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Re: Comments on Feb. 22, 2023 Workshop – Environmental Justice in Refinery Communities

Thank you for this opportunity to provide comments on a Preliminary Draft of Potential Regulatory Amendments to the Low Carbon Fuel Standard (LCFS) and Amendment Concepts ("Preliminary Draft") on behalf of Communities for a Better Environment and the Asian Pacific Environmental Network. As environmental justice organizations, we organize and support the advocacy of communities living on the frontlines of California's current fossil fuel transportation system. The health and safety of our communities have been sacrificed by dangerously unhealthy air pollution as well as toxic leaks, explosions, and fires from oil extraction, refineries, and highway corridors. Please note our organizations have also signed on to a joint climate justice coalition letter that highlights key concerns that affect all of our communities.

This LCFS rulemaking could have a large influence on how the shift away from petroleum fuels laid out in the 2022 Scoping Plan plays out on the ground, so it is important that these decisions are shaped by meaningful participation from environmental justice (EJ) frontline communities with the most at stake. **To that end, we request that CARB host an EJ workshop with scenarios and potential policy mechanisms that reflect the concerns of EJ communities. We also request that CARB refrain from certifying any CCS projects and postpone any updates to petroleum project-based crediting, including CCS crediting.** If the LCFS will continue to play a role in California, our environmental justice communities deserve a fair opportunity to be in meaningful dialogue with the agency.

It is important for CARB to recognize that the vast majority of hydrogen is made today with fossil gas through steam methane reformation (SMR), and used in refining processes.[1] Consequently, refinery fenceline communities bear the brunt of health-harming air pollution from co-located hydrogen infrastructure, which is not abated by switching from fossil to biogenic methane. Since the start of the LCFS program, the state has documented *increases* in particulate matter (PM2.5) and greenhouse gas emissions in communities living next to hydrogen plants and refineries.[2] Yet fossil gas SMR hydrogen can receive LCFS credits, and even more disturbingly,

[1] *See* California Energy Commission Hydrogen Fact Sheet, June 2021 ("Currently, more than 95 percent of hydrogen is sourced from fossil fuels.").
[2] OEHHA, *Benefits and Impacts of Greenhouse Gas Limits on Disadvantaged Communities*. Feb. 3, 2022, https://oehha.ca.gov/environmental-justice/report/ab32-benefits.

under the guise of being "renewable" through book-and-claim accounting with inflated biomethane credits that drive factory farm gas pollution in rural EJ communities.

We recommend five types of corrections, at minimum, to the LCFS below:

I. **Correct Biomethane Carbon Intensity Scoping.** First, CARB should correct the distorted carbon intensity calculations for biomethane. Inflated values for factory farm gas drive pollution in *both* lower income communities of color in rural agricultural areas and refinery communities along the coast.

II. **Stop Subsidizing Steam Methane Reformation-Based Hydrogen in Refinery Communities.** Second, CARB should remove pathways and crediting mechanisms like book-and-claim accounting that support the growth of hydrogen production via steam methane reformers co-located with oil refineries and also drive pollution from concentrated animal feeding operations (CAFOs) in rural communities.

III. **Cap and Limit Unsustainable Biofuel Feedstocks.** Third, as it has increasingly been recommended by many biofuel supporters and experts such as the International Council on Clean Transportation (ICCT) and Union of Concerned Scientists (UCS), the biofuel feedstock subsidy should be capped at a level designed to prevent the indirect land use change (ILUC) being driven by the increasing prevalence of soybean oil and other food crop oils as feedstocks. We concur with this recommendation on additional grounds.

IV. **Pause Certifications and Schedule Additional Workshops to Update Petroleum Project-Based Crediting.** Fourth, CARB should schedule additional workshops to reform LCFS petroleum project-based crediting. Any subsidies should be limited overall, encourage direct environmental benefits, and designed in a manner consistent with the need to meet climate targets by phasing down the refining of combustion fuels—with the need to plan for a managed decline of refining in mind.

V. **Pause Certifications for CCS Projects and Postpone Updates to the LCFS CCS Protocol, Reconsider CCS in Refineries.** Fifth, CARB should place a moratorium on any carbon capture projects and update the LCFS CCS Protocol alongside or after the SB 905 rulemaking process, in which environmental justice communities should receive additional protections. In that process, CARB should consider removing CCS in refineries from LCFS project-based crediting.

We do appreciate that CARB has consistently asked stakeholders to address the developments over recent years on the relative availability and impact of various biofuel feedstocks. We also appreciate how CARB staff have started to consider phasing out the crediting of petroleum projects by 2040. We urge CARB to have the courage to reckon fully with the ever-increasing urgency of phasing down—and eventually phasing out—California's fossil fuel industry on the path to meeting its climate targets.

We welcome engagement and collaboration with CARB staff to address the concerns of environmental justice communities in California. Below, we provide additional detail and rationale for our recommendations.

