March 15th, 2023

RE: International Council on Clean Transportation comments on the **February 2023 LCFS Workshop**

These comments are submitted by the International Council on Clean Transportation (ICCT). The ICCT is an independent nonprofit organization founded to provide unbiased research and technical analysis to environmental regulators. Our mission is to improve the environmental performance and energy efficiency of road, marine, and air transportation, in order to benefit public health and mitigate climate change. We promote best practices and comprehensive solutions to increase vehicle efficiency, increase the sustainability of alternative fuels, reduce pollution from the in-use fleet, and curtail emissions of local air pollutants and greenhouse gases (GHG) from international goods movement.

The ICCT welcomes the opportunity to provide comments on the Air Resources Board's February LCFS workshop to discuss potential changes to the Low-Carbon Fuel Standard. We commend the agency for its technical analysis and interest in continuing to improve the effectiveness of one of its flagship climate programs. Based on the content of the workshop, the comments below offer a number of technical observations and recommendations for ARB to consider in future changes to the Low-Carbon Fuel Standard.

We would be glad to clarify or elaborate on any points made in the below comments. If there are any questions, ARB staff can feel free to contact Nik Pavlenko (n.pavlenko@theicct.org) and Dr. Stephanie Searle (stephanie@theicct.org).

Stephanie Searle

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Summary of February workshop updates

CARB presented potential updates to its LCFS program in a February 22, 2023 public workshop. These updates were developed in alignment with the statewide 2022 Scoping Plan that aims for an economy-wide carbon neutrality target by mid-century. The proposed LCFS updates include significant revisions to the program including obligating jet fuel consumed on intrastate flights, expanded guidance for hydrogen and biomethane pathways, and revised incentives for zero-emission vehicle infrastructure crediting. As an overarching update, CARB is considering revising its 2030 carbon intensity (CI) target between 25 and 35% in an effort to increase the program's ambition relative to the state's long-term climate goals and to stabilize credit prices. CARB will also need to consider setting appropriate CI targets beyond 2030.

To meet the goals of the Scoping Plan, CARB presented other guiding principles for future LCFS revisions include rapidly increasing the share of zero-emission vehicles on the road, increasing the share of the state's hydrogen supply, maintaining a role for liquid biofuels, and phasing out the use of biomethane as a primary fuel. CARB has also set a long-term target for a 94% reduction in petroleum demand between 2022 and 2045.

We support CARB's intent to increase the ambition of the LCFS and its role as a key lever for achieving California's broader climate goals and advancing low-carbon transport technologies. However, we note that this is also a critical juncture to evaluate the efficacy of the LCFS and whether or not the types of fuels and technologies it incentivizes, as well as the integrity of the GHG reductions generated through the program, are suitable for long-term decarbonization of the transport sector. Establishing higher LCFS compliance targets in the absence of meaningful revisions to the eligibility and GHG accounting for fuels could be counterproductive to the goals of the program. Below we provide several recommendations to help ensure that California meets its carbon-neutrality goals without compromising the integrity of the LCFS program. The following comments are summarized as follows: 1) establish deliverability requirements for biomethane as a primary fuel and hydrogen intermediate, 2) set policy safeguards around the quantity of lipid-based fuel credited under the LCFS, and 3) obligate both intrastate and interstate aviation fuel consumed in California. Establishing a more ambitious CI target with an auto-adjustment mechanism would help stabilize credit prices and support higher low-carbon fuel uptake through 2030 and beyond, but that target must be accompanied by

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corresponding improvements to the design, GHG crediting and implementation of the LCFS.

Establish deliverability requirements for biomethane as a primary fuel and hydrogen intermediate

CARB correctly notes that the growth potential for renewable natural gas in transportation is limited, and has proposed deliverability requirements and a phaseout for these fuels. Natural gas vehicles (NGVs) made up approximately 5% of California's heavy-duty vehicle fuel demand in 2021.[1] This share is expected to decline in the future in response to the state's Advanced Clean Trucks (ACT) and proposed Advanced Clean Fleets (ACF) regulations. RNG credited under the LCFS already makes up 89% of natural gas supplied to transportation;[2] allowing the growth of this pathway to continue beyond even the volumes of CNG consumed in the transport fleet further risks undermining the credulity of this pathway's impact on transportation. The ACT has set zero-emission vehicle (ZEV) sale requirements for medium and heavy-duty vehicles through 2035 while the ACF sets up to 100% ZEV purchase requirements by 2040 on businesses and public entities that operate medium and heavy-duty fleets.[3] Under both regulations, NGVs do not qualify as zero-emission vehicles. Therefore, CARB's intention to phase out the use of biomethane as a primary fuel credited under the LCFS is well-founded.

