

September 28, 2023

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.<sup>1</sup> I helped develop and enthusiastically support the LCFS. A strong LCFS is critical to helping California achieve its zero emission goals.

In general, I urge CARB to adopt many of the recommendations from the Environmental NGO and Environmental Justice Communities. More specifically in this letter, I am urging the Board to **cap 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 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.

If the rest of the world follows California's example, the demand for virgin vegetable oil will be enormous: Just last month CARB issued a news release celebrating the accomplishment that the LCFS has resulted in renewable diesel and biodiesel replacing 50% of diesel. CARB often prides itself on providing an example for the world to follow. **So, what would happen if the rest of the world follows California's lead and replaces over 50% of its diesel fuel with renewable diesel and biodiesel?** Currently, the world annually produces 200 million metric tons of vegetable oil, a majority from the tropical countries of Indonesia, Malaysia, Brazil, and Argentina. Replacing 50% of diesel worldwide would require an additional 600 million metric tons, necessitating a fourfold increase in worldwide production of vegetable oil. It doesn't take a scientist to know that the impact of such an increase in vegetable oil production on agricultural commodity prices, global hunger, tropical deforestation, and biodiversity would be enormous, especially in a world that is expected to add another 2 billion people by 2050. **Which leads me to ask: Are you really being a leader if the world would be much better off not following?**

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

Crop-based biofuels are not sustainable: Many studies, including work performed by CARB<sup>2</sup>, show that 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 in the U.S. found that total life cycle emissions for corn ethanol exceed those of gasoline.<sup>3</sup> 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 response to state and federal policies.<sup>4</sup> 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<sup>5,6</sup>, 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 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**”.<sup>7</sup> The biofuel industry wrongly claims that the LUC CI penalty for crop-based biofuels negates any food price increases and food consumption impacts and therefore CARB does not need to impose any additional limits on biofuel consumption beyond the current LUC CI penalty. However according to Hertel et al., if food consumption were held constant in the CARB LUC model (instead of allowing food consumption to decrease as is done in

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<sup>2</sup> See 2015 LCFS Rulemaking document at [Microsoft Word - APPENDIX I-iLUC\\_FINAL\\_ks.docx \(ca.gov\)](#)

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

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

<sup>5</sup> See [Economics of Biofuels | US EPA](#)

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

<sup>7</sup> 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.

the actual LCFS modeling), twice as much forest conversion to agriculture would be predicted and the LUC CI penalty would increase by 40%. **In essence, a portion of the emission reductions attributable to crop-based biofuels under the LCFS is the result of the most food insecure populations in the world eating less.**

Crop-based renewable diesel (and biodiesel) 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 (or ineffectiveness) of more than \$600 per metric ton of GHG emission reduction, a value that greatly exceeds any reasonable estimate of the social cost of carbon.<sup>8</sup> 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. Moreover, because of the RFS volume mandate, these fuels would have been produced and consumed in the U.S. without the LCFS incentive. Stacking the smaller LCFS incentive on top of the larger federal incentives merely results in the shuffling of the lowest CI renewable diesel, biodiesel and ethanol to California. **Essentially, California consumers are paying a significant cost to support combustion fuels that achieve very little real global GHG reduction, money that would be much better spent helping California transition to zero emission transportation.**

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, Natural Resources Defense Council, Union of Concerned Scientists and Earthjustice, as well as UC Davis Institute for Transportation Studies are urging CARB to limit the use of vegetable oil-based biofuels under the LCFS.<sup>9,10</sup> **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 direct staff to cap and ultimately phase-out the use of crop-based biofuels in California.**

Sincerely,

James Duffy

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

<sup>9</sup> See comment letters from [ICCT](#), [NRDC](#), [UCS](#), and [Earthjustice](#).

<sup>10</sup> See ITS Research Report "Driving California's Transportation Emissions to Zero", [Carbon Neutrality Study 1: Driving California's Transportation Emissions to Zero – University of California Institute of Transportation Studies \(ucits.org\)](#), pages 392-396.