I. CARB Should Correct the LCFS Carbon Intensity Calculations for Factory Farm Gas

As recommended in numerous comments from Leadership Counsel for Justice and Accountability as well as other environmental justice and environmental organizations, we urge

you to exclude all fuels derived from factory farm gas from the LCFS. In the alternative, we ask that you amend the LCFS to correct the inaccurate calculations creating excessively low carbon intensity scores for factory farm gas that allow oil companies to game the LCFS—-and cover up pollution in refinery/SMR hydrogen communities.

II. CARB Should Eliminate Subsidies and Incentives for Dirty Steam Methane Reformation Hydrogen in Refinery Communities

It is unacceptable that hydrogen producers can use fossil gas to produce hydrogen through steam methane reformation—a process that emits major greenhouse gasses and health-harming pollution in communities that bear the brunt of pollution from California's oil refineries—and obtain LCFS credits. Right now, refineries are filing permits to *expand* their fossil gas SMR hydrogen production. We ask CARB to update the LCFS so that it no longer supports a growing industry practice that is disproportionately harming lower income communities of color.

Oil company reliance on factory farm gas for in and out of state hydrogen creation also allows hydrogen producers to continue polluting in some of the most polluted neighborhoods in California while characterizing their fuel as "renewable." For example,[3] Shell generated excessively inflated LCFS credits from certifying a "Gasified Hydrogen from Renewable Biomethane" pathway without actually changing its fossil-based steam methane reformation operations in Wilmington, CA. Shell needed only to purchase the "environmental attributes" of a dairy in Morris, Minnesota using book-and-claim accounting in an LCFS credit market with no deliverability requirements for hydrogen.

It is no small coincidence that some of the companies benefiting most from LCFS credit generation from dairy digester projects are major oil companies, whose oil refineries and co-located fossil gas hydrogen plants also disproportionately pollute low-income communities of color. For example, Shell Energy North America[4] is a major investor in dairy and other methane projects that generate LCFS credits; Chevron[5] has joint ventures with both CalBio[6] and

[3] Shell at Air Products Chemical in Wilmington, CA is paired with dairy manure-derived biomethane in Minnesota. https://ww2.arb.ca.gov/sites/default/files/classic/fuels/lcfs/fuelpathways/comments/tier2/b0348_summary.pdf; First Element Fuel at Air Products Chemical in Wilmington, paired with dairy manure-derived biomethane in Indiana. https://ww2.arb.ca.gov/sites/default/files/classic/fuels/lcfs/fuelpathways/comments/tier2/b0145_summary.pdf.

[4] Shell Energy North America Investments in Natural Gas. https://shellenergy.com/business/products-and-services/renewable-solutions/renewable-natural-gas/

[5] Rem. "Biogas - Chevron to Acquire Beyond6 CNG Fueling Network." Renewable Energy Magazine, at the Heart of Clean Energy Journalism, REM, 1 Dec. 2022, https://www.renewableenergymagazine.com/biogas/chevron-to-acquire-beyond6-cng-fueling-network-20221201.

[6] "California Bioenergy LLC (CalBio) announced a joint investment in their second holding company to produce and market dairy biomethane as a renewable natural gas (RNG) transportation fuel in California" https://www.chevron.com/newsroom/2022/q4/chevron-calbio-expand-partnership-on-dairy-biomethane-fuel-projects

Brightmark[7] to expand its investments in dairy methane projects throughout California; BP and Aria Energy[8] have also announced new dairy methane projects.

III. CARB Should Place Appropriate Caps on the Availability of LCFS Subsidies for Crop-Based Fuels

We appreciate CARB's specific request for feedback concerning crop-based biofuels. In answer to the specific question posed as to whether staff should consider a cap on such fuels, our answer is yes. There are not sufficient sustainable feedstocks, nor sufficient demand, given that California has recognized electrification should be the primary replacement for fossil fuels. We support previous commenters' proposals to and and limit LCFS subsidies for crop-based biofuels.

The LCFS was designed originally to provide a CI calculation associated with individual increments of fuel production, without attention paid to the possible non-linear impact of more versus fewer increments being produced. In the intervening years, however, it has become clear where certain types of non-petroleum fuels are produced at a very large scale (as is currently planned at two Bay Area refineries, Marathon Martinez and Phillips 66 Rodeo), market disruptions leading to Indirect Land Use Change ("ILUC") may be triggered at that scale that are not fully accounted for in the incremental CI calculation. This conclusion has been reached by many bioenergy experts who are generally supportive of development of non-petroleum fuels, but are recommending caps in the LCFS on subsidizing fuels produced with crop-based feedstocks.[9]

It is likely that in coming years, under a status quo application of the LCFS, the majority of renewable diesel and sustainable aviation fuel produced in the state will come from food crop and food system oils, predominantly soybean oil. One indicator for the likely predominant role of soybean and other food crop oils for future liquid fuel production is the current breakdown of feedstock demand for biodiesel production.[10] From 2018 to 2020, 59% of biodiesel in the United States was produced from soybean oil as feedstock, compared to 11% from yellow grease, 14% from distiller's corn oil, and only 3% from tallow, or rendered beef fat.[11] Another

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[7] Malik, Naureen. "Chevron, Brightmark Advance Push to Convert Cow Manure into Renewable ..." Financial Post , Bloomberg News, 24 Aug. 2021, https://financialpost.com/commodities/energy/oil-gas/chevron-expanding-push-into-dairy-to-gas-fuel-to-cut-emissions.