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[1] CARB, "Low Carbon Fuel Standard Reporting Tool Quarterly Summaries," accessed March 15, 2023, https://ww2.arb.ca.gov/resources/documents/low-carbon-fuel-standard-reporting-tool-quarterly-summaries; EIA, "California Natural Gas Consumption by End Use," accessed March 15, 2023, https://www.eia.gov/dnav/ng/ng_cons_sum_dcu_SCA_a.htm.

[2] EIA, "California Natural Gas Vehicle Fuel Consumption (Million Cubic Feet)," accessed March 15, 2023, https://www.eia.gov/dnav/ng/hist/na1570_sca_2a.htm; CARB, "Low Carbon Fuel Standard Reporting Tool Quarterly Summaries."

[3] California Air Resources Board, "Advanced Clean Trucks Regulation" (2019), https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2019/act2019/fro2.pdf; California Air Resources Board, "Advanced Clean Fleets Regulation Summary," accessed March 15, 2023, https://ww2.arb.ca.gov/resources/fact-sheets/advanced-clean-fleets-regulation-summary.

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Complementary policies (i.e., SB1383) are in place to reduce methane emissions in California.[4] However, CARB has failed to develop a meaningful binding methane regulation for manure management, despite the requirement under SB1383 to implement a regulation starting in 2024. As of 2019, methane emissions associated with manure management had only been reduced by 1% from the 2013 baseline.[5] Though the LCFS has been used as a method of reducing manure management emissions,[6] its relevance to California is greatly limited by its extension to any manure management project in the country. This does little to reduce in-state methane emissions or change agricultural behavior in California.

Avoided methane emissions for some sources of biomethane under the LCFS rest entirely on assumptions; changes to the legality of certain manure management practices would change the counterfactual emissions for these pathways. If CARB adopts a binding methane regulation, this would necessarily require an update CARB's baseline assumptions around methane management practices so that methane is assumed to be captured in the counterfactual, rather than vented or flared. This would greatly affect the carbon intensity for some pathways; for example, using CA-GREET, we calculate that the CI of dairy CNG would be approximately 36 gCO_2e/MJ rather than an average value (of -336 gCO_2e/MJ.[7]

The proposed phaseout of avoided methane crediting of 2030 to 2040 is insufficient to slow the growth of this avoided methane crediting in the next 15 years, particularly when factoring in a

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[4] California Legislature, "SB-1383 Short-Lived Climate Pollutants: Methane Emissions: Dairy and Livestock: Organic Waste: Landfills." (2016), https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201520160SB1383.

[5] California Air Resources Board, "Current California GHG Emission Inventory Data," 2021, https://ww2.arb.ca.gov/ghg-inventory-data.

[6] Corey, R. W. 2022. Petition for Rulemaking to Exclude All Fuels Derived from Biomethane from Dairy and Swine Manure from the Low Carbon Fuel Standard Program. https://ww2.arb.ca.gov/sites/default/files/2022-01/LCFS%20Petition%20Response%202021.pdf.

[7] A simple average of existing, certified pathways. Due to data limitations, we do not have access to the volume-weighted average CI of dairy biogas pathways in the LCFS

potential upward revision to LCFS reduction targets and credit banking. An earlier phaseout would send a stronger signal and more accurately align biomethane consumption with the quantities of natural gas consumed in the California transport fleet; RNG credited under the LCFS already makes up 89% of natural gas supplied to transportation.[8] CARB acknowledges that avoided methane crediting helps offset the high capital cost of digester projects which will become less needed in the later years of the program.[9] We recognize the need for granting biomethane producers flexibility in meeting targets; however, we recommend that the phaseout take effect for new projects beginning in 2024, consistent with the intent of the SB1383 methane regulations. This would still entitle early movers to negative CI crediting, with an additional 10 years of guaranteed value under the provisions of SB 1383, while constraining further growth of this pathway and limiting this pathway's further dilution of LCFS ambition.

