature increase.*[11]

---

[9] Id. at p. 4.
[10] Id. at p. 15.
[11] Id. at 22 (footnotes omitted).

The Value of Regenerative Agriculture as a Natural Solution

Consistent with the Getting to Neutral Report, regenerative agriculture has tremendous momentum, is actionable today, and has great atmospheric carbon reduction potential. According to the IPCC 2018 report, the global technical GHG emission mitigation potential from all agriculture exceeds 5 gigatons of CO2e per year. Per the Agriculture chapter's Executive Summary, "Soil carbon sequestration (enhanced sinks) is the mechanism responsible for most of the mitigation potential (*high agreement, much evidence*), with an estimated 89% contribution to the technical potential."[12]

In order to achieve these substantial reductions, market signals must be provided to farmers that there are economic rewards for better practices. California's LCFS program can provide a critical market driver for these impactful carbon smart agricultural practices. The United States Department of Energy's Argonne National Laboratory found deploying cover crop system in the upper Great Plains would result in increased carbon sequestration, reducing the carbon intensity of the agricultural production, and could generate a value of $279 per acre if allowed under the California LCFS program.[13]

Summary of Policy Benefits

Quantifying greenhouse gas emissions for biofuel feedstocks from Climate Smart Agricultural practices and assigning corresponding carbon intensity scores has major benefits:

- It compensates farmers, on a purely voluntary basis, for climate-smart farming practices.
- It creates an incentive for continuous improvement to advance sustainable farming practices sequesters carbon and offers improved yields.
- It improves water quality and soil health.

---

[12] 2018 IPCC Agriculture Chapter (full cite at footnote 1), at p. 499.
[13] https://iopscience.iop.org/article/10.1088/1748-9326/ab794e

- It will help to achieve scale more quickly and offer significant near-term greenhouse gas emission reductions than carbon market programs that provide less attractive carbon pries for farmers.

Conclusion

Bayer appreciates all of the work that CARB has done in developing the LCFS, and the agency's willingness to improve the program periodically through rulemakings. While we recognize that providing incentives for Climate Smart Agricultural practices in the LCFS program presents challenges, we are confident that the challenges can be overcome and the massive GHG reductions that carbon-smart feedstock can deliver will provide a substantial return on CARB's staff time investments and efforts in this area.

Thank you for your consideration of our input. We look forward to engagement with CARB and other stakeholders on this vital issue.

Respectfully,

Leonardo Bastos
SVP Commercial Ecosystems, Bayer Crop Science