March 2, 2009

The Honorable Arnold Schwarzenegger
Office of the Governor
State Capitol
Sacramento, CA 95814

RE: Opposed to Selective Enforcement of Indirect Effects in CA LCFS

Dear Governor Schwarzenegger,

We are writing regarding the California Air Resources Board's (ARB) ongoing development of the Low Carbon Fuel Standard (LCFS). With the rulemaking nearing its final stage, we would like to offer comments on the critical issue of how to address the issue of indirect, market-mediated effects.

As you are aware, ARB staff continues to push a regulation that includes an indirect land use change (iLUC) penalty for biofuels. To be clear, this effect is not the direct land conversion from growing crops for fuel. It is the alleged indirect, price-induced land conversion effect that could occur in the world economy as a result of any increase in demand for agricultural production. The ability to predict this alleged effect depends on using an economic model to predict worldwide carbon effects, and the outcomes are unusually sensitive to the assumptions made by the researchers conducting the model runs. In addition, this field of science is in its nascent stage, is controversial in much of the scientific community, and is only being enforced against biofuels in the proposed LCFS.

The push to include iLUC in the carbon score for biofuel is driven at least partially by concerns about global deforestation. There is no question that global deforestation is a problem, and that indirect effects must be looked at very carefully to ensure that future fuels dramatically reduce GHG emissions without unintended consequences. The scientific community is actively seeking ways to mitigate deforestation, enhance efficient land use, feed the poor and malnourished and reduce global warming. Because of the complex and important issues involved, it is critical that we rely on science-based decision-making to properly determine and evaluate the indirect effects of all fuels, as well as any predicted changes in agricultural and forestry practices. In a general sense, it is worth noting that most primary forest deforestation is currently occurring in places like Brazil, Indonesia and Russia as a direct result of logging, cattle ranching and subsistence farming. Adding an iLUC penalty to biofuels will hold the sector accountable to decision-making far outside of its control (i.e. for decisions related to the supply chains of other products), and is unlikely to have any effect on protecting forests or mitigating GHG emissions as a result of land management practices. But because indirect effects are not enforced against any other fuel in the proposed LCFS, an iLUC penalty will chill investment in both conventional and advanced biofuel production, including advanced biofuels made from dedicated energy feedstocks such as switchgrass and miscanthus, which have the potential to make the agricultural sector far less resource-intensive and could provide a significant carbon negative source of transportation fuel.

More than 20 scientists wrote to the ARB in June 2008 suggesting that more time and analysis is required to truly understand the iLUC effect of biofuels. In addition to iLUC, we know very little about the indirect effects of other fuels, and therefore cannot establish a proper relative value for indirect effects among the various compliance fuels and petroleum under the LCFS. In consideration of this and other rulemaking activities and research conducted since June 2008, we, the undersigned 111 scientists, continue to believe that the enforcement of any indirect effect, including iLUC, is highly premature at this time, based on the following two principles:

1) The Science Is Far Too Limited and Uncertain For Regulatory Enforcement

ARB staff is proposing to enforce a penalty on all biofuels for indirect land use change as determined by a computable general equilibrium (CGE) model called GTAP. This model is set to a static world economic condition (e.g. 2006), then shocked with a volume of biofuel to create the perceived land conversion result. The modeling outcome is applicable to the set of assumptions used for that particular run, but is not particularly relevant when there is a shift in policy, weather, world economic conditions or other economic, social or political variables. For example, by definition, these models assume zero innovation, which means they could not have predicted the 500% increase in corn yields since 1940, the tripling of wheat yields since 1960, or the 700% increase in yield that can occur if farmers in developing countries adopt higher yield seed varieties and more efficient farming practices. This inability to predict innovation is not limited to agriculture; similar attempts to use economic equilibrium models in other emerging markets like telephony or computing would have been equally unsuccessful. As discussed, the model runs are unusually sensitive to the assumptions made by the modelers, which is why the iLUC modeling results published thus far differ by a factor of at least four, and under some scenarios, are actually zero for today's biofuels. Even at this late stage in the LCFS process, the GTAP model runs still do not reflect basic on-the-ground realities, such as the use of marginal and idle lands. They do not reflect recent articles about the potential for energy crops to absorb carbon at higher rates than previously thought. A partial solution to this problem is to conduct a series of model runs with different assumptions and adjustments. Unfortunately, this has not occurred at ARB (researchers have run limited sensitivity analysis within the current set of primary assumptions). We are only in the very early stages of assessing and understanding the indirect, market-mediated effects of different fuels. Indirect effects have never been enforced against any product in the world. California should not be setting a wide-reaching carbon regulation based on one set of assumptions with clear omissions relevant to the real world.

