

August 27, 2024

The Honorable Liane M. Randolph, Chair  
California Air Resources Board  
1001 I Street  
Sacramento, CA 95814

RE: 2024 Low Carbon Fuel Standard Amendments

Dear Chair Randolph:

Indigo Ag, Inc. (Indigo Ag) appreciates the current and historic efforts by the California Air Resources Board (CARB) to reduce the greenhouse gas (GHG) emissions from transportation through the implementation of the State's Low Carbon Fuel Standard (LCFS). Since 2011, California's LCFS program has been tremendously successful and is a model for the nation and the world. Indigo Ag supports the continued evolution of the LCFS through the CARB rulemaking process. Of particular interest to Indigo Ag is the production of biofuels in the most sustainable manner. The use of sustainably grown biofuels directly supports the State's goal to reduce anthropogenic emissions by 85 percent by 2045.

### **About Indigo Ag**

Indigo Agriculture, Inc. ("Indigo") was founded in 2013 and is headquartered in Boston, Massachusetts, with its commercial office based in Memphis, Tennessee. Carbon by Indigo is the first private program to quantify agricultural soil carbon benefits with registry-approved rigor at a global scale, and Indigo Source is the first program to produce low carbon intensity (CI) ag feedstocks at scale. Our ecosystem partner-based approach supports the scaling of our technology to realize the large, pooled projects needed to move beyond carbon abatement and realize mass drawdown across agricultural acres.

Thousands of US farmers across seven million acres of active cropland have enrolled in our programs, which generate carbon offsets, low CI crops, and/or other ecosystem services. Our prior work has primarily focused on the voluntary market, following Climate Action Reserve's (CAR) Soil Enrichment Protocol (SEP) and The Greenhouse Gas Protocol's (GHGP) Land Sector & Removals Guidance (LSRG). We have now taken this project through three successful rounds of independent verification by an ISO-accredited verification body. Across those three verifications we have issued nearly 300,000 credits, each representing one metric ton of CO<sub>2</sub>e emissions either reduced, avoided, or removed from the atmosphere. We also work with our supply chain partners to deliver ~20M bushels of low CI ag commodities to voluntary buyers each year.

Over the last 6 years, Indigo has made substantive (and almost certainly unique levels) of investment in our science and technology and methods for driving carbon action and quantification farms with growers and our partners. It is through this investment that we have proven that these programs are not only robust but can be scaled in a credible way and are

excited for the opportunity to bring these capabilities to alternative fuels markets, such as the LCFS.

### **Leverage Existing Certification Programs to Meet Sustainability Requirements**

At the April 10, 2020<sup>4</sup> workshop, CARB stated that in implementing a continuous third-party sustainability certification program, it plans to “leverage existing certification programs”<sup>1</sup> and listed four programs approved under the European Union’s (EU) Renewable Energy Directive (RED): ISCC, RSB, REDcert, and Bonsucro. We recommend that CARB allows a fuel pathway to select the sustainability certification program that best fits their feedstock, agricultural practices, and operation. Specifically, we encourage the use of a sustainability certification programs that include the quantification of direct and indirect nitrous oxide emissions and soil carbon sequestration changes, such as the ISCC. The ISCC GHG Guidance requires the measurement of a soil carbon baseline and impacts “after at least 10 years of application” of practices. After initial soil carbon sampling, the GHG Guidance allows the use of the DAYCENT model, which has been extensively calibrated and validated in the US.<sup>2</sup>

An alternative approach that would leverage existing certification programs would be for CARB to use CAR’s SEP to meet the sustainability certification requirements. CAR has been supporting GHG reduction programs in the State for more than two decades. In 2002, the state passed SB 812 entitled “Air pollution: California Climate Action Registry.” This law mandated CAR’s predecessor, the California Climate Action Registry, to develop the first offset protocol for the sequestration of carbon in forests.<sup>3</sup> This protocol became the U.S. Forest Projects Compliance Offset Protocol, which is currently used in the State’s Cap-and-Trade Program.

In addition, CAR is an approved Offset Project Registry (OPR) under the State’s Program. The Cap-and-Trade regulations have detailed requirements for OPRs including a conflict of interest policy, maintenance of professionally liability insurance, and personnel trained on CARB’s programs and processes.<sup>4</sup> These requirements would need to be developed and implemented for organizations supporting the sustainability certification programs that CARB does not have as extensive experience with.