[8] Bioenergy International. "BP and ARIA Energy Partner in California Dairy Farm RNG Project." Bioenergy International, Bioenergy International, 26 Mar. 2021, https://bioenergyinternational.com/bp-and-aria-energy-partner-in-california-dairy-farm-rng-project/.

[9] ICCT, *Setting a lipids fuel cap under the California Low Carbon Fuel Standard*, July 2022, *available at* https://theicct.org/publication/lipids-cap-ca-lcfs-aug22/ (ICCT July 2022).

[10] *See* Zhou, Y; Baldino, C; Searle, S. *Potential biomass-based diesel production in the United States by 2032*. Working Paper 2020-04. International Council on Clean Transportation, Feb. 2020, https://theicct.org/sites/default/files/publications/Potential_Biomass-Based_Diesel_US_02282020.pdf (accessed Dec 8, 2021).

[11] Data from EIA Biodiesel Production Report, Table 3. Feedstock breakdown by fat and oil source based on all data from Jan. 2018–Dec. 2020 from this table. U.S. Energy Information Administration (EIA), Monthly Biodiesel Production Report Table 3, Feb. 26, 2021, https://www.eia.gov/biofuels/biodiesel/production/table3.pdf (accessed Dec. 14, 2021). Data were converted from mass to volume based on a specific gravity relative to water of 0.914 (canola oil), 0.916 (soybean oil), 0.916 (corn oil), 0.90 (tallow), 0.96 (white grease), 0.84 (poultry fat), and 0.91 (used cooking oil). See also Zhou, Baldino, and Searle, 2020-04.

indicator is the limited domestic supply of alternative feedstock sources. Tallow and other waste oil volumes have come nowhere near meeting current biodiesel feedstock demand, with little prospect of expanding soon.[12]

There is now broad consensus in the scientific literature that increased demand for food crop oil biofuel feedstock has induced ILUC, with significant negative climate and other environmental consequences.[13] This ILUC is substantially a result of displacement and substitution of commodities, leading to the conversion of land use for crops other than that of the feedstock demanded. Since oil crops are to a great degree fungible—they are, essentially, interchangeable lipid, triacylglycerol (TAG) or fatty acid inputs to products[14] —their prices are significantly if not wholly linked: when the price of one crop increases, another cheaper crop will be produced in greater volumes to fill the gap as consumers substitute their use of the more expensive crop. A chief substitute for soybean oil is palm oil, whose production has been linked to significant deforestation and associated carbon sink loss.

The European Union is taking the lead to address the problem with curbs on the most problematic feedstocks. After a decade of studies, the European Parliament has voted to restrict use of soybean oil as a feedstock, by providing that it would no longer be counted toward the quota for first-generation biofuels.[15] Belgium has already banned soybean oil-based biofuels as of 2022.[16] We recommend that CARB take the US lead in addressing the harm associated from large-scale use of feedstocks in the food system by setting caps on the availability of the LCFS subsidy for fuels produced from such feedstocks. The ICCT's recent briefing papers suggests a number of ways in which a cap could be conceptualized and implemented, recommending that caps be established "based on an analysis of feedstock availability and competing demands for

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[12] *See* Baldino, C; Searle, S; Zhou, Y, *Alternative uses and substitutes for wastes, residues, and byproducts used in fuel production in the United States*, Working Paper 2020-25, International Council on Clean Transportation, Oct. 2020, https://theicct.org/sites/default/files/publications/Alternative-wastes-biofuels-oct2020.pdf (accessed Dec 8, 2021).

[13] *See* Portner et al., 2021; C. Malins and C. Sandford, *Animal, vegetable or mineral (oil)? Exploring the potential impacts of new renewable diesel capacity on oil and fat markets in the United States*. Cerulogy, ed. International Council on Clean Transportation, Jan. 2022. https://theicct.org/wp-content/uploads/2022/01/impact-renewable-diesel-us-jan22.pdf. *See also* Searchinger, T. et al., *Use of U.S. Croplands for Biofuels Increases Greenhouse Gases Through Emissions from Land Use Change*. Science, 2008, 319, 1238, https://science.sciencemag.org/content/319/5867/1238 (accessed Dec 8, 2021) (This landmark article reflects the earliest indications that certain biofuel feedstocks are counterproductive as climate measures.)

[14] The Environmental Impact Report (EIR) for the Rodeo Renewed biofuel conversion project expressly recognized this fungibility: "The different uses of the commodity and whether or not there are substitutes for those commodities also affect the renewable feedstocks market. For example, soy and corn can both be used for livestock feed or human food production. If one commodity increases in price, farmers may be able to switch to the other commodity to feed their livestock for a cheaper cost (CME Group). This is particularly important for renewable feedstocks given the different uses for oilseeds, including food production and animal feedstocks, and the different vegetable oils that may be used as substitutes (e.g., canola oil may be a substitute for soybean oil)." Rodeo Renewed Final EIR 3.8.3.2.

