NEW FUELS ALLIANCE

October 23, 2008

Mary D. Nichols, Chairman
California Air Resources Board
Headquarters Building
1001 "I" Street
Sacramento, CA 95812

Dear Chairman Nichols,

We, the undersigned 30 companies and individuals, are writing to provide comment on the prospect of including indirect land use change (ILUC) in the California Low Carbon Fuel Standard (LCFS), and in general, to discuss the public policy implications of enforcing indirect effects of any kind in the regulation. This letter is submitted in response to comments submitted to the Air Resources Board (ARB) on the issue of ILUC over the past several months, including at the most recent public workshop held on October 16th.

First and foremost, we recognize that promoting the production and use of biofuels could help achieve domestic and global sustainable development goals, but that there are challenges associated with growing the biofuels industry in an environmentally responsible way. While the growth of crop-based biofuels should not be allowed to exacerbate sensitive land degradation here or abroad, there is nonetheless an opportunity to promote positive land use development in the context of both conventional and advanced crop-based biofuels. As such, it is important that the LCFS be careful in its regulatory approach if it is to foster sustainable fuel production.

The argument in favor of including ILUC in the LCFS is based on the belief that biofuels have significant indirect land use impacts, and ignoring them is the wrong public policy decision. The argument against including ILUC in the LCFS is based on the belief that the field of ILUC – and perhaps indirect impact modeling in general – is too uncertain to regulate at this time.

The public policy decision to extend the scope of the LCFS from direct to indirect, market-mediated effects is a monumental one. This is true for land use change, or any other indirect effect. Direct impacts are relatively certain, verifiable and attributable to specific types of fuels. This is true because these effects are directly related to and traceable to the production, transportation and combustion of those fuels, including upstream land use change attributable to fuel production, such as the conversion of pasture to corn or other biofuel feedstock.

Indirect impacts, on the other hand, are market- and policy-mediated. They are, in essence, the ripple effects of any given market decision in the global economy. Indirect impacts have not been enforced by any regulatory agency against any product in the world. Indirect impacts, whether applied to biofuels or any other fuel, occur as a consequence of a myriad of nested, policy and socio-economic variables. An article published in *BioScience* magazine captures the complexity of indirect effects, as they relate to deforestation: "[a]t the underlying level, tropical deforestation is … best explained by multiple factors and drivers acting synergistically rather than by single-factor causation, with more than one-third of the cases being driven by the full interplay of

*economic, institutional, technological, cultural and demographic variables."*[1] This review of land change science goes on to conclude that it has proven difficult to achieve a theory of coupled land use changes that lead to useful, predictable outcomes for this highly complex process. Similar approaches have led to strikingly different outcomes depending on location, scale and other complex factors, making prediction uncertain.

It may be possible to model these impacts over time, so we should not abandon the idea of developing the science. But it is also true that no model today comes close to capturing the interplay of economic, institutional, technological, cultural and demographic variables inherent with quantifying the indirect impact of any fuel. In fact, the economic equilibrium models being offered as the mechanisms to quantify (and perhaps enforce) ILUC in the LCFS were not designed for regulatory use – i.e. to assign specific compliance metrics to specific fuels. They were designed to analyze the impacts of policies in more general terms. Using a model to publish a paper is very different than using a model to assign specific values that could fundamentally change the business landscape for alternative energy companies. As indicated in a 2008 GTAP paper on biofuels, referenced by the ARB LCFS website under GTAP peer review: "researchers have begun to use a CGE (computable general equilibrium) framework [to assess biofuels], however, with several caveats such as lack of incorporating policy issues, absence of linkages to other energy markets, and land use changes, etc. Our study makes an attempt to address these issues. However, the studies on CGE modeling are few, largely due to the *infancy of the industry and limitations on the availability of data* [emphasis added]."[2]

We are aware that proponents of including ILUC in the regulation argue that a preliminary quantification of ILUC is better than ignoring the impact all together; that "zero" is not the right number for ILUC for biofuels. While it is likely true that zero is not the right number for the indirect effects of any product in the real world, enforcing indirect effects in a piecemeal way could have very serious consequences for the LCFS. For example, zero is also not the right number for the indirect impact of producing a gallon of petroleum, using more electricity from coal and natural gas, producing advanced batteries and hybrid vehicles, or commercializing fuel cell technology. Yet, to date, ARB has not devoted any significant LCFS rulemaking resources to investigating the indirect effects of other fuels. If ARB is to enforce indirect, market-mediated effects, they must be enforced against all fuel pathways. The argument that zero is not the right number does not justify enforcing a different wrong number, or penalizing one fuel for one category of indirect effects while giving another fuel pathway a free pass.

