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Ms. Mary Nichols
Chairman, California Air Resources Board
P.O. Box 2815
Sacramento, CA 95812

Re: Low Carbon Fuel Standard Regulations

Dear Chairman Nichols,

We write this letter to comment on the proposed low carbon fuel standard regulation, focusing in particular on the technical and policy implications of land use change associated with biofuels that divert the productive capacity of land. The Air Resources Board has worked exceptionally hard to reflect the goals of climate protection and the evolving science of low-carbon transportation options. Over the last year, a large number of reports by international technical agencies such as the World Bank, FAO, and the International Energy Agency, by national technical agencies, and by scientific organizations, such as SCOPE and the British Royal Society, have strongly cautioned that biofuel policies must account for and limit competition with the world's productive land and guard against expansion into natural areas. We generally agree with these views and write to express our agreement with the proposal to count the full effects of land use change in greenhouse gas accounting for biofuels, not merely the benefits of land use.

We also write to support proposals for a full policy evaluation by 2011. Based on our work we suggest a set of principles that may be useful to the Air Resources Board in making the Low Carbon Fuel Standard operational:

1. Incorporating Full Land Use Change Impacts in a Low Carbon Fuel Standard

The basic reason a greenhouse gas analysis of biofuels must count indirect land use change is that if an analysis counts the greenhouse gas benefits of devoting land to biofuels – which these lifecycle analyses do – it must also count the costs of doing so.

The basic flaw in historical bioenergy accounting was that it counted biomass as a carbon free source of energy on the theory that the plants used to make biomass take up the same carbon from the atmosphere that is emitted when biomass is burned as a fuel. All lifecycle analyses therefore credit biofuels with the carbon taken up by the plants incorporated into them, and that credit is the source of potential greenhouse gas benefits. But, of course, if land is not devoted to biofuels, it will still produce plants. Just using those plants for biofuels does not by itself take any more carbon out of the atmosphere and therefore should not qualify biofuels for a credit. The proper question is whether devoting

land to grow plants for biofuels results in additional carbon taken up or withheld from the atmosphere overall, and any benefit results only from any net increase. To calculate that net, the costs of devoting land to biofuels must be subtracted from the benefits.

When forest is diverted directly to biofuel production, the cost is the lost storage and ongoing sequestration of carbon on those forests. When plants that already supply a human need are diverted for biofuels— such as food -- there can be a variety of different types of social and economic costs, but the greenhouse gas cost is measured by the indirect effects on world carbon storage and sequestration as those human carbon needs are at least to some extent replaced elsewhere.

Because indirect effects are hard to predict with certainty, the argument has been made that the indirect effect of land on biofuels should be left out entirely. But if the land use costs of biofuels are left out, the benefits should be left out as well. In that event, biofuels would neither receive a charge for the direct or indirect land use change, but neither would they receive a land use credit, i.e., the credit for the carbon absorbed in plants grown on that land. Yet, without that credit, biofuels do not generate greenhouse gas benefits compared to fossil fuels. It cannot be legitimate to count only benefits and not costs.

The relationship of carbon in plants to land is similar to the relationship of interest to a pool of savings (at least prior to the present economic crisis). Put simply, if you borrow money, you have to count the costs of that money in your accounting, i.e., the interest you are giving up. When you invest land in your biofuel business and wish to count the carbon in plants it produces, you have to deduct the carbon in plants not produced for something else.

In addition, on practical grounds, counting direct but not indirect land use change imposes a restriction that would have little significance in practice because it would only require biofuel producers to have two tanks. For example, palm oil expansion in Southeast Asia primarily to meet the world's voracious demand for vegetable oil is causing large-scale deforestation and releases of carbon from drained peat soils. Palm oil can also supply biodiesel. Under the rule of counting direct but not indirect effects, a palm oil producer would be able to qualify for the California market simply by storing in one tank all the palm oil now produced from already-cleared forests and selling that for biodiesel while then clearing more forest to replace the vegetable oil for food so long as it stored that oil in a second tank. Such an easily avoided standard would be worth little.

2. Principles for Guiding a Policy Review by 2011

Although we believe that indirect land use change is indispensable to any meaningful greenhouse gas accounting, we also agree that it involves significant uncertainties, and requires that each fuel – petroleum fuels, biofuels, and electrified vehicles should all be

subject to comparable direct and indirect impact analysis. This is one reason we support recommendations for a full review of the full low carbon fuel standard policy by the end of 2011. In general, however, the likely land use effects of land-based biofuels range from significant to very large, and both the uncertainty of greenhouse gas benefits and potential impacts on hunger, biodiversity and other environmental values warrant a cautionary approach. To provide for the most useful review, we suggest that the board instruct the staff to focus on some key questions and follow a few key principles in this review.

First, the CARB board should seriously consider whether it wishes to support biofuels for greenhouse gas benefits that result from reduced food consumption. Some of the crops diverted to biofuels are replaced by by-products, and to that extent food is not diverted. But the particular GTAP model runs used by CARB to calculate indirect land use change predict that much of the food not replaced by these by-products would not be replaced at all. In fact, the runs found that if the food were replaced, corn ethanol would increase greenhouse gas emissions under any scenario. When food is not replaced – a reaction to higher prices – some of the effect may be relatively unobjectionable as it might simply shift consumption patterns modestly among the wealthy. But in general, the world's wealthy can outcompete the world's poor for food, so much of the predicted effect implies more malnutrition.