[15] "Soy oil set to follow palm as crop faces biofuel feedstock restrictions," *Biofuels International* July 14, 2022, *available at* https://biofuels-news.com/news/soy-oil-set-to-follow-palm-as-crop-faces-biofuel-feedstock-restrictions/. See Malins, C. *Risk Management: Identifying high and low ILUC-risk biofuels under the recast Renewable Energy Directive*; Cerulogy, 2019; 4, 14. http://www.cerulogy.com/wp-content/uploads/2019/01/Cerulogy_Risk-Management_Jan2019.pdf.

[16] Belgium to ban palm- and soy-based biofuels from 2022. Argus Media, Apr. 14, 2021. https://www.argusmedia.com/en/news/2205046-belgium-to-ban-palm-and-soybased-biofuels-from-2022.

vegetable oil, waste oil, and animal fats for food and other uses," as well as "scaled proportionally with California's share of the national distillate fuel market for an equitable distribution of [biomass-based diesel] resources."[17]

Although soy is currently the main feedstock concern, distiller's corn oil is a growing concern as well, with the production of ethanol causing major problems in the corn growing states. The AB 32 Environmental Justice Advisory Committee public meeting included a discussion on the Low Carbon Fuel Standard (LCFS). A presentation at the AB 32 Environmental Justice Advisory Committee public meeting[18] by invited expert Dr. Maureen McCue from Physicians for Social Responsibility-Iowa described significant environmental problems caused by ethanol, including deforestation, soil and nutrient loss, pollinator extinction, and risking food costs.[19] Iowa is the largest producer of ethanol. Additional market disruption results from the fact that distiller's corn oil was has long been used in animal feed, before large amounts of it were diverted to produce biodiesel.[20]

California subsidies for the combustion of corn-based liquid fuels are also fantastically high. The LCFS currently subsidizes ethanol production that employs CCS, which only addresses a small fraction of the production lifecycle impact, as well as use of its primary by-product, distiller's corn oil. By industry estimates, a 100 million gallon per year ethanol plant produces around 300,000 metric tons of CO_2 annually. If carbon capture and sequestration (CCS) is used to reduce the carbon intensity by 30 gCO_2e/MJ under the California LCFS, the 100 M gal ethanol plant receives $50 million in subsidies.[21] The byproduct distiller's corn oil would generate an additional subsidy when used, as currently planned, along with soybean oil and canola oil to produce renewable diesel at the Phillips 66 facility in Rodeo, California.[22]

CARB should therefore evaluate and implement a cap on subsidies associated with soy, corn, and any other feedstocks determined to be problematic, either due to CI impacts from ILUC, other environmental harms, or food system disruptions.

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[17] ICCT July 2022 at 2.
[18] AB 32 Environmental Justice Advisory Committee (EJAC) Meeting, July 25, 2022, https://ww2.arb.ca.gov/events/ab-32-environmental-justice-advisory-committee-meeting-21.
[19] Maureen McCue, Ethanol & Pipelines: Unintended Consequences From Iowa to California, Presentation to the AB 32 EJAC, https://ww2.arb.ca.gov/sites/default/files/2022-07/PSR%20Iowa%20presentation%20to%20EJAC.pdf*; see also* Sheri Deal-Tyne, Health and Energy Policy Researcher, PSR-Iowa, report on the CO2 emissions and land use changes from producing ethanol, and the plan to build over 3500 miles of pipeline to transport CO2 through six states to where it will be sequestered. California's LCFS provides incentives to the ethanol industry to utilize CCS. https://blogforiowa.com/2022/03/21/carbon-capture-in-iowa/.
[20] Transparency Market Research, Distiller's Corn Oil Market, Forecast 2018-2028, https://www.transparencymarketresearch.com/distillers-corn-oil-market.html#:~:text=The%20distillers%20corn%20oil%20is%20produced%20during%20the%20ethanol%20production,oil%20or%20is%20used%20directly.
[21] "The door is open for ethanol and CCS," Ethanol Producer Magazine, May 2020, https://ethanolproducer.com/articles/17176/the-door-is-open-for-ethanol-producers-and-ccs.
[22] Air Resources Board, Staff Summary for Phillips 66 Company Tier 2 Pathway Application, Sept. 20, 2022, https://ww2.arb.ca.gov/sites/default/files/classic/fuels/lcfs/fuelpathways/comments/tier2/b0323_summary.pdf.

IV. CARB Should Pause Certifications and Schedule Additional Workshops to Update Petroleum Project-Based Credits

We request that CARB schedule additional workshops to reform LCFS petroleum project-based crediting. Any subsidies should be limited overall, encourage direct environmental benefits, and designed in a manner consistent with the need to meet climate targets by phasing down the refining of combustion fuels—with the need to plan for a managed decline of refining in mind.