Currently, the book-and-claim system used to credit biomethane produced and consumed in California does not align with the stringency of book-and-claim used for low-CI electricity. To better ensure that credited fuels are consumed in the transportation sector, we recommend that CARB impose deliverability requirements on biomethane beginning in 2024. We also recommend that these requirements be applied consistently to biomethane as a primary fuel and biomethane as a hydrogen intermediate. Due to the highly negative CI values assigned to some biomethane pathways, current practice allows for a relatively small amount of fuel injected into natural gas pipelines throughout the country to take the place of larger quantities of alternative fuels produced in-state, crowding out contributions from other fuel pathways with a more legitimate claim to displacing in-state fuel consumption. This practice likely dilutes the LCFS' impact on reducing overall petroleum consumption, disadvantages other states in meeting their own climate targets, and is currently widespread.[10] Based on state-level RNG production estimates and

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[8] EIA, 2022. "Natural Gas Consumption by End Use: Volumes Delivered to Vehicle Fuel Customers". https://www.eia.gov/dnav/ng/ng_cons_sum_a_EPG0_vdv_mmcf_a.htm

[9] CARB, "Low Carbon Fuel Standard Public Workshop: Potential Regulation Amendment Concepts," https://ww2.arb.ca.gov/sites/default/files/classic/fuels/lcfs/lcfs_meetings/LCFSpresentation_02222023.pdf.

[10] Daniel Mazzone, Julie Witcover, and Colin Murphy, "Multijurisdictional Status Review of Low Carbon Fuel Standards, 2010–2020 Q2: California, Oregon, and British Columbia" (UC Davis Institute of

LCFS accounting data, approximately 70% of RNG credited under the LCFS is produced out of state.[11]

CARB's current deliverability proposal for biomethane is modeled off the California Energy Commission's Renewables Portfolio Standard (RPS) guidance on biomethane-derived electricity.[12] Under this guidance, biomethane injected into a common carrier pipeline must flow "from the point of injection to the point of receipt at least 50 percent of the time on an annual basis" (p. 9). Biomethane must also be injected within or interconnected to a pipeline system located within the Western Electricity Coordinating Council (WECC) region. We recommend that CARB strengthen this guidance by setting an in-state interconnection requirement beginning in 2024. As a weaker option, CARB could establish a deliverability requirement for biomethane to be produced and delivered within the WECC region. The California Energy Commission collects detailed data on the state pipeline network that could be used to verify this information at "citygate" gas interconnection points located throughout the state.[13]

Exempting hydrogen produced from biomethane from book-and-claim requirements established for CNG has the potential to undermine the benefits of implementing deliverability requirements altogether, for very little benefit. Though CARB has emphasized the need to support the growth of the hydrogen industry, the current system of biomethane hydrogen production simply involves purchasing environmental attributes for conventional gray hydrogen produced from natural gas, which is already a well-developed, commercialized technology. The additional subsidy value would not drive the value of green hydrogen, which is

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Transportation Studies, July 2021), https://escholarship.org/uc/item/080390x8.

[11] Database of Renewable Natural Gas (RNG) Projects: 2021 Update, Argonne National Laboratory, January 2022, https://www.anl.gov/es/reference/renewable-natural-gas-database.; CARB, "Low Carbon Fuel Standard Reporting Tool Quarterly Summaries."

[12] California Energy Commission, "RPS Eligibility Guidebook, Ninth Edition Revised," April 27, 2017.

[13] California Energy Commission, *California Natural Gas Pipelines*, accessed March 7, 2023, https://www.energy.ca.gov/sites/default/files/2020-10/Natural_Gas_Pipelines_ADA.pdf.

produced through an entirely different conversion process. This would likely shift investment from RNG toward bio-based hydrogen applications without addressing the underlying uncertainty around traceability. To provide an example of this risk, a California hydrogen producer has applied to produce hydrogen via fossil-based steam methane reforming while purchasing environmental attributes from a dairy farm injecting biomethane into the Wisconsin gas grid. This gas qualifies for a CI score below -250 gCO_2e/MJ,[14] but has been collecting methane on a digester since 2013—long before the application. Without book-and-claim requirements, it could be conceivable that the response to deliverability requirements for RNG would simply be to shift existing book-and-claim crediting to similar examples of gray hydrogen production, with little if any net benefit.