Finally, five projects have been successfully listed under CAR’s SEP since it was adopted in September of 2020. The protocol already includes many of the requirements proposed in §95488, such as the requirement to apply fertilizer in a manner than minimizes runoff, enhance soil fertility, and monitor land use change. For the requirements that are not quantified in the protocol, such as maintaining or enhancing biodiversity, minimizing runoff, and reducing

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<sup>1</sup> CARB (2024) California Low Carbon Fuel Standard Workshop. <https://ww2.arb.ca.gov/sites/default/files/2024-04/LCFS%20April%20Workshop%20Slides.pdf>

<sup>2</sup> ISCC (2024) ISCC EU 205 – Greenhouse Gas Emissions. [https://www.iscc-system.org/wp-content/uploads/2024/01/ISCC\\_EU\\_205\\_Greenhouse-Gas-Emissions\\_v4.1\\_January2024.pdf](https://www.iscc-system.org/wp-content/uploads/2024/01/ISCC_EU_205_Greenhouse-Gas-Emissions_v4.1_January2024.pdf)

<sup>3</sup> California Senate. SB 812 (2002) SB 812, Sher. Air pollution: California Climate Action Registry. [https://leginfo.ca.gov/faces/billNavClient.xhtml?bill\\_id=200120020SB812](https://leginfo.ca.gov/faces/billNavClient.xhtml?bill_id=200120020SB812)

<sup>4</sup> CARB (2018) Regulation for the California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms. Title 17. CCR § 95986. [https://ww2.arb.ca.gov/sites/default/files/2021-02/ct\\_reg\\_unofficial.pdf](https://ww2.arb.ca.gov/sites/default/files/2021-02/ct_reg_unofficial.pdf)

unsustainable water use, CAR requires all projects to publicly track and disclose how each project meets the United Nations (UN) Sustainable Development Goals (SDGs), which include “provisions for monitoring, reporting and verification.”<sup>5</sup> The use of the UN SDGs is part of the requirements of being an Eligible Emissions Unit Programme under the International Civil Aviation Organization’s (ICAO) Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA).<sup>6</sup> CAR is an approved Eligible Emissions Unit Programme. The UN SDGs required to be tracked and reported by Programmes cover the following best environmental management practices:

- Maintain or enhance biodiversity habitat on agricultural or forested lands
  - SDG 15 “Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss”
- Enhance soil fertility and avoid erosion or compaction
  - SDG 2 “End hunger, achieve food security and improved nutrition and promote sustainable agriculture”
- Apply fertilizers in a manner that minimizes runoff, and soil and water contamination
  - SDG 2 “End hunger, achieve food security and improved nutrition and promote sustainable agriculture”
  - SDG 6 “Ensure availability and sustainable management of water and sanitation for all”
- Reduce unsustainable water use, and minimize diffuse and localized pollution from chemical residues, fertilizers, soil erosion, or other sources of ground and surface water contamination
  - SDG 2 “End hunger, achieve food security and improved nutrition and promote sustainable agriculture”
  - SDG 6 “Ensure availability and sustainable management of water and sanitation for all”

Between the quantification requirements in the protocol and the UN SDG reporting required by CORSIA, the CAR SEP more than meets the requirements in § 95488.

### **Remote Sensing Should be Allowed to Monitor and Report Land Use Changes**

Remote sensing has become a powerful tool for agronomic data collection and validation. It also shows great promise for soil carbon quantification. Indigo currently uses publicly available remote sensing data, together with our significant volume of ground-truthing data, to develop advanced algorithms for these purposes. Today our algorithms are able to identify field boundaries (with greater accuracy than the Common Land Units) and generate data on

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<sup>5</sup> ICAO (2019) CORSIA Emissions Unit Eligibility Criteria. [https://www.icao.int/environmental-protection/CORSIA/Documents/ICAO\\_Document\\_09.pdf](https://www.icao.int/environmental-protection/CORSIA/Documents/ICAO_Document_09.pdf)

