



# Union of Concerned Scientists

April 22, 2009

Mary Nichols, Chair  
California Air Resources Board (CARB)  
1001 I Street  
Sacramento, CA 95812

**Subject: Strong Support for LCFS, But Proposed Biofuel Emissions Are Overly Conservative**

Dear Chairman Nichols and members of the Board,

We appreciate the opportunity to comment on the proposed Low Carbon Fuel Standard (LCFS) regulation. UCS strongly supports California's pioneering effort to regulate lifecycle pollution from transportation fuels. The standard, which is a model for the country and other nations, will provide a mechanism for moving away from today's petroleum-based fuels towards tomorrow's cleaner, renewable, and more sustainable fuels. The LCFS provides an elegant, market-based structure to de-carbonize our fueling system.

We recommend strengthening certain aspects of the regulation, as articulated in the comment letter we submitted jointly with 35 other groups on April 15. The rule should be strengthened to prevent air quality backsliding, ensure ultra-low carbon fuels are used in California, protect sensitive lands, and promote sustainable fuels production.

We commend you and your staff for your groundbreaking work in the important area of lifecycle analysis, and particularly for grappling with the urgent and complex task of quantifying emissions associated with indirect land use changes (iLUC) induced by increased production of biofuels feedstocks. However, we find that staff's proposed carbon intensity values for biofuels may be too low for the following three reasons. First, the staff's proposed methodology to account for CO<sub>2</sub>-equivalent emissions (CO<sub>2</sub>e) over time undervalues the impact of biofuels that cause land use change. Second, the staff has adjusted the GTAP model variables to increase yields of biofuel feedstocks without increasing direct emissions from fertilizers and other inputs. Third, there is growing evidence that the direct emissions from fertilizer use may be higher than estimated in the LCFS.

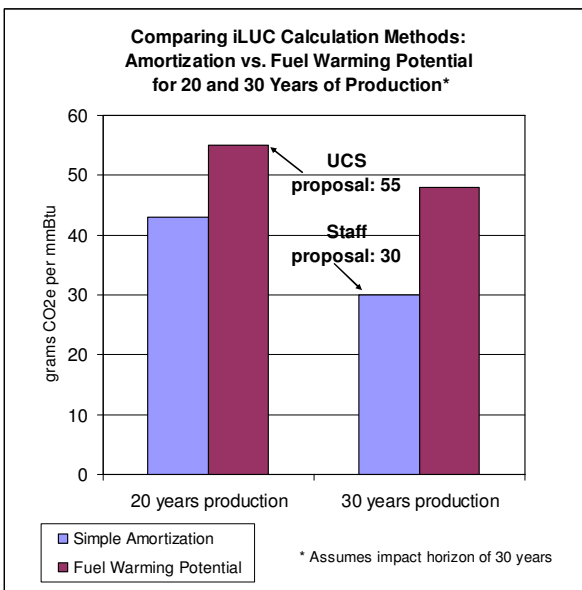
We urge the Board to send a clear signal to conventional biofuel producers that the current carbon intensity values for biofuels will likely be adjusted upward in the next review of the program. The following provides more detail on why the carbon intensity values for biofuels may be too low.

## 1) Time treatment of emissions underestimates impact

In the current proposal, staff is utilizing an economic approach to account for emissions over time that implicitly treats a unit of CO<sub>2</sub>e released today as though it has the same consequences as one released in the future. This “annualized” approach is consistent with how regulatory agencies have traditionally weighed the economic costs and benefits of reducing criteria pollutant emissions. Since criteria pollutants often have a short residence time in the atmosphere, it is appropriate to account for their emissions in tons per day or per year.

But the science of global warming calls for a different approach to accounting for emissions over time. Since CO<sub>2</sub>e can have a long residence time in the atmosphere of decades, even centuries, the real warming potential of the greenhouse gases (GHG) should be taken into account. The relative global warming impact based upon the actual amount of GHG in the atmosphere is a better proxy for the economic costs of climate change than the annual flow of GHG.