At this point in time, the goal and effect of the California climate policy no longer be to simply maximize production of lower-carbon combustion fuels. Rather, it should be designed to incentivize production of such fuels consistent with a path toward meeting California's climate goals, without either incentivizing an excess of combustion fuels, which could interfere with electrification goals and continue harmful combustion emissions, or incentivizing capital investments that could lock in refining, instead of shepherding the needed wind-down of California's refineries. Additionally, the LCFS should not have the effect of simply shifting California's emissions out of state – either by causing ILUC through out-of-state production of crop-based feedstocks and resultant market disruption, as discussed in the previous section, or by driving increased exports of refined products, which is already occurring as discussed below.

Here is a summary of some potential ideas that CARB could evaluate and consider in a later workshop alongside interagency conversations with stakeholders, including environmental justice communities:

- ***Coordinate lower carbon petroleum products with a refining phaseout plan.*** CARB could coordinate the volume of available LCFS credits for lower carbon petroleum-based products with a well-ordered supply-side planning process to phase out refining in the state.
- ***Subsidies proportional to refined product export increases.*** The volume of LCFS credits available could be reduced over time commensurate with increases in export of refined products, to help ensure that incentivized low-carbon production is not merely shifting emissions out of state.
- ***Caps to deter overproduction of biofuels.*** The availability of LCFS credits could be limited in order to deter production of volumes and types of biofuel that are inconsistent with California's climate planning trajectories.
- ***Cap biofuel credits to fossil fuels actually replaced.*** CARB should ensure that the LCFS credits only biofuels that reduce emissions by replacing fossil fuels, not biofuels that induce increased exports of fossil fuels to be burned outside California.

By its current design, which provides unlimited subsidies for production of fuels with determined lower CI, the LCFS otherwise invites two potential unintended consequences.

First, there is a risk of incentivizing overproduction of combustion fuels beyond what is called for and anticipated in CARB's climate planning, and incentivizing the buildout of liquid fuel refining infrastructure that will be counterproductive or superfluous to a decarbonizing economy.

For this reason, it is important to ensure that the LCFS does not incentivize a buildout of petroleum refining infrastructure that, while achieving incremental reductions in carbon intensity

on paper, is inconsistent with the need to phase out refining and combustion fuel altogether. California fuel consumers should not be compelled to pay for the buildout of so-called "lower carbon" refining infrastructure that threatens to generate petroleum products in excess of the declining levels needed to meet climate goals. Likewise, it should not encourage otherwise stranded petroleum assets, or to switch to producing petroleum-based fuels for the export market (already occurring as described below). Thus, it is important that LCFS be reformed to be consistent with a well-developed plan to phase out petroleum refining, with subsidies limited accordingly.

LCFS reform should specifically address the very real risk of overproduction of bioenergy at a level that exceeds volumes anticipated in CARB's climate planning. Studies supporting CARB's planning consistently demonstrate that California's climate goals require a dramatic reduction in the use of *all* combustion liquid fuels in the state's transportation sector, not just petroleum-based fuels; hence indicating a consensus that the need for biofuels is limited, at best. Specifically, pathway scenarios developed by Mahone et al. for the California Energy Commission (CEC),[23] Air Resources Board (CARB)[24] and Public Utilities Commission,[25] Brown et al. for the University of California,[26] and Reed et al. for UC Irvine and the CEC[58] all add benchmarks for assessing refinery conversions to biofuels.

Accordingly, State-commissioned studies also indicate a need to avoid incentivizing overproduction and use of biofuels, in particular by limiting the production of crop-based lipid biofuels given their added climate risks. PATHWAYS, the primary modeling tool for the AB 32 Scoping Plan, now runs a biofuels module to determine a least-cost portfolio of the biofuel products ultimately produced (e.g. liquid biofuel, biomethane, etc.) based on biomass availability.[27] Back in 2017, Mahone et al. chose to exclude purpose-grown crops because of their harmful environmental impacts and climate risks and further limited the biomass used to in-state production in addition to California's population-weighted share of total national waste biomass supply.[28] A study by Brown et al. meanwhile, in considering pathways to reduce

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[23] Mahone et al., 2018. *Deep Decarbonization in a High Renewables Future: Updated results from the California PATHWAYS Model;* Report CEC-500-2018-012. Contract No. EPC-14-069. Prepared for California Energy Commission. Final Project Report. Energy and Environmental Economics, Inc.: San Francisco, CA. *available at* https://ww2.energy.ca.gov/2018publications/CEC-500-2018-012/CEC-500-2018-012.pdf

[24] Mahone et al., 2020. Achieving Carbon Neutrality in California: Pathways Scenarios Developed for the California Air Resources Board, California Air Resources Board, Energy and Environmental Economics, Inc. *available at* https://ww2.arb.ca.gov/sites/default/files/2020-10/e3_cn_final_report_oct2020_0.pdf

[25] Mahone et al., 2020b. *Hydrogen Opportunities in a Low-Carbon Future: An Assessment of Long-Term Market Potential in the Western United States;* Energy and Environmental Economics, Inc.: San Francisco, CA. Report prepared for ACES, a joint development project between Mitsubishi Hitachi Power Systems Americas, Inc. and Magnum Development, LLC. Submitted to the California Public Utilities Commission June 2020. *Available at* https://www.ethree.com/?s=hydrogen+opportunities+in+a+low-carbon+future

[26] Brown et al., 2021. *Driving California's Transportation Emissions to Zero;* Report No.: UC-ITS-2020-65. Institute of Transportation Studies, University of California. DOI: 10.7922/G2MC8X9X. *available at* https://escholarship.org/uc/item/3np3p2t0

[27] E3 introduced a new biofuels module in the model that, unlike previous iterations of the PATHWAYS model, endogenously selects least-cost biofuel portfolios given the assumed available biomass. Mahone et al., 2020, footnote 2 at 19-20.

