RFA RENEWABLE FUELS ASSOCIATION

April 28, 2010

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

Dear Chairwoman Nichols,

I am writing to inform you and the Board of an important advancement in the science of indirect land use change (ILUC) that has major implications for California's recently adopted Low Carbon Fuels Standard (LCFS). New research conducted and published by Purdue University using the Global Trade Analysis Project model (GTAP) concludes that land use change emissions potentially associated with corn ethanol expansion are likely *less than half* of the level estimated by the California Air Resources Board (ARB) staff for the LCFS. While we continue to have grave concerns about including highly uncertain and prescriptive indirect emissions penalties in the LCFS (for instance, we do not believe ARB has the authority to account for ILUC consistent with the Commerce Clause of the U.S. Constitution), we write to point out the new Purdue findings because we believe ARB has committed itself to consider and respond to critical developments like these.

ARB has repeatedly stated that its ILUC analysis for the LCFS was based on the "best available" science and analytical tools, and that the Board is committed to evaluating and adopting advances in the science that would improve the accuracy of its analysis. Indeed, ARB states, "…the GTAP is the best available tool for estimating the global land use change impacts associated with expanded biofuel production. *When and if the Board is made aware of a better estimation tool, it can direct staff to utilize that tool* (emphasis added)."[1] To be sure, Purdue's recent enhancement of the GTAP model and its new ILUC results represent a "better estimation tool" than was used by ARB for the LCFS. Accordingly, we believe that the Board, given its commitments, must direct the staff to adopt the new Purdue results and use the new, improved GTAP model from this point forward until such time that even better tools are available. Because regulated parties under the LCFS will imminently be making decisions about 2011 fuel purchases and related logistics, the Purdue ILUC value should be adopted in the LCFS look-up table *immediately* so that regulated parties have the certainty they need to make purchasing and logistical decisions for the upcoming 2011 LCFS compliance cycle.

The new Purdue University research, which was funded in part by the U.S. Department of Energy (DOE), clearly shows that ARB significantly overestimated corn ethanol indirect land use change emissions under the LCFS. In simulations where the most recent available global economic database (2006) was employed and future crop yield increases and population growth were considered, Purdue economists estimated average corn ethanol land use emissions at 13.9 grams

[1] Calif. Air Resources Board, California's Low Carbon Fuels Standard: Final Statement of Reasons (December 2009), 633.

CO2-equivalent per mega joule (g/MJ). These results are less than half of the ILUC value of 30 g/MJ adopted by ARB for the LCFS. Presumably to test the sensitivity of ARB's results to model enhancements excluding the use of the 2006 database, the Purdue researchers also examined a case that mirrored exactly the approach taken by ARB for the LCFS analysis (i.e., the old 2001 GTAP database was used, and crop yield growth and population growth was ignored). Even in this case, Purdue found average corn ethanol land use change emissions to be 20.8 g/MJ, or 31% lower than ARB's estimate of 30 g/MJ. Purdue recently finalized and published these results and shared them with stakeholders, including staff at ARB.[2]

The new results obtained by Purdue can be compared in an apples-to-apples manner to the ARB LCFS results because in both cases: 1.) the exact same economic model (Purdue's GTAP) was used; 2.) the same corn ethanol production scenario (15 billion gallons by 2015) was examined; and 3.) the same department at the same university conducted the simulations and many of the same researchers were involved. To be clear, the differences between the new Purdue results and ARB's LCFS results stem from the many major improvements that Purdue has made to the GTAP model, not from any discrepancies in the analytical objectives or underlying scenarios. Many of these enhancements were made in response to comments and questions submitted to ARB and Purdue in recent years by stakeholders and other users of the GTAP model. The following are among the major improvements that were made to GTAP:

- *The model's global economic database was updated from 2001 to 2006*. ARB's analysis for the LCFS used the old (2001) GTAP database, while the new Purdue research draws from a recently integrated 2006 database. The authors of the new Purdue paper state, "The global economy changed significantly over the 2001-2006 period…" and there were changes to "…important factors which could alter the land use implications of biofuels."

- *Cropland pasture in the U.S. and Brazil and Conservation Reserve Program (CRP) lands have been added to the model*. These important land types were absent from the model when it was used by ARB and its contractors for the LCFS analysis. Excluding these lands from the model, as ARB did, constrains the amounts and types of land that are available for conversion to crops, which ultimately results in artificially inflated ILUC estimates.

