

**BEFORE THE  
CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY  
AIR RESOURCES BOARD**

**Proposed Regulations to Implement  
the Low Carbon Fuel Standard**

**Comments of Biotechnology Industry Organization  
for Public Comment, October 4, 2011**

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Brent Erickson  
Executive Vice President  
Industrial and Environmental Section  
Biotechnology Industry Organization  
1201 Maryland Avenue, S. W. Suite 900  
Washington, D.C. 20024  
Phone (202) 962 9200  
Fax: (202) 488-6301  
[WWW.BIO.ORG/IND/](http://WWW.BIO.ORG/IND/)

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Proposed Regulations to Implement the Low Carbon Fuel Standard**

BIO is the world's largest biotechnology organization, with more than 1,100 member companies worldwide. BIO represents leading technology companies in the production of conventional and advanced biofuels and other sustainable solutions to energy and climate change. BIO also represents the leaders in developing new crop technologies for food, feed, fiber, and fuel.

BIO and its member companies wish to provide brief, high level comments in response to the model structure and parameter changes; specifically related to GTAP work on indirect land use change (ILUC), and other indirect effects from biofuel production. We understand CARB will be incorporating this data, and subsequent modeling work on indirect effects, to update the overall carbon intensity (CI) calculations for at least four biofuel pathways in California's Low Carbon Fuel Standard (LCFS). Our response is specific to the preliminary 'results' presented by Purdue University at the September 14<sup>th</sup> public meeting.

BIO supports California's efforts to reduce the carbon intensity of transportation fuels. However, BIO urges the CARB Board, and the Executive Officer of the Board, to employ sound science in the determination of key variables for sensitivity analysis and selection of the range of uncertainty in those variables. It is critical that CARB approach potential model changes that could affect these values with the utmost care, open-mindedness, and flexibility. To deliver the maximum real GHG reductions, CARB's computation of GHG equivalent emissions, employing lifecycle analysis (LCA) and econometric modeling (e.g. GTAP), should: (1) follow consistently applied and thoroughly vetted methodology; (2) be based on contemporary and complete data; (3) account for, and encourage, a range of future technology advances to ensure continued reductions in the carbon intensity of the state's fuel mix; and (4) ensure consistent methodology is applied, and offer stability in the program that will enable fuel producers to plan long range strategies for compliance. BIO references more nuanced concerns on the GTAP model and CARB's approach to ILUC inclusion in comments to the original regulation order, submitted to CARB in April 2009. (See attached)

BIO is seeking clarification on the GTAP preliminary model changes listed below:

*Sensitivity of land cover changes with respect to changes in the food demand induced by higher food prices due to biofuel production*

- One scenario assumes that consumer food demand stays the same with higher food prices. This assumption is contrary to observed behavior and economic

modeling, which shows that consumers in developing countries decrease expenditures on less efficient feed sources, such as meat and dairy, while maintaining cereal consumption. BIO urges CARB to review the available economic literature, including but not limited to the following references:

- Seale, James, A. Regmi and J. Berstein (2003) *International Evidence on Food Consumption Patterns*, United States Department of Agriculture, ERS Research Briefs.
- Abler, D. (2010). Demand Growth in Developing Countries. Paris, OECD: 48.

In contrast, for developed countries food demand has been shown to be less elastic. Consumers decrease expenditures on restaurant meals as well as other goods and services to compensate for the larger percentage of their income spent on food. Spending on travel and larger expenditures such as vehicles and appliances might decrease, which may in turn result in a reduction of GHG emissions. How could these potential market dynamics be included in the modeling? Would this be solely within the nested variables within GTAP? And if so, a figure (diagram) of the nested categories within the version of GTAP Purdue is running would be most helpful.

- BIO strongly discourages incorporating fixed food consumption in the modeling. The issue of food consumption is important but should not be handled by modeling of ‘virtual’ land use change from biofuels production, which would not be expected to take place in the real world.

#### *Sensitivity of land cover changes with respect to yield-to-price elasticity*

- As stated on page viii of the Tyner report “Calculation of Indirect Land Use Change (ILUC) Values for Low Carbon Fuel Standard (LCFS) Fuel Pathways”, there are no crop yield improvements built into the model. The yield-to-price elasticity is the only way that yield improvements are captured. Sound science dictates using the totality of literature when setting the appropriate range for sensitivity analysis. Literature reviews on yield-to-price elasticity (Keeney, R and T. Hertel, 2008. The Indirect Land Use Impacts of U.S. Biofuel Policies: the Importance of Acreage, Yield and Bilateral