[28] *See e.g.,* Mahone et al., 2018. *Deep Decarbonization in a High Renewables Future: Updated results from the California PATHWAYS Model;* Report CEC-500-2018-012. Contract No. EPC-14-069. Prepared for California Energy Commission. Final Project Report. Energy and Environmental Economics, Inc.: San Francisco, CA.

California's transportation emissions, placed a cap on lipid-based jet fuel and diesel use to a maximum of 0.5–0.6 and 0.8–0.9 billion gallons/year, respectively.[29] Yet even currently approved in-state lipid bioenergy production (diesel and jet fuel) proposed would total approximately 2.1 billion gallons/year when fully operational.[30] This volume of production could exceed caps of 0.0–1.5 billion gallons/year prescribed by nearly any state climate pathway that has been considered.

Thus, it is critically important that CARB, in considering a path forward for the LCFS, be mindful of the risk that the LCFS can and will incentivize both perpetuation of refining infrastructure and refiners, who are not bound by any climate modeling, could threaten the state's climate progress.

Second, there is the problem of leakage: that is, the risk of the LCFS having the unintended effect of incentivizing export of refined petroleum products from the state, thus externalizing rather than eliminating the associated carbon emissions. Unfortunately, this result is already occurring under the LCFS as currently formulated, and needs to be reversed. Available data shows that petroleum distillate fuels refining for export to other states and abroad has continued to expand in California in the last two decades even as LCFS-incentivized biofuel production ramped up in recent years. It is clear from this data that renewable diesel production during those decades—which was originally expected to replace fossil fuels—merely added a new source of carbon to the liquid combustion fuel chain. Total distillate volumes, including diesel biofuels burned in-state, petroleum distillates burned in-state, and petroleum distillates refined in-state and exported to other states and nations, increased from approximately 4.3 billion gallons per year to approximately 6.4 billion gallons per year between 2000 and 2019.[31] [32]

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available at https://ww2.energy.ca.gov/2018publications/CEC-500-2018-012/CEC-500-2018-012.pdf ("most scenarios apply this more restrictive biomass screen to avoid the risk that the cultivation of biomass for biofuels could result in increased GHG emissions from natural or working lands.", pp. 10).

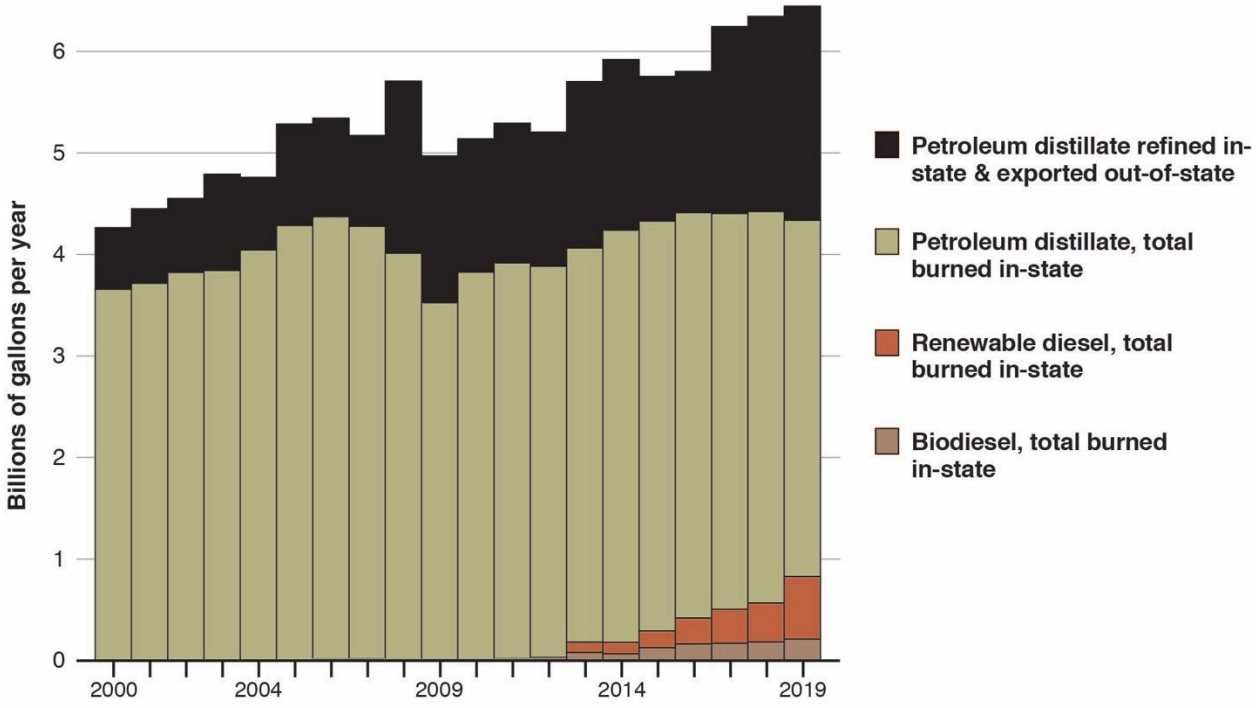
[29] Brown et al., 2021. *Driving California's Transportation Emissions to Zero;* Report No.: UC-ITS-2020-65. Institute of Transportation Studies, University of California. DOI: 10.7922/G2MC8X9X. *available at* https://escholarship.org/uc/item/3np3p2t0