Proponents of ILUC inclusion insist that they know enough about ILUC to enforce it in a fuel regulation. For example, the June 26 UC letter defending ILUC inclusion states that ILUC is more certain than claimed because the analysis conducted to date utilizes peer-reviewed models like FAPRI and GTAP. However, the fact that these models are peer-reviewed should not be inferred to mean that they have been peer-reviewed to be used for the purpose of enforcing indirect effects against specific fuels in a carbon-based fuel regulation. CGE models like GTAP provide estimates of land use change in distant locations, but at the price of severe limits in accuracy and at the expense of a realistic inclusion of complex causes of land use change. It seems that the desire for the utility of CGE models has overwhelmed the need for accuracy in estimating ILUC effects. The outcome could be poor public policy in the early stages of an unprecedented yet incredibly important transition in our liquid transportation fuel economy.

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[1] Helmut J. Geist & Eric F. Lambin, *Proximate Causes and Underlying Driving Forces of Tropical Deforestation*, BioScience Magazine, Volume 52, No. 2 (Feb. 2002).
[2] See https://www.gtap.agecon.purdue.edu/resources/download/4034.pdf, p. 3.

The June 26 UC letter also does not acknowledge the depth of uncertainty of predicting market-mediated effects of any kind, or the status of current research into this vast scientific space. For example:

- The current ILUC analysis for biofuels is very limited in scope. The public discussion has thus far been limited to the reductive effect of corn ethanol demand on world agricultural markets, and the possible conversion of relatively pristine lands that could occur from agricultural expansion. In addition, ARB has commented that non-corn energy crops (e.g. for cellulosic ethanol) will have a similar land use ripple effect if, in fact, land is used. But the analysis has not investigated the possible counter-balancing effect (i.e. benefits) of increased biofuel production, whether related to more sustainable agricultural land use and crop shifting, decreased urbanization, or the market-mediated effects of additional fuel supplies. Simply by increasing the profitability of agriculture, both domestically and overseas, biofuel production can have many positive effects on farmers and farming systems. In Californian, profitability helps farmers resist the pressures to transfer irreplaceable cropland to urban development, among other benefits. Given that land use change comes as a result of the interplay of so many variables, the exclusive focus on the reductive land use effect is of great concern.

- The modeling scenarios publicized to date have severe data and technical shortcomings. While it is true that the GTAP model is peer-reviewed, it is also well recognized that any model is only as good as the inputs used. For example, the UC letter states that they are using the "state-of-the-art" GTAP model to perform ILUC analysis for corn ethanol. The GTAP results were largely similar to those released by another researcher using the FAPRI model. But the UC letter fails to mention that they used the same land use conversion emissions data – a single set of data from the 1990s – for both exercises, without any apparent additional analysis or verification. So it should not be surprising that the results are largely the same. Other land use emissions studies have shown a ten-fold difference in land conversion emissions depending on what assumptions are used. In another example, the GTAP model does not include inputs for idle or CRP lands. This is a concern for two obvious reasons: (1) idle lands will be the first to be converted under any reasonable land conversion scenario; and, (2) any model that does not include idle and CRP land will produce exaggerated forest effects because the major points of domestic agricultural land use expansion are disabled. Lands in developing countries without clear rents (economic values in a marketplace) cannot be analyzed in GTAP. This includes much one-time cropland that is not accounted for or included in the GTAP estimates of effects. The preliminary ILUC numbers reviewed to date have been described as robust by several researchers involved, but an analysis that does not include the major points of domestic and international agricultural land expansion is not robust. It is important to note that the amount of U.S. agricultural land acreage dedicated to all crops, and coarse grains in particular, has generally declined during the last several decades while agricultural output has increased. It is also important to note that U.S. corn acreage has decreased in 2008. Historically in North America, advances in crop production technology correlate to the stabilization of forest use and a steady increase in forested acreage over the last century. Biofuel production, if carefully developed, could lead to a similar process in many third world settings, and the opposite effect of that feared. These considerations put into serious doubt the fundamental assumption that increased demand for crop-based products necessarily increases acreage planted.