We recognize that the use of hydrogen as a transportation fuel and in other sectors will be critical to meet the 2022 Scoping Plan goals. However, exempting hydrogen producers from deliverability requirements and failing to update its baseline CI assumptions grants hydrogen fuel an unfair advantage and crowds out investment for other fuels with significant emissions reduction potential. At the federal level, domestic hydrogen production is expected to remain heavily subsidized from the Inflation Reduction Act. Under the legislation, hydrogen producers can receive up to $3 per kilogram in tax credits through 2032.

Cap the quantity of lipid-based fuel credited under the LCFS

The February 2023 CARB workshop's discussion of the treatment of crop-derived fuels in the LCFS was a noticeable step backwards from the discussion feedstock cap on crop based biofuel proposed in the November 2022 workshop. [15] In order to

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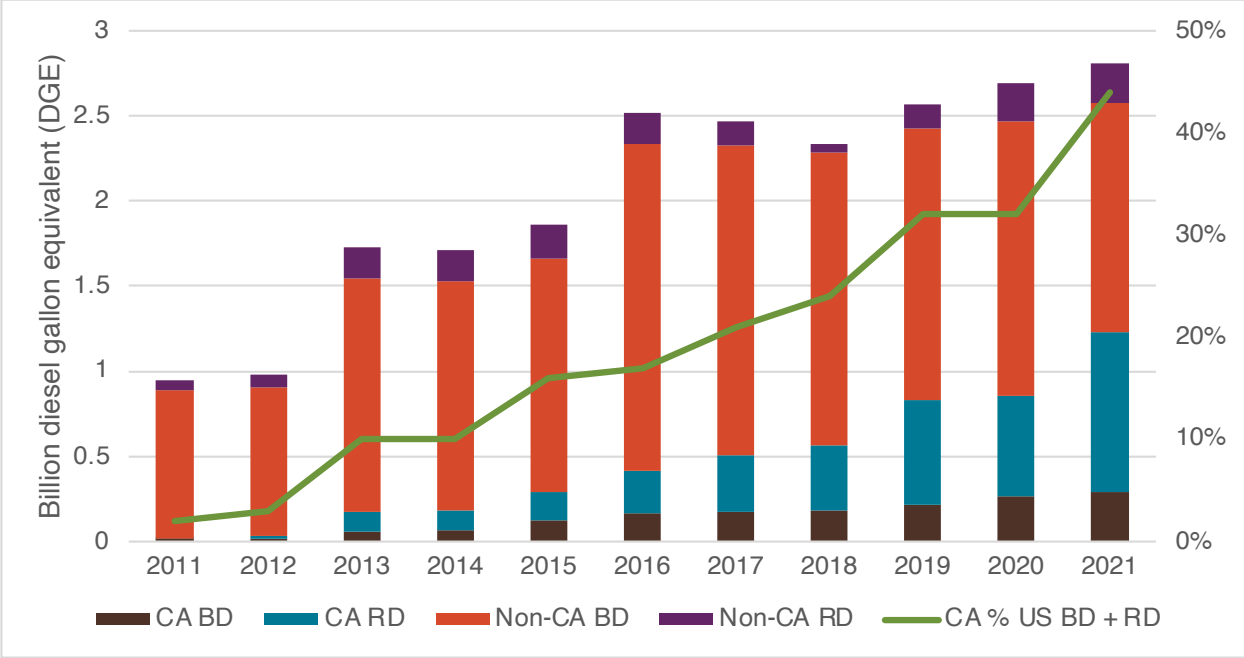
[14] ARB, 2021. "Staff Summary: FirstElement Fuel, Inc. Fuel Production Facility: Praxair SMR Facility Hydrogen Produced from Renewable Natural Gas" https://ww2.arb.ca.gov/sites/default/files/classic/fuels/lcfs/fuelpathways/comments/tier2/B0392_summary.pdf

[15] California Air Resources Board, "Low Carbon Fuel Standard Public Workshop: Concepts and Tools for Compliance Target Modeling," November 9, 2022, https://ww2.arb.ca.gov/sites/default/files/2022-11/LCFSPresentation.pdf.