- *According to the Purdue authors, the model's treatment of corn ethanol animal feed co-products (called distillers dried grains, or DDG) is "significantly improved" over the version of model used by ARB for the LCFS*. Despite real world data and information to the contrary, ARB simply assumed for the LCFS analysis that DDG replaces only corn in animal feed rations and only on a pound-for-pound basis.

[2] Purdue economists presented their results at an April 23, 2010, workshop at the University of Chicago. The April 2010 final report was distributed electronically to stakeholders, including ARB staffer John Courtis, on April 15, 2010. The report is available online at http://www.transportation.anl.gov/pdfs/MC/625.PDF.

- *The model's method for estimating crop yields on newly converted(i.e., marginal) lands is much more sophisticated and detailed than previous versions of the model, including the version used by ARB for the LCFS*. The model now estimates crop yields on newly converted lands with regional specificity, rather than applying one generic estimate to all marginal croplands around the world, as ARB did for the LCFS.

- *For the new analysis, Purdue took into account crop yield growth and population growth over the period of the simulation.* The new model conservatively assumed growth in crop yields of 1% annually from 2006 to 2015. To account for increased food demand, the Purdue authors also assumed global population will grow at a rate consistent with recent trends. In contrast, ARB ignored both effects for the LCFS analysis and did not assume crop yields would grow at all beyond the period of 2006-2008.

- *The new Purdue analysis also assumes that some portion of the carbon stored in trees is not immediately released into the atmosphere when the forest is converted to cropland*. Rather, it is assumed in the new version of the model that a fraction of the carbon in harvested trees will be stored long term in furniture, buildings and other wood products. For the LCFS analysis, ARB assumed 100% of the carbon in trees is immediately released into the atmosphere when the forest is converted (despite the agency's clear statement in the ISOR that it meant to assume that 10% of the carbon would be stored in wood products).[3]

In many instances in the LCFS public record, ARB acknowledged that these improvements to the model were necessary. As one example, in regard to the exclusion of cropland pasture and CRP lands, ARB stated that the precision of the GTAP model could be increased by "…expand[ing] the types of land areas available for conversion to agricultural uses. Former Conservation Reserve Program lands could be added in the U.S. Idle croplands that are not currently available could be added worldwide."[4] In regard to this issue, ARB further stated, "There are efforts currently by many institutions and GTAP researchers to include these types of lands in the GTAP database. *Once such a database becomes available, we will evaluate it for possible adoption* (emphasis added)."[5] As another example, ARB also recognized that using the old GTAP database (2001) was a weakness of the analysis. According to ARB, "Staff was aware at the outset of the modeling effort that using 2001 as the baseline year was a limitation. The reason that GTAP employed the 2001 world economic database as the analytical baseline is that this was the most recent year for which a complete global land use database existed as of the time of analysis."[6] Fortunately, a more current world economic database (2006) now exists within GTAP.

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[3] In its Initial Statement of Reasons, ARB stated that it "…assumed that 90 percent of the above-ground…carbon is emitted over the fuel production period," meaning 10 percent is sequestered in building products. However, this assumption was not reflected in ARB's final ILUC results. When ARB was questioned about why this assumption was not reflected in final calculations, it responded in the FSOR that, "A miscommunication between ARB, UC Berkeley, and Purdue resulted in a discrepancy between the emission factors discussed in the Staff Report (and presented on the ARB website) and the emission factors actually used in the land use change modeling for the regulation." ARB suggested that, "Instead of '90 percent,' the actual assumption was '100 percent.'" A correction was made in errata to fix the "mistake." (FSOR, 651-653)
[4] Calif. Air Resources Board, California's Low Carbon Fuels Standard: Final Statement of Reasons (December 2009), 635.
[5] Ibid., 659
[6] Ibid., 693.