<sup>6</sup> ICAO (2024) CORSIA Eligible Emissions Units. [https://www.icao.int/environmental-protection/CORSIA/Documents/CORSIA%20Eligible%20Emissions%20Units/CORSIA%20Eligible%20Emissions%20Units\\_March%202024.pdf](https://www.icao.int/environmental-protection/CORSIA/Documents/CORSIA%20Eligible%20Emissions%20Units/CORSIA%20Eligible%20Emissions%20Units_March%202024.pdf)

management events such as tillage, irrigation, planting, cover crops, and harvesting. The Cropland Data Layer is also a very useful tool for determining crop type and crop rotations over time. These outputs can be used to reduce the data collection burden on individual farmers, as well as for providing a validation check on land use change around the world. They can also be used to generate estimates of carbon intensity of specific fields.

### **Challenges Implementing the Sustainability Requirements**

IndigoAg is encouraged about the inclusion of sustainability criteria in the 15-Day Changes to the LCFS regulations. We support the leveraging of existing certification programs and encourage CARB to seek additional feedback about the design and implementation of the requirements from organizations with expertise in the quantification of environmental impacts from agriculture. If implemented thoughtfully and carefully, there are opportunities not only to implement the certification requirements by using existing programs, but also in a manner to encourage agricultural producers to implement multiple practices that increase the sustainability of the fuel. Not seeking additional feedback on the design and implementation could result in “overly simplistic metrics” that “fail to conserve the key ecological values they seek to protect”<sup>7</sup> as was found by a 2020 paper that evaluated 255 peer-reviewed publications on biodiversity programs and found 24 different categories that included metrics for habitat area and condition, ecological diversity, and biological population density.

### **IndigoAg has Valuable Experience Designing and Implementing Sustainability Certifications for Agriculture**

For more than five years, Indigo has been strongly supportive of including climate-smart agricultural practices in the LCFS. We feel that these practices need to be accurately measured, monitored, and verified. Agriculture is an inherently variable system that depends on a myriad of variables including crop rotation, geography, soil type, and weather. The ability to implement a certification program that certifies the “best environmental management practices” related to agricultural practices such as enhancing biodiversity, avoiding erosion, minimizing runoff, and optimizing water use should be done carefully and leveraging programs that have demonstrated experience with agricultural systems, such as the ISCC and CAR programs.

Since 2013, we have pursued innovative ways for science and technology to drive sustainability and profitability in agriculture. Our core mission is “Harnessing nature to help farmers sustainably feed the planet.” Our four key principles are:

- Helping farmers enhance their profitability and soil health
- Improving the quantity, quality, and traceability of the food available to consumers
- Protecting the environment by reducing and removing harmful greenhouse gases from the atmosphere, while incentivizing sustainable land stewardship practices
- Creating long-term value for our shareholders

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<sup>7</sup> Marshall, E., Wintle, B.A., Southwell, D., Kuhala, H. (2020) What are we measuring? A review of metrics used to describe biodiversity in offsets exchanges. *Biological Conservation*. (241) 108250 <https://doi.org/10.1016/j.biocon.2019.108250>

We are prepared to work with staff and stakeholders to identify and leverage the tools, processes, and procedures to determine the “best environmental management practices.”

### **Reducing Land-Based Emissions is Key to Meeting California Targets**

In 2018, the Intergovernmental Panel on Climate Change (IPCC) published a Special Report on the impacts of a 1.5°C global warming above pre-industrial levels. This report found that achieving global carbon neutrality by mid-century is critical to avoiding the most catastrophic impacts of climate change.<sup>8</sup> Moreover, the IPCC Sixth Assessment identified land-based emissions mitigation as “the only [sector] in which large-scale carbon dioxide removal may currently and short term be possible” and that it is “crucial to limit climate change and its impacts.”<sup>9</sup> The latest science finds that it is increasingly likely that the 1.5°C target will be exceeded<sup>10</sup> and that large-scale GHG reductions are critical to meeting any state or global target, including the goals of the Paris Agreement under the United Nations Framework Convention on Climate Change (UNFCCC).<sup>11</sup>