mitigate the risks highlighted in the February 2023 workshop, we recommend that CARB implement a cap on all lipid-based feedstocks and set on an energy rather than volume basis, based on 2020 consumption levels in conjunction with California's share of the U.S. diesel market. There is strong evidence that the production of food-based biofuels has significant adverse impacts on the environment and consumers including land-use change, deforestation, biodiversity loss, and food price spikes.[16] Despite this risk, the volume of biomass-based diesel (BBD) grew from 1% to 50% of the state's alternative fuel pool (in gasoline-gallon equivalents [GGE]) between 2011 and 2021. Over this same period, the share of BBD credit generation grew from 8% to 45%.[17] California has also dramatically increased its share of the national BBD fuel pool, illustrated by the green line in Figure 1. The absolute volume of biodiesel (BD) and renewable diesel (RD) consumed in California compared with the rest of the U.S. are converted to diesel gallon equivalent (DGE) and shown in the stacked bars.



[16] Chris Malins and Cato Sandford, "Animal, Vegetable or Mineral (Oil)?" (Cerulogy, 2022).

[17] California Air Resources Board, "LCFS Data Dashboard," accessed July 16, 2021, https://ww3.arb.ca.gov/fuels/lcfs/dashboard/dashboard.htm.

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Figure 1. Biodiesel and renewable usage trends within and outside California

Over the past decade, California has driven feedstock supply away from other states due to the limited availability of lipid feedstocks (i.e., vegetable oils and waste oils).[18] To date, most of this diversion has come from waste oils with lower environmental impact; however, strong policy incentives for BBD could shift the LCFS market from one that is primarily generated from waste oils to one that is increasingly reliant on vegetable oils such as soybean, a trend that is already emerging. CARB began tracking soy oil renewable diesel volumes credited under the LCFS as its own feedstock category beginning in 2021. This category made up 17% of BBD volumes credited through Q3 of 2022 (Figure 2).

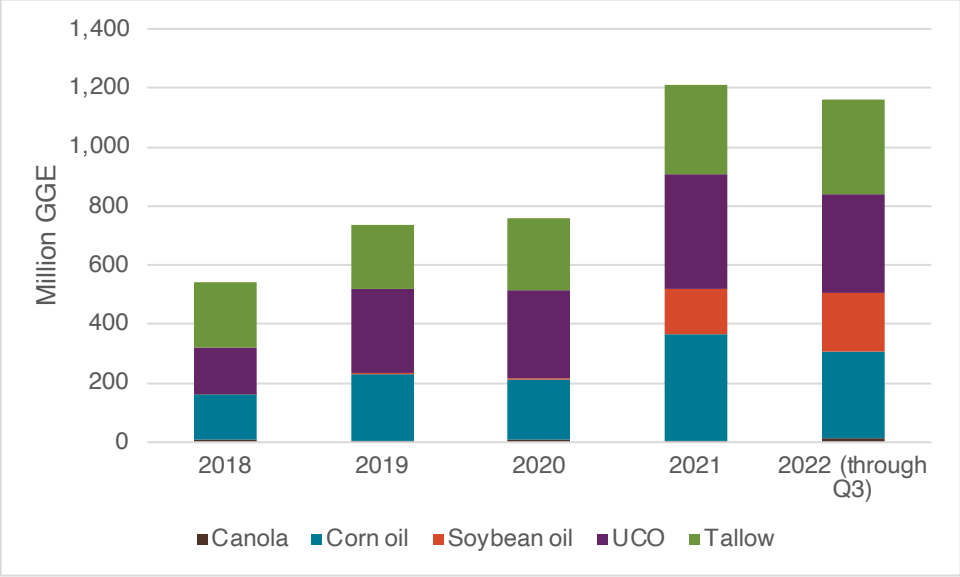

Figure 2. *BBD volumes by feedstock category in million gasoline gallon equivalents (GGE)*

CATS modeling in CARB's example scenario illustrates how without a safeguard, the growth of renewable diesel would continue to dominate LCFS compliance and pose important sustainability risks. For example, the growth of renewable diesel and biodiesel together would rise to 2.5 billion gallons in 2030 from the 2021 consumption level of approximately 1.2 billion gallons. Due to the limits of waste oil collection, it is likely that this would need to be met primarily with additional virgin vegetable