- None of the available models being utilized for ILUC analysis are capable of taking into account the "interplay of economic, institutional, technological, cultural and demographic variables" inherent with land use change. For example, the GTAP figures presented by ARB staff on June 30 were neither sensitive to U.S. federal biofuels policy, which contains land use provisions designed to discourage certain types of land conversion, nor the energy or land use policies in those countries where the land conversion allegedly takes place in the scenarios modeled. This means that the ILUC scenarios do not (and cannot) take into account variables that would fundamentally change the outcome of the given modeling exercise, even directionally. Among the many variables driving deforestation and other forms of land use change are domestic and international policy, infrastructure development (including roads for oil and timber extraction), soil quality, topography, droughts, floods, wars, domestic cost of labor/land/fuel or timber, population and migration, urbanization and poverty. A recent paper published by the National Academy of Sciences (NAS) notes that, "… no facet of land change research has been more contested than that of cause. Empirical linkages between proposed causal variables and land change have been documented, but these commonly involve the more proximate factors to the land-outcome end of complex explanatory connections, such as immigrant, subsistence farmers and deforestation or locally configured common property resource regimes and land degradation. The distal factors that shape the proximate ones, such as urban poverty or national policies, tend to be difficult to connect empirically to land outcomes, typically owing to the number and complexity of the linkages involved. Attention to proximate causes elevates the potential to commit errors of omission . . .."[3] In trying to ascribe specific, numerical (CO2 e g/MJ) land use impacts to specific types of biofuels, ARB and UCB staff are in essence attempting to disentangle nested variables when it is the cumulative effect of these factors that cause the net outcome of land use change. This may be useful for policy analysis, but is far more dangerous as a methodology for assigning specific indirect land use change values to specific fuels within in a small fraction (CA ethanol) of one sector (motor fuels) of the global economy.

- The noticeable lack of indirect effects analysis for other fuels, particularly oil, is of serious concern. ARB staff has mentioned the possibility of an ILUC analysis for petroleum, but land use is only a part of the overall indirect carbon effect of oil. The indirect effects of unmitigated petroleum consumption, in a world economy largely dictated by petroleum and energy indicators, are vast. For example, noted agricultural economist (and architect of the GTAP model) Wally Tyner recently concluded that 75% of the run-up in *corn prices* is due to increased oil prices. Advocates for ILUC inclusion argue that higher corn prices cause crop shifting toward corn and away from soybeans, which drives up the price of soybeans and attracts Brazilian (rainforest) acres to soybean production. However, the UC researchers appear more inclined to ascribe the carbon effects of this theoretical causal chain to biofuels rather than to oil. It remains unclear, in a space characterized by many layers of interrelated effects, whether ascribing this effect solely to biofuels is correct. If the rising price of agricultural commodities is a concern – as the catalyst for additional planting – it is now clear that oil prices have a profound effect on agricultural commodity markets. There are also market- and policy-mediated effects for electrification from coal and natural gas, hydrogen production from coal and natural gas, and hybrid production.

[3] B.L. Turner II, Eric F. Lambin, Anette Reenberg, *The emergence of land change science for global environmental change and sustainability*, PNAS vol. 104, no. 52 (Dec. 26, 2007).

- The June 26 UC letter posits the argument that underestimating ILUC for biofuels is probably worse than overestimating ILUC since underestimating ILUC would create incentives for the overproduction of crop-based biofuel. The obvious implication is that without ILUC penalties for biofuels, we may face a runaway, unfairly advantaged crop-based biofuels industry with potentially serious land use impacts. This position seems out of touch with the realities of the U.S. transportation fuels industry. Roughly 86% of the federal subsidies handed out to energy companies between 2005 and 2009 will go to fossil fuel companies. A recent report out of Purdue University (by an author of the GTAP model) concluded that the price of oil is primarily responsible for the increased price of grains, including corn. The increasing price of agricultural commodities has put enormous strain on the conventional biofuels industry, suspending production at dozens of plants. The initial LCFS Policy Analysis published in August 2007 recognized that the new, low-carbon transportation fuels needed in California are at a disadvantage because they "compete on a very uneven playing field: the size, organization and regulation of these industries are radically different." It is difficult to see how enforcing even conservative indirect effects against biofuels, especially while not enforcing any indirect impacts against other fuels (as is the current LCFS trajectory), would unfairly incent crop-based biofuels. More likely, it will perpetuate the status quo, and continue California on a path toward (increasingly less sustainable) oil dependence. It is also instructive to point out, as the LCFS Policy Analysis did in August 2007, the duality of California's climate policy: to encourage investment and improvement in current and near-term technologies, while also stimulating innovation and the development of new technologies. To this end, it is imperative that the LCFS value and devalue all fuels equitably, so as not to exacerbate an already uneven playing field for alternative fuels.

- The fundamental assumption of the current ILUC argument – that using an acre of land in the U.S. for fuel will require almost an acre of crop development somewhere else – produces questionable results when applied to "good" public policy initiatives. For example, under the same assumption it is possible that setting aside land for the Conservation Reserve Program (CRP) creates more carbon emissions, because it takes agricultural acreage out of domestic food and feed production, which results in agricultural cultivation of grasslands and deforestation abroad. It is possible that other land protection policies, including national parks and wilderness areas, also fail the "zero sum" land use assumption because they take timber and agricultural land out of traditional production. By the "zero sum" standard, any land conservation policy in California or the United States exports pollution (or creates ILUC) elsewhere.