[30] Supporting Material Appendix for *Changing Hydrocarbons Midstream: Fuel chain carbon lock-in potential of crude-to-biofuel petroleum refinery repurposing;* prepared for the Natural Resources Defense Council (NRDC) by Greg Karras, G. Karras Consulting, *available at* www.energy-re-source.com; *Application for Authority to Construct Permit and Title V Operating Permit Revision for Rodeo Renewed Project: Phillips 66 Company San Francisco Refinery (District Plant No. 21359 and Title V Facility # A0016);* Prepared for Phillips 66 by Ramboll US Consulting, San Francisco, CA. May 2021; *Initial Study for: Tesoro Refining & Marketing Company LLC—Marathon Martinez Refinery Renewable Fuels Project;* received by Contra Costa County Dept. of Conservation and Development 1 Oct 2020; *April 28, 2020 Flare Event Causal Analysis; Tesoro Refining and Marketing Company, subsidiary of Marathon Petroleum, Martinez Refinery Plant #B2758;* report dated 29 June, 2020 submitted by Marathon to the Bay Area Air Quality Management District: San Francisco, CA., *available at* https://www.baaqmd.gov/about-air-quality/research-and-data/flare-data/flare-causal-reports; *Paramount Petroleum, AltAir Renewable Fuels Project Initial Study;* submitted to City of Paramount Planning Division, 16400 Colorado Ave., Paramount, CA. Prepared by MRS Environmental, 1306 Santa Barbara St., Santa Barbara, CA; Brelsford, R. Global Clean Energy lets contract for Bakersfield refinery conversion project. *Oil & Gas Journal.* 2020**.** Jan. 9, 2020.

[31] CARB GHG Inventory Fuel Activity data, 2019 update.

[32] CEC *Fuel Watch*. Weekly Refinery Production. California Energy Commission: Sacramento, CA, *available at* https://ww2.energy.ca.gov/almanac/petroleum_data/fuels_watch/output.php

Specifically, crude refining for export (shown in black in the figure below[33]) expanded after in-state burning of petroleum distillate (shown in olive) peaked in 2006, and the exports expanded again from 2012 to 2019 with more in-state use of diesel biofuels (shown in dark red and brown). From 2000 to 2012 petroleum-related factors alone drove an increase in total distillates production and use associated with all activities in California of nearly one billion gallons per year. Then total distillates production and use associated with activities in California increased again, by more than a billion gallons per year from 2012 to 2019, with biofuels accounting for more than half that increment. These state data show that diesel biofuels did not, in fact, replace petroleum distillates refined in California. Although the use of renewable- and bio-diesel reduced the instate use of petroleum distillate, the petroleum distillate exported continued to grow. Overall the total output of California refineries increased, causing more local air pollution and global carbon emissions.



Distillate fuel shares associated with all activities in California, 2000–2019.
Growth in total distillates excluding jet fuel and kerosene from State data.

Data from CEC Fuel Watch and CARB GHG Inventory Fuel Activity Data, 2019 update.

These emission impacts from refining for export are more severe than disclosed in the 2022 Climate Change Scoping Plan. Despite the wealth of export data, the 2022 Scoping Plan

[33] Figure produced by Greg Karras, Community Energy reSource.

notably omitted data related to foreign exports or total exports from refiners.[34][35] Yet the very real fuel chain emissions associated with refined fuel exports by refiners in California during 2013–2019, including direct emissions from extracting imported oil used to produce the exports, refining it in-state and burning the exported fuels, totaled some 930 million metric tons CO2e.[36]

In order to avoid these unintended consequences, we recommend that CARB consider various ways to cap LCFS subsidies by limiting the subsidies in a manner consistent with the state's climate policy—which includes, per AB 32, a prohibition on shifting emissions out of state. Additionally, CARB should work with CalEPA and its sister agencies establish a clear plan to phase out petroleum refining in California consistent with climate goals, and limit subsidies to ensure that the LCFS does not support the continued use or additional buildout of petroleum refining infrastructure that is inconsistent with that phaseout plan.