[18] Zhou, Yuanroung, Baldino, Chelsea, and Searle, Stephanie, "Potential Biomass-Based Diesel Production in the United States by 2032." (ICCT, 2020). https://theicct.org/publication/potential-biomass-based-diesel-production-in-the-united-states-by-2032/

oils, such as soy oil derived from increased domestic crushing. To meet additional demand, we estimate that approximately 170 million gallons could come from increased waste oil collection;[19] the remainder, or 1.1 billion gallons, would be sourced from increased soy oil production or imports.

Currently, approximately 50% of the 86 million hectares of planted soy in the U.S. goes towards domestic crushing, with about 43% of the resulting soy oil used to produce BBD (approximately 1.7 billion gallons). The additional 1.1 billion gallons of soy demand could come from a mixture of diversion of existing soy biodiesel incentivized by the Renewable Fuel Standard consumed in other states, increased domestic crushing, or shifting consumption from food markets. Each of these options poses its own problems and would undermine the quality of GHG reductions intended by the LCFS. Shuffling existing soy biodiesel already incentivized under the RFS would have little net benefit; further, increasing total national soy demand beyond 1.7 billion gallons (of which California is on track to consume over 250 million gallons in 2022) would risk undermining the binding targets of the RFS and could distort both RFS and LCFS credit markets. Increased domestic soy crushing or soy planting risks indirect, market-mediated effects on land-use and deforestation. Increased domestic soy crushing risks palm oil substitution in those markets intended for soybean exports.[20] Meeting an additional 1.1 billion gallons of demand would require an additional 15-16 million acres depending on the conversion yield of the fuel (whether diverted from other uses or new planting), an increase of 70-80% from current land demand for BBD production reported by USDA, as illustrated below in Figure 2.[21] This does not account for yield improvements from on-farm management practices.

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[19] Jane O'Malley et al., "Setting a Lipids Cap under the California Low Carbon Fuel Standard" (ICCT, August 2, 2022), https://theicct.org/wp-content/uploads/2022/08/lipids-cap-ca-lcfs-aug22.pdf.

[20] Jane O'Malley et al., "Setting a Lipids Cap under the California Low Carbon Fuel Standard" (ICCT, August 2, 2022), https://theicct.org/wp-content/uploads/2022/08/lipids-cap-ca-lcfs-aug22.pdf.

[21] "USDA ERS - Oil Crops Yearbook," accessed March 15, 2023, https://www.ers.usda.gov/data-products/oil-crops-yearbook/oil-crops-yearbook/.