Second, CARB should develop a multi-model approach to calculating indirect land use change that also incorporated other forms of evidence, including opportunity cost. Each economic model used has its own limitations, and there is inherent uncertainty in predicting how government infrastructure and land use policies will respond to higher crop prices triggered by biofuels that use productive land. Relying on any one model over time would be less justified than relying on a combination.

Third, CARB should incorporate opportunity cost into its analysis of biofuels that divert productive land. Biofuel strategies motivated primarily by rural development goals might legitimately ask only whether they harmed or helped efforts to combat climate change. But strategies focused on reducing climate change itself probably need to ask whether devoting land to biofuels reduces greenhouse gas emissions more than devoting land to alternative purposes. That is particularly true because most climate mitigation strategies suggest significant reliance not just on reducing deforestation but also on increasing forests, and any energy policy that competes heavily for productive land hinders the capacity to pursue these forest strategies unlike energy strategies that do not rely on productive land.

Fourth, in the face of uncertainty, an appropriate response should be a cautionary approach to land-based biofuels. For example, the GTAP calculations of land use change and greenhouse gas emissions for corn ethanol are lower than those of some other models because the GTAP model runs predict that little food is replaced by land use change. To

start, almost half of the diverted food is not replaced (even after first subtracting by-products), and a significant majority of the food that is replaced is replaced by a higher rate of yield increases spurred by higher prices. There are many reasons these predictions could be wrong and the greenhouse gas emissions from a biofuel yet much larger. One study by the European Union's Joint Research Center estimated that if only a 2.5% of the vegetable oil diverted to biodiesel were replaced by palm oil plantations established in peatlands, the emissions from the peatlands alone would eliminate any greenhouse gas benefit from replacing diesel fuel. These uncertainties and risks provide many reasons for caution. Not only are the potential increases in emissions greater than the potential savings, but there are serious risks in pursuing a strategy that may not in the end actually reduce emissions but that displace other mitigation measures whose benefits are more certain. Given these uncertainties, we support CARB's efforts, and a full review by 2011 provides the opportunity to incorporate refinements and the evolving science of land use change analysis.

It is vital to note, however, that uncertainty does not need to stand in the way of action. Not only does the Low Carbon Fuel Standard permit for new science to be reflected in the standards, but a company that feels its production process is significantly better than the average assigned value may provide the data and petition for a different value. This flexibility rewards innovation, reflects best science, and permits process transparency.

Fifth, CARB should seriously consider the additional environmental concerns associated with biofuel production that competes for land with food and biodiversity. Even if the greenhouse gas calculations were to refuse to count benefits from increased hunger, those hunger effects would still exist. Even if greenhouse gas emissions from land use change for some biofuels might not be enough to fully offset the benefits, the land use change could still be large and have significant consequences for biodiversity. The many technical reports referenced above recommend an approach that focuses only on biofuels that do not divert the productive capacity of land based on this multitude of harms and risks. This is an approach that focuses on the use of waste products, such as forest waste and municipal waste, and on the production of biofuels from marginal, and degraded land.

Sixth, for any fuel, CARB should consider establishing a minimum threshold of greenhouse gas savings. That is true if only because it ultimately will not help to pursue biofuels that generate only modest reductions in greenhouse gases as part of a strategy for reducing greenhouse gas emissions by 80%. These concerns, along with concerns of the other environmental adverse consequences of biofuels and the financial cost, have led to federal legislation and legislation by the European Union that also sets a minimum requirement for 45% to 60% reductions in greenhouse gases for future biofuels. Even while CARB pursues a graded quantitative approach, it could still reasonably establish thresholds

that demand at least a high level of greenhouse gas emissions before a biofuel can qualify toward meeting requirements for carbon reductions.

Seventh, and related to the above, CARB should be highly concerned about inadvertently pushing for large mandates of crop-based biofuels. Today, crop-based biofuels are the only available biofuels. Even if the markets develop quickly for electric-powered cars and advanced cellulosic biofuels that use wastes and avoid land use change, those sources may not be available to meet the entire 10% carbon reduction mandate by 2020, or the smaller amounts of reductions required earlier. The present rule, despite its generally negative findings about existing crop-based biofuels – findings which include extremely modest greenhouse gas savings despite large impacts on hunger and deforestation – could inadvertently require that a huge percentage of transportation fuel sold in California include these fuels. For example, if even 1.5% of carbon savings were to come from corn based ethanol, 15% of California fuel by energy content would have to come from corn-based ethanol – a proportionately larger mandate than any other adopted by government. CARB needs to carefully consider a range of strategies to avoid the risk of such large mandates.

We believe that these principles should guide a review not only of biofuels but of all fuel sources. We also wish to emphasize that there should be significant capacity to produce biofuels that do not divert the productive capacity of land. Much of the Department of Energy's analysis of potential U.S. biomass focuses on wastes and agricultural residuals, a portion of which can probably be used for energy while preserving other environmental needs. Countries like Brazil may also be able to adopt strategies to avoid indirect land use change. A proper concern for land use does not preclude a meaningful role for biofuels.

The staff of your agency deserves enormous credit for the difficult, disciplined technical work it has undertaken to contribute to this rule. We support the commitment to calculating all aspects of land use change, also support the concept of a 2011 review, and suggest the adoption of these guidance principles.

Sincerely,

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