V. CARB Should Pause Certifications for CCS Projects and Postpone Updates to the LCFS CCS Protocol, Reconsider CCS in Refineries

It would be premature for CARB to approve any CCS projects through the LCFS CCS Protocol, given that CARB has not completed its rulemaking to create a CCS program pursuant to SB 905.

We also urge CARB to consider removing CCS in refineries from project-based crediting due to additional risks, barriers, and overriding environmental health concerns. This reconsideration would align CARB with the Department of Energy (DOE), as CCS has already been rejected by the DOE's primary expert on this issue as the right tool to decarbonize the refinery sector.[37] This re-evaluation is necessary due to several factors not previously considered, including (a) long timelines now understood to be required to develop CCS for components of California refineries, as none exist in the state and no comparable example exists elsewhere; (b) the utility of subsidizing major capital investments as oil refinery production declines; (c) the ceiling on the potential of CCS to operate as an effective and economical decarbonization strategy for refineries because of its physical properties; (d) the addition to current dangers at century-old oil refineries,

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[34] West Coast Transportation Fuels Markets; U.S. Energy Information Administration: Washington, D.C. 2015. https://www.eia.gov/analysis/transportationfuels/padd5; California Energy Commission. Refinery Inputs and Production; Fuels Watch data; accessed Oct. 2022 from https://www.energy.ca.gov/data-reports/reports/weekly-fuels-watch; California Air Resources Control Board. 2000–2020 GHG Inventory (2022 Edition); Full Inventory, Fuel Combustion and Heat Content; accessed Nov. 2022; https://ww2.arb.ca.gov/ghg-inventory-data.

[35] U.S. Census Bureau Trade Data Reports; exports of petroleum refinery products from California from https://usatrade.census.gov/. Four (4) Trade database query reports include: 1. Exports from California to all other nations of petroleum products manufactured by all facilities in the North American Industrial Classification (NAIC) 3241; 2. Exports from California to all other nations of gasoline and other light petroleum oils excluding crude and excluding biodiesel, HS Commodity Code 271012; 3. Exports from California to all other nations of jet fuel, diesel, distillate and other medium and heavy oils, excluding crude and excluding biodiesel, HS Commodity Code 271019; 4. Exports from California to all other nations of petroleum coke, calcined and not calcined, HS commodity codes 271311 and 271312.

[36] CEJA (2022). Climate Pathways in an Oil State—2022; A California Environmental Justice Alliance Report. Prepared by Greg Karras, Community Energy reSource. https://www.energy-re-source.com/_files/ugd/bd8505_3ab3d89b8c8940289f4be022b0228d28.pdf

[37] Dr. Jennifer Wilcox, Principal Deputy Assistant Secretary of Energy, U.S. Department of Energy, at Carbon Capture and Storage Symposium, held by U.S. EPA, CARB, and Stanford University, September 29, 2022, You Tube CCS Symposium Opening Keynote video beginning at Time 37:58, available at: https://www.youtube.com/watch?v=3pH11tFfGVQ.

including along hazardous CO2 pipeline routes, and in sequestration leaks, which are far from benign, (e) the concern of adding pollution and safety risks from construction and operation of CCS technology in communities already overburdened by industrial pollution and hazards.

Oil refineries are highly complex, unique industries, frequently taking up more than a thousand acres, with many a hundred years old, design cannot be assumed to be consistent with a simple cookie-cutter replication as in much smaller industrial pilot projects outside the state. CBE has previously submitted comments on space-constrained oil refineries in CARB's 2022 Scoping Plan workshops, and expanded comments as part of the California Environmental Justice Coalition (CEJA).

Those comments demonstrate that for example at Southern California refineries, the South Coast Air Quality Management District and refiners determined that refineries are already space-constrained, resulting in determinations to abandon the strongest regulatory standards for NOx controls, and to avoid phaseout of highly-hazardous hydrogen fluoride, due to these constraints. Our comments also refuted the assumption that modular systems are already available for large refinery operations—these require special design for larger systems, such as California's oil refineries. We additionally supplemented our analysis with the testimony of Dr. Phyllis Fox, Ph.D., PE, BCEE, QEP, regarding the extremely hazardous operations of CO2 pipelines, which already released a suffocating cloud of CO2 in Mississippi.

In Scoping Plan proceedings, CARB responded with simple statements that improved safety standards will be put in place later. Currently, there is no regulatory framework to protect environmental justice communities from the risks associated with CCS infrastructure. The California Natural Resources Agency, to our knowledge, has not even provided a proposal to the Legislature (due February 1, 2023) for a framework to establish standards that minimize safety risk from pipelines carrying carbon dioxide, and CARB has not held workshops focused on how it proposes to measure and minimize safety and co-pollutant harms. These processes are necessary for communities to vet the State's proposed CCS safety protocols, even if they alone are unlikely to sufficiently prevent harm from CCS project approvals.

Thank you for this opportunity to comment. We welcome engagement and an opportunity for collaboration with CARB staff to address the concerns of refinery communities in California.

Sincerely,

Connie Cho, Associate Attorney
Communities for a Better Environment

Faraz Rizvi, Policy & Campaign Manager
Asian Pacific Environmental Network