- Enforcing indirect impacts using the methodology envisioned by ARB may produce questionable market behaviors. ARB has discussed having a "non zero" land use change attribution (i.e. penalty) in the LCFS for certain broad categories of fuels (e.g. corn ethanol, biodiesel, cellulosic ethanol, etc.). However, it is generally accepted that different regions have different tolerances for increased agricultural production, as well as different indicators for agricultural products based on weather, supply/demand, annual plantings, etc. Yet, agricultural expansion in a region that can tolerate it pays the same ILUC price under the LCFS as expansion in regions that cannot tolerate intensification. And both farmers, irrespective of the efficiency or sustainability of their crop, pay for theoretical environmental damages abroad that they have no control over. The public policy proposal to penalize products for decisions and trends far outside of their sector

and control is a major one, may not produce the desired behavioral effect, and should endure a substantial public review process.

- We are not sure that ARB is applying the principle of indirect effects enforcement in a balanced and consistent way. For example, ARB staff has made clear their inclination to debit all crop-based ethanol for ILUC, irrespective of the type or location of the land used for production. However, on the subject of tar sand petroleum use by oil companies, ARB staff has implied only that oil companies will be debited *if they use tar sands in California*. Put another way, the penalty for biofuels is automatic while the penalty for oil can be avoided by redistributing its product. This creates obvious compliance inequities, but also questionable climate accounting in the marketplace. Oil companies will simply use lighter crude in California to escape penalty under the LCFS. But this decision will short supply of light crude elsewhere and increase the demand for tar sands and other resource intensive crude with obvious climate impacts. Requiring oil companies to account for tar sands use abroad is the definition of a market-mediated effect. Yet ARB seems more inclined to enforce market-mediated effects against ethanol, for land use change, than indirect effects against oil companies for heavy crude and tar sands.

To be clear, the renewable fuels industry supports the ongoing effort to better understand the indirect effects of the energy choices we make. But the enforcement of indirect effects of any kind, given the complexity and relative infancy of the field, must be done carefully and in a balanced way. Some members of the UC scientific community want to include ILUC in the LCFS. But this is not a consensus position. In addition to the 27 signatories of the June 24 letter to ARB, Dr. Michael Wang of Argonne National Laboratory, one of the foremost experts in lifecycle carbon assessment (LCA) field and author of the GREET model being used as the framework for the LCFS, recently stated, "indirect land use changes are much more difficult to model than direct land use changes. To do so adequately, researchers must use general equilibrium models that take into account the supply and demand of agricultural commodities, land use patterns, and land availability (all at the global scale), among many other factors. Efforts have only recently begun to address both direct and indirect land use changes … [w]hile scientific assessment of land use change issues is urgently needed in order to design policies that prevent unintended consequences from biofuel production, conclusions regarding the GHG emissions effects of biofuels based on speculative, limited land use change modeling may misguide biofuel policy development."[4] The signatories of the June 24 letter expressed similar concerns.

The UC letter signatories dismiss the rationale that ILUC be left out of the LCFS at this time based, in essence, on the assertion that ILUC exists. As stated, all fuels and products have indirect carbon impacts. Yet, zero may in fact be the right number for "indirect effects" for all fuel pathways in the first version of the LCFS from a public policy perspective if: (1) ARB and UC cannot enforce scientifically defensible numbers because of the lack of verifiable or reliable data or an incomplete understanding of the full spectrum of indirect effects across all fuel pathways; and/or, (2) there are serious unanswered public policy questions about the merits of enforcing indirect effects in a performance-based carbon regulation; and, (3) there is no accounting for the foregone public benefits of domestic and international biofuel development, or for the export of pollution to other locations on a strict LCFS policy with high penalties for domestically produced biofuels. To this latter point, it is worth noting in any discussion about market-mediated, indirect effects the potential to destabilize the advanced biofuels sector with overly aggressive or inequitable compliance metrics against conventional biofuels. It is well understood that

[4] See http://www.transportation.anl.gov/pdfs/letter_to_science_anldoe_03_14_08.pdf.

conventional biofuels are a cornerstone for the development of advanced biofuels, which includes infrastructural, political, market acceptance and investment risk considerations. Enforcing additional compliance metrics against conventional biofuels will not accelerate the commercialization of advanced biofuels.

Notwithstanding the challenges ahead, our industry is eager to be an early actor under the regulation and looks forward to the ongoing formulation of the LCFS rule. We strongly agree with the UC researchers that the challenge that comes with ushering in new technical, economic, social and environmental areas of inquiry and action is of balancing further study with implementation. But we do not agree that throwing uncertain numbers at selected fuels under the LCFS will create a positive outcome for either the environment or the LCFS policy itself.

We would be happy to address questions or concerns you may have, and appreciate your leadership on this important endeavor.

Sincerely,

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