To account for emissions that vary over time, like biofuel emissions, we recommend that the Board adopt the “Fuel Warming Potential” method, as outlined in the Initial Statement of Reasons (dated March 5, 2009). In collaboration with researchers at the University of California, Berkeley and Davis, we outline the “Fuel Warming Potential” method in a recently published, peer-reviewed article.<sup>1</sup> We also recommend that the LCFS use appropriately conservative assumptions regarding project horizon for biofuels. Specifically, we recommend that the project horizon be 20 years rather than the proposed value of 30 to recognize uncertainties in future fuel production and use.



This chart compares iLUC emissions using the amortization and fuel warming potential methodologies for 20 and 30 years of production, assuming an impact horizon on 30 years. The CARB staff proposal, simple amortization with a 30 year project horizon, results in iLUC emissions of 30 grams CO<sub>2</sub>e per mmBtu. Using our recommended approach, fuel warming potential with a 20 year project horizon, emissions from iLUC are 55 grams CO<sub>2</sub>e per mmBtu. Our recommended approach would result in iLUC emissions 80 percent higher than the CARB staff proposal.

<sup>1</sup> M O'Hare, R J Plevin, J I Martin, A D Jones, A Kendall and E Hopson. 2009. Proper accounting for time increases crop-based biofuels' greenhouse gas deficit versus petroleum. *Environmental Research Letters*, 4: 024001 (7 pages). April 7. Affiliation of authors: Goldman School of Public Policy, University of California, Berkeley, CA 94720, USA; Energy and Resources Group, University of California, Berkeley, CA 94720, USA; Union of Concerned Scientists, 2 Brattle Square, Cambridge, MA 02238-9105, USA; Department of Civil and Environmental Engineering, University of California, Davis, CA 95616, USA. Available online at: <http://stacks.iop.org/1748-9326/4/024001>

## 2. Adjustments to GTAP

Based largely on comments from the ethanol industry, including the Renewable Fuels Association, CARB adjusted the baseline to account for observed yield increases, resulting in an eight percent decrease in the initial iLUC estimates. However, CARB did not adjust the direct emissions from such biofuels, even though increases in yield are likely accompanied by an increase in inputs, such as fertilizers, that release global warming pollution. As noted by peer reviewer John Reilly from MIT:

The process of intensification generally involves using more inputs as a substitute for land. The intensification process likely involves increases in GHG emissions. Some of the most substantial aspects of intensification are likely to be increased use of fertilizer, especially nitrogen, increased irrigation, and denser livestock management.

## 3. Direct emissions from fertilizer usage may be too low

Recent studies find that the global warming pollution from fertilizers may be much higher than previous estimates. A 2007 study found that heat-trapping emissions from fertilizers used on conventional biofuel feedstocks, such as corn for ethanol and rapeseed for biodiesel, can equal or exceed the cooling through fossil fuel savings.<sup>2</sup>

This issue is highlighted in a comment letter (submitted 4/21/09) to CARB from more than 175 scientists:

...we urge you to evaluate the increasing use of nitrogen fertilizers and herbicides associated with greater biofuel production. In particular, nitrogen fertilizers enhance the emission of nitrous oxide—a powerful greenhouse gas in Earth's atmosphere.

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In conclusion, California's Low Carbon Fuel Standard can be a model for other states and the country as a whole, and CARB has, once again, led the world in cleaning up pollution from the transportation sector. CARB's analysis of the indirect emissions from biofuels is based upon sound science, transparent analysis, and a judicious process. However, the proposed carbon intensity for biofuels is overly conservative, and will likely need to be adjusted upward in the future. To send an accurate signal to investors, the Board should provide adequate warning that biofuel emissions could and likely will be higher in future rulemakings.

Thank you for the opportunity to comment.

Sincerely,



Patricia Monahan  
Deputy Director for Clean Vehicles  
California Office Director

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<sup>2</sup> Crutzen, P. J., Mosier, A. R., Smith, K. A., and Winiwarter, W. 2007. N<sub>2</sub>O release from agro-biofuel production negates global warming reduction by replacing fossil fuels. *Atmos. Chem. Phys. Discuss.*, 7: 11191-11205.