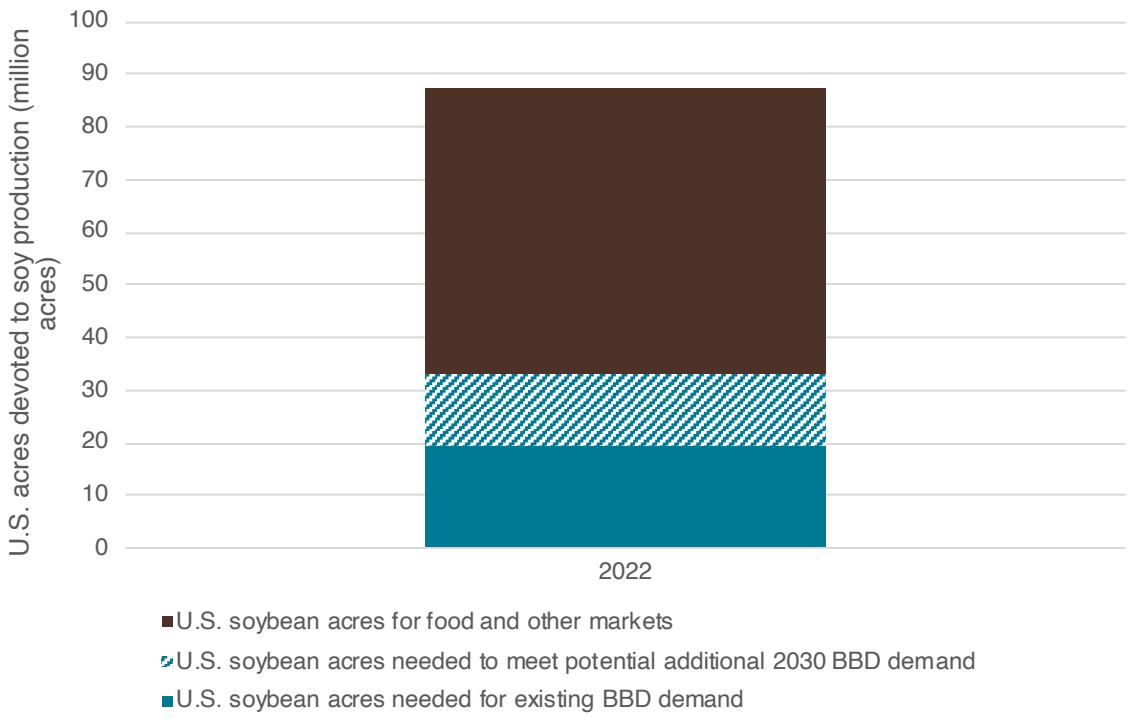

Figure 2. U.S. soybean acreage demand (adapted from LCFS workshop, slide 39)

Implementing an energy-based cap on lipid-derived fuels would mitigate the economic and sustainability risks associated with lipid-based feedstocks while preserving the incentive to improve their per-MJ carbon intensity. It would also support a more balanced portfolio of near- zero carbon fuel pathways such as battery and hydrogen fuel cell electric vehicles and liquid fuel produced from second-generation biomass feedstocks. Our projected 2030 cap of 1.2 billion gallons is based on California's 2020 consumption of lipid-based feedstocks (1.1 billion gallons) and a 2.2% increase in feedstock availability.[22] The cap could be revised annually based on the projected growth in BBD feedstock production such as increased soybean crushing.[23] To ensure that California does not consume a disproportionate share of the growth of domestic lipid production, upward revisions to the lipid

[22] O'Malley et al., "Setting a Lipids Cap under the California Low Carbon Fuel Standard."

[23] U.S. Environmental Protection Agency, "Draft Regulatory Impact Analysis: RFS Standards for 2023-2025 and Other Changes," November 2022, https://www.epa.gov/system/files/documents/2022-12/420d22003.pdf.

cap based on the growth of domestic lipid availability could be adjusted by California's share of the national distillate fuel market, which is currently 7%.[24]

We recommend that CARB set a cap on lipid-based biofuels with the highest sustainability risks rather than all food-based feedstocks due to potential downsides. In a 2022 ICCT study that modeled a future hypothetical national LCFS market, we find that a cap on crop-derived biofuels at 2020 levels was able to limit the contribution of first-generation crop-derived biofuels such as those made from corn and soy towards program compliance; however, we found that this was undermined by increased imports of cheaper used cooking oil-derived biofuels from abroad.[25] That study found that, even with a crop-derived biofuel cap in place, total waste oil consumption continued to grow by 2030 and exceeded domestic waste oil availability, thus driving foreign imports of waste oils to produce renewable diesel. That study found that the strongest safeguard was a separate cap for waste oils alongside crop-based biofuels, resulting in the lowest indirect emissions and potential for waste oil fraud, and leaving greater room for second-generation alternative fuels to contribute towards the program. A combined lipids cap would have a similar effect to separate food and waste oil caps, as it would limit the use of feedstocks used for renewable diesel production that pose the strongest economic and sustainability risks.

Expand LCFS obligation to aviation fuel consumed on intra-state and interstate flights

In the February 2023 workshop, CARB proposed designating aviation fuel consumed on intrastate flights as a deficit-generating fuel. Airlines would be responsible as the fuel reporting entities while alternative aviation fuel (i.e., SAF) producers and importers would remain as credit generators. Although this inclusion may begin to reduce the climate impacts of aviation fuel, the scope of

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[24] U.S. EIA, "California Profile," accessed April 6, 2022, https://www.eia.gov/state/print.php?sid=CA.

[25] Pavlenko, Nikita, Searle, Stephanie, and Christensen, Adam. "Opportunities & Risks for a National Low-Carbon Fuel Standard". (ICCT, 2022). https://theicct.org/publication/low-carbon-fuels-us-mar22/

that change is too restricted to drive meaningful changes in the sector.