Even after these enhancements were made to GTAP, many uncertainties remain. Still, the new Purdue results are being received by the scientific community as the state-of-the-art in terms of land use change modeling. While the Purdue authors acknowledge that "…modeling land use change is quite uncertain…" and that their analysis is "…limited by data availability, validity of parameters, and other modeling constraints…", the new Purdue study undoubtedly represents the cutting edge and best available science on the issue of land use change and biofuels. Without question, the new Purdue results are superior to the results obtained by ARB in terms of robustness, data currency, and detail. Throughout the LCFS process, ARB has repeatedly stated its intent to integrate modeling improvements and new data as they become available. Indeed, in the LCFS Initial Statement of Reasons, the agency writes, "…ARB has committed to determining the total direct and indirect emissions associated with production, distribution, and use of all fuels through conducting complete lifecycle analyses *based on the best available science* (emphasis added)."[7] Further, ARB suggests, "The Board agrees that the issue of land use change impact estimation must be subject to ongoing evaluation and analysis…"[8] and, "The Board has also committed to an ongoing inquiry into the best indirect land use change estimation methodologies."[9]

In keeping with ARB's stated commitment to using the best available science and data, the Board should move *immediately* to adopt the value of 13.9 g/MJ for the corn ethanol ILUC penalty in lieu of the current 30 g/MJ estimate. ARB has vociferously committed to adopting advancements in the science of the indirect effects as it becomes available. Integrating the new Purdue value would represent a directional shift in the fuels that would be viewed as viable compliance options, i.e. the current carbon intensity scores prevent most corn ethanol from being used beyond 2011, while adjusting the carbon intensity scores to reflect the new Purdue ILUC value would allow many corn ethanol pathways to serve as viable compliance options for several years under the LCFS. As noted above, <u>any delay in considering and adopting the new Purdue results will seriously hamper the ability of regulated parties to comply with 2011 LCFS obligations</u>. Time is of the essence. The California fuels market simply can't afford to wait for possible modifications to the regulation that may result from the expert work group recommendations (which aren't expected until December 2010). Adopting the Purdue ILUC value immediately would greatly enhance the ability of regulated parties to meet their greenhouse gas reduction obligations in the early years of the LCFS, ultimately minimizing fuel cost impacts to the state's consumers.

Further, there is very recent precedent for ARB making material changes to adopted regulations and adjusting implementation deadlines when new information and better data are presented. Just last week at its April Board meeting, ARB staff acknowledged that its previous estimates of off-road diesel emissions related to the off-highway diesel rule were "too high."[10] New analyses from third parties and ARB itself showed the original off-road emissions inventory may have been overestimated by ARB by 140-400%. At last week's meeting, ARB members stated that

[7] California Air Resources Board, Staff Report: Initial Statement of Reasons, Proposed Regulation to Implement the Low Carbon Fuels Standard: Vol. I (March 5, 2009), Page IV-48
[8] Calif. Air Resources Board, California's Low Carbon Fuels Standard: Final Statement of Reasons (December 2009), 638.
[9] Ibid., 642
[10] Calif. Air Resources Board, Staff Presentation at April 2010 Board meeting (April 22, 2010), slide 10.

additional analysis needs to be conducted and affected parties must be given more time to comply with the rules. Similarly, new analyses presented to ARB in December 2009 led the Board to direct staff to re-evaluate the science behind the pending on-road diesel rules for trucks and buses. One Board member stated the staff report upon which the rule is based is "not acceptable" and proposed that ARB "…set aside the rule until this report be redone."[11] In a similar way, we are urging the Board to re-evaluate the science behind ILUC and consider the new evidence presented in the Purdue paper.

We appreciate your consideration of this new information and your commitment to ensuring the best available science is appropriately integrated into the LCFS regulation. While we view the new Purdue analysis as being the best available to date, we believe much more research and analysis is needed on the issue of land use change. There is still much room for improvement in the GTAP model and the scientific community still has a great deal to learn, in general, on the topic of biofuels and land use change. We would greatly appreciate the opportunity to meet with you and your staff to discuss the new Purdue results in more detail.

Sincerely,

Bob Dinneen
President & CEO

Cc:

Monica Vehar, Clerk of the Board
John R. Balmes, M.D., Board member
Sandra Berg, Board member
Dorene D'Adamo, Board member
Lydia H. Kennard, Board member
Ronald O. Loveridge, Board member
Barbara Riordan, Board member
Ron Roberts, Board member
Daniel Sperling, Board member
John G. Telles, Board member
Ken Yeager, Board member

[11] Calif. Air Resources Board, Transcript of December 2009 Board meeting (December 9, 2009), 80.