In 2016, the California legislature adopted Senate Bill 32, codifying a statewide GHG reduction target of at least 40 percent below 1990 levels by 2030. In 2022, the California legislature adopted Assembly Bill 1279, requires the state to achieve net zero GHG emissions as soon as possible, but no later than 2045.<sup>12</sup>

The agriculture sector will need to play a significant role in helping California meet the goal of reducing statewide GHG emissions by 40 percent by 2030 and net zero no later than 2045. Not only can the agriculture sector help the State meet its GHG goals, but it can also do so while implementing “best environmental management practices.” However, those practices need to be clearly defined and quantified. Practices including optimizing fertilizer application, reducing tillage, using enhanced-efficiency fertilizers, double-cropping, and planting cover crops have the

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<sup>8</sup> IPCC, 2018: Summary for Policymakers. In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 3-24, <https://doi.org/10.1017/9781009157940.001>.

<sup>9</sup> Nabuurs, G.-J., R. Mrabet, A. Abu Hatab, M. Bustamante, H. Clark, P. Havlík, J. House, C. Mbow, K.N. Ninan, A. Popp, S. Roe, B. Sohngen, S. Towprayoon, 2022: Agriculture, Forestry and Other Land Uses (AFOLU). In IPCC, 2022: Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [P.R. Shukla, J. Skea, R. Slade, A. Al Khourdajie, R. van Diemen, D. McCollum, M. Pathak, S. Some, P. Vyas, R. Fradera, M. Belkacemi, A. Hasija, G. Lisboa, S. Luz, J. Malley, (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA. <https://doi.org/10.1017/9781009157926.009>.

<sup>10</sup> Mathews, D.H., Wynes, S. (2022) Current global efforts are insufficient to limit warming to 1.5°C. *Science* 376 (6600) 1404-1409. <https://www.science.org/doi/10.1126/science.abo3378>

<sup>11</sup> Mace, M.J., Fyson, C.L., Schaeffer, M., Hare, W.L. (2021) Large-Scale Carbon Dioxide Removal to Meet the 1.5°C Limit: Key Governance Gaps, Challenges and Priority Responses. *Global Policy* 12 (51) 67-81. <https://doi.org/10.1111/1758-5899.12921>

<sup>12</sup> CARB (2022) 2022 Scoping Plan for Achieving Carbon Neutrality. <https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf>

potential to reduce the CI of fuels by more than 40 g CO<sub>2</sub>e/MJ<sup>13,14</sup> or up to 74 percent.<sup>15</sup> And these practices are not limited to their GHG benefits; they provide “additional ecosystem service benefits, including watershed protection, increased biodiversity, and improved soil health and fertility,”<sup>16</sup> which will help the State meet the proposed requirements in §95488.

For the foreseeable future, liquid fuels will be required to power a significant portion of transportation in the state. To create the supply for the fuels with the “best environmental management practices,” CARB needs to account for and incentivize field-based practices. We are prepared to help the State meet this challenge.

CARB has been an international leader in developing and implementing programs to reduce GHG emissions across the California economy. The inclusion of a “continuous third-party sustainability certification” for biomass used in fuel pathways will continue the State’s environmental leadership. We look forward to continued collaboration with CARB to design and implement policies and strategies that further reduce emissions from the transportation sector.

Sincerely,



Christopher M. Malone  
Vice President, Market Development  
Indigo Ag

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<sup>13</sup> Liu, X. et. al. (2020) Shifting agricultural practices to produce sustainable, low carbon intensity feedstocks for biofuel production. *Environ. Res. Lett.* <https://doi.org/10.1088/1748-9326/ab794e>

<sup>14</sup> Yoo, E., Lee, U., Wang, M. (2022) Life-Cycle Greenhouse Gas Emissions of Sustainable Aviation Fuel through a Net-Zero Carbon Biofuel Plant Design. *ACS Sustainable Chem. & Eng.* 10 (27), 8725-8732. <https://doi.org/10.1021/acssuschemeng.2c00977>

<sup>15</sup> Scully, M.J., Norris, G.A., Alarcon Falconi, T.M., MacIntosh, D.L. (2021) Carbon intensity of corn ethanol in the United States: state of the science. *Environ. Res. Lett.* 16, 043001. <https://doi.org/10.1088/1748-9326/abde08>

<sup>16</sup> Liu, *op. cit.*