2) Indirect Effects Are Often Misunderstood And Should Not Be Enforced Selectively

In basic terms, there is only one type of carbon impact from a commercial fuel: its direct effect. Direct carbon effects are those directly attributable to the production of the fuel, which in the case of biofuel includes the land converted to produce the biofuel feedstock. Indirect effects, on the other hand, are those that allegedly happen in the marketplace as a result of shifting behaviors. As such, penalizing a biofuel gallon for direct *and* indirect land use change is the equivalent of ascribing the carbon impact of land

converted to produce biofuel feedstock as well as the land needed to produce another, allegedly displaced supply chain (e.g. soy production for food). Leaving aside the issue of whether these effects can be predicted with precision or accuracy, or whether such a penalty is appropriate for the LCFS, it is clear that indirect effects should not be enforced against only one fuel pathway. Petroleum, for example, has a price-induced effect on commodities, the agricultural sector and other markets. Electric cars will increase pressure on the grid, potentially increasing the demand for marginal electricity production from coal, natural gas or residual oil. Yet, to date, ARB is proposing to enforce indirect effects against biofuel production only. This proposal creates an asymmetry or bias in a regulation designed to create a level playing field. It violates the fundamental presumption that all fuels in a performance-based standard should be judged the same way (i.e. identical LCA boundaries). Enforcing different compliance metrics against different fuels is the equivalent of picking winners and losers, which is in direct conflict with the ambition of the LCFS.

Proponents of iLUC inclusion claim that all regulations are uncertain. This is true. However, the level of uncertainty implicated here far outweighs that found in other regulatory fields. For example, the European Parliament declared in December that the iLUC of biofuel "is not currently expressed in a form that is immediately usable by economic operators."[1] They decided not to incorporate iLUC penalties in their biofuel programs and initiated further analysis of the issue. It is also not enough to suggest that iLUC is a significant indirect effect, while other indirect effects are likely smaller. The magnitude of the alleged iLUC effect ranges from zero to very large, depending on the assumptions utilized. This is also likely true for other fuels, especially with regard to the marginal gallons of petroleum that are coming into the marketplace, such as heavy oil, enhanced oil recovery, and tar sands. Either way, even small effects are significant under the LCFS. Just a few g/MJ separate corn ethanol from petroleum in the proposed regulation, and advanced biofuel is very close to CNG and hydrogen under certain scenarios. We agree with the sentiment expressed by many experts that while indirect effects are important to understand, enforcing them prematurely and selectively on only certain fuels in a performance-based standard could have major negative consequences, even for GHG mitigation. Put another way, no level of certainty justifies asymmetrical enforcement of indirect effects.

Given the limited time, a reasonable solution to the challenges discussed above is to submit an LCFS regulation based on direct carbon effects (including direct land use impacts) and support a rigorous 24-month analysis of the indirect, market-mediated effects of petroleum and the entire spectrum of alternative fuels, regardless of source. The analysis could be conducted in collaboration with other institutions and governments implementing carbon-based fuel standards, and should include a consideration of the best way to prevent carbon effects outside the primary system boundary, including promoting sound land use practice with more direct policy solutions. This approach is consistent with the principle that all fuels should be judged through the same lens in a performance-based standard, as well as the approach taken by the European Parliament. It is worth noting that an LCFS

[1] http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+TA+P6-TA-2008 0613+0+DOC+XML+V0//EN&language=EN#BKMD-27

policy based on direct effects already favors non-land intensive, advanced biofuel production over conventional biofuel production.

The LCFS provides an incredible opportunity to reduce the carbon intensity of transportation fuel and promote a more sustainable transportation fuel marketplace. We commend your leadership and the ARB staff for their ability to process a challenging set of scientific data resources into a workable regulation. However, it is critical that the LCFS stay on course with regard to its primary mission of establishing a level, carbon-based playing field for all fuels.

We are writing this letter as researchers in the field of biomass to bioenergy conversion, but the signatories do not represent the official views of the home institutions, universities, companies, the Department of Energy, the United States Department of Agriculture, or any of the National Laboratories. We look forward to working with ARB to ensure that the regulation reflects the best science available, and takes a policy approach that is balanced across all fuel pathways.

Sincerely,

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