

June 24, 2022

Liane Randolph, Chair
Members of the Board
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Dear Chair Randolph and Members of the Board,

I am a retired staff member at the California Air Resources Board (CARB). During my 13-year career at CARB, I worked almost exclusively on the Low Carbon Fuel Standard (LCFS), including over a year as Branch Chief overseeing the program.¹

I am urging the Board to **restrict and ultimately phase-out the use of crop-based biofuels in California**. The use of crops such as corn and soy as feedstock to produce liquid biofuels is not a sustainable means of reducing GHG emissions and may actually increase emissions as compared to fossil fuels. Moreover, using crops to produce biofuels is expensive and exacerbates tropical deforestation and global hunger. CARB's promotion of these fuels is not in line with its reputation as a global leader on environmental policy.

Crop-based biofuels are not sustainable: The method of carbon accounting used in the Scoping Plan modeling treats biofuels as carbon neutral and ignores emissions occurring outside of California associated with producing crops and converting those crops into biofuel. Many studies, including work performed by CARB², show that these full life cycle emissions, including emissions from increased fertilizer application and land use change (LUC), are significant, highly uncertain, and appreciably or entirely negate the carbon benefit of using biogenic feedstock. In fact, a recent assessment of GHG emissions resulting from corn ethanol production incentivized by the federal Renewable Fuel Standard (RFS) found that total life cycle emissions for corn ethanol exceed those of gasoline.³ This study concludes that “the RFS increased corn prices by 30% and the prices of other crops by 20%, which, in turn, expanded US corn cultivation by 2.8 Mha (8.7%) and total cropland by 2.1 Mha (2.4%) in the years following policy enactment (2008 to 2016). These changes increased annual nationwide fertilizer use by 3 to 8%, increased water quality degradants by 3 to 5%, and cause enough domestic land use change emissions such that the carbon intensity of corn ethanol produced under the RFS is no less than gasoline and likely at least 24% higher.”

Another recent research study published in Nature Sustainability shows that the pace of tropical deforestation has more than doubled over the first two decades of this century, the same time period over which biofuel production has significantly increased in

¹ I am writing this comment letter on my own behalf as a private citizen.

² See 2015 LCFS Rulemaking document at [Microsoft Word - APPENDIX I-iLUC_FINAL_ks.docx \(ca.gov\)](#)

³ Lark et al., Environmental outcomes of the US Renewable Fuel Standard, PNAS 2022 Vol. 119 No. 9.

response to state and federal policies.⁴ This study also shows that most (82%) of the forest carbon loss is at some stages associated with large scale commodity or small-scale agricultural activities, particularly in Africa and Southeast Asia.

Producing crop-based biofuels increases food prices and exacerbates global hunger: As indicated by the research quoted above and multiple other research studies^{5,6}, diverting crops from human and animal feed markets to produce biofuels results in an increase in agricultural commodity prices as compared to the counterfactual without biofuel production. This increase in food prices likely results in increased hunger, especially amongst the most vulnerable populations of the world. According to Tom Hertel, professor at Purdue University and author of several studies on LUC impacts of biofuels including original modeling work performed for CARB's LCFS, "reduced food consumption is an important market-mediated response to increased biofuels production. While lower food consumption may not translate directly into nutritional deficits among wealthy households, any decline in consumption will have a severe impact on households that are already malnourished".⁷

If the rest of the world follows California's example, the demand for virgin vegetable oil will be enormous: The Scoping Plan modeling assumes that by 2030 California will consume approximately 2.3 billion gallons (0.31 exajoules) of renewable diesel and that over 80% of this renewable diesel will be produced from virgin vegetable oils. This volume of renewable diesel produced from virgin oil represents approximately 50% of California's current diesel consumption. If the rest of the world followed California's lead and likewise offset 50% of its diesel consumption using crop-based renewable diesel, the production of virgin vegetable oil would need to increase by more than 600 million metric tons or approximately three times the current worldwide production of all vegetable oil. The impact of such an increase in vegetable oil production on agricultural commodity prices, global hunger, and tropical deforestation would likely be enormous.

Crop-based renewable diesel is an extremely expensive means of reducing GHG emissions: Renewable diesel receives monetary incentives from the federal RFS, the federal Biodiesel Blenders Tax Credit, and the California LCFS. These incentives stack, and adding the incentive values of these three programs results in a total societal cost of nearly \$4 per gallon and a GHG cost effectiveness of more than \$600 per metric ton of GHG emission reduction.⁸ Considering that emission reductions from crop-based biofuels are highly uncertain, one can only conclude that policies incentivizing these biofuels are a costly and risky means of spending limited consumer dollars on climate change mitigation.

⁴ Feng, et al., Doubling of annual forest carbon loss over the tropics during the early twenty-first century, *Nature Sustainability*, 5, pages444–451 (2022)

⁵ See [Economics of Biofuels | US EPA](#)

⁶ See [The impact of the U.S. Renewable Fuel Standard on food and feed prices \(theicct.org\)](#)

⁷ Hertel et al., Effects of US Maize Ethanol on Global Land Use and Greenhouse Gas Emissions: Estimating Market-mediated Responses, *Bioscience*, Vol. 60 No. 3, 2010.

⁸ Cost effectiveness estimated by dividing the total incentive value by the estimated GHG emission reduction for soy renewable diesel under the LCFS.

In conclusion, emissions associated with producing crop-based biofuels are highly uncertain and may, in fact, be greater than fossil fuels on a full life cycle basis. Moreover, these fuels are very expensive and exacerbate tropical deforestation and global hunger. Because of these issues, the European Union has taken steps to restrict the use of biofuels produced from food and feed crops, and mainstream environmental organizations such as International Council on Clean Transportation and the Union of Concerned Scientists as well as UC Davis Institute for Transportation Studies are urging CARB to limit the use of vegetable oil-based biofuels under the LCFS.^{9,10} Promoting the use of these fuels is not in line with California's role as a global leader in environmental policy, and I highly encourage the Board to take steps to restrict and ultimately phase-out the use of crop-based biofuels in California.

Sincerely,

James Duffy

⁹ See comment letters from ICCT ([26-lcfs-wkshp-dec21-ws-B2RdOgRaV2gAZQRi.pdf \(ca.gov\)](#)) and UCS ([83-lcfs-wkshp-dec21-ws-UyZRNAR2UV1QOgVs.pdf \(ca.gov\)](#))

¹⁰ See ITS Research Report "Driving California's Transportation Emissions to Zero", [eScholarship UC item 3np3p2t0.pdf](#), pages 392-396.