We use ICCT's Global Aviation Carbon Assessment (GACA) model to assess the scale of this obligation. Emissions from intrastate flights are approximately 2 million tonnes CO_2, with the bulk of these emissions attributable to flights from 400 to 800 km. Meanwhile, flights leaving the state comprise approximately 94% of the California's aviation emissions.[26] Depending on the emission factors used in the model and the inclusion of non-commercial and freight aviation, approximately 6-12% of emissions attributable to California aviation fall within the intrastate aviation category. In contrast, inter-state domestic aviation emissions contribute approximately 45% of California aviation emissions, a much higher share.

Our analysis and assumptions are detailed in our previous set of comments submitted for the November 2022 LCFS workshop.[27] We assume a 1.7% annual increase in aviation demand through 2030 in conjunction with a 0.5% annual efficiency improvement consistent with the Projection of Aviation Carbon Emissions (PACE) model.[28] To assess the scale of expanding the LCFS to aviation fuels, we evaluate the potential obligation on fuel suppliers of intrastate fuel volumes through 2035.

We estimate that the LCFS deficits generated by aviation fuel consumed on intrastate flights would grow from approximately 6 thousand tonnes CO_2e in 2023 to over 280 thousand tonnes by 2035. This would comprise a miniscule share of overall LCFS program obligations in 2021, which in total reached 18 million tonnes CO_2e of deficits. Based on 2021 SAF consumption data reported to CARB, the total compliance already achieved from

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[26] In its GHG Emission Inventory, the California Air Resources Board (CARB) attributes 4.4 million tonnes of CO_2-equivalent emissions (Mt CO_2e) to intrastate aviation. These numbers are based on the sale of aviation fuels and so include non-commercial aviation and freight operations.

[27] Stephanie Searle, "International Council on Clean Transportation Comments on the November 2022 LCFS Workshop," December 21, 2022, https://www.arb.ca.gov/lists/com-attach/84-lcfs-wkshp-nov22-ws-B2lQOVAnVVkEMAc3.pdf.

[28] International Council on Clean Transportation, "Projection of Aviation Carbon Emissions (PACE) Model" (Washington, D.C., n.d.), https://theicct.github.io/PACE-doc/.

blending SAFs in 2021 would greatly exceed the deficits from expanding the obligation in 2023.[29] By 2025, however, the continued decline in the carbon intensity benchmark, in conjunction with projected growth in intrastate fuel consumption, would necessitate additional fuel blending. Assuming the average carbon intensity of SAFs remains the same as in 2021, the deficits from intrastate aviation in 2030 would necessitate blending approximately 60 million gallons of SAF's, based on the 2021 average certified SAF carbon intensity. However, we note that the deficits may also be offset via other compliance pathways outside the aviation sector, such as those from road biofuel blending or electric vehicle charging. Therefore, the actual delivered volumes of SAF could be lower than the quantity of deficits implies.

Expanding the program to obligate only fuels consumed for intrastate flights would therefore only have a minor impact on the deployment of SAFs from 2023 to 2030. The maximum 60 million gallons of SAF required to offset deficits in 2030 falls far short of the 1.5-billion-gallon target envisioned by California's legislature under AB 1322[30] or the 20% SAF blending target proposed by the Governor. Greater quantities of SAFs could be generated through either a higher GHG reduction target for the LCFS, or an expansion of the program's obligation to cover a larger share of California's aviation sector. By contrast, we estimate that by expanding the obligation to inter-state flights as well would greatly increase the necessary quantity of SAF to meet the program deficits, generating approximately 2.3 million deficits in 2030, and requiring up to 450 million gallons of SAF to offset—approximately 20% of projected 2030 domestic fuel consumption.

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[29] Based on the LCFS dashboard, the average CI of alternative jet fuel was 36.2 gCO2e/MJ and 8.1 million gallons gasoline-equivalents were consumed in 2021, generating approximately 51,000 tonnes CO_2e of LCFS credits.

[30] Robert Rivas and Robert Muratsuchi, "AB-1322 California Global Warming Solutions Act of 2006: Aviation Greenhouse Gas Emissions Reduction Plan." (2021), https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=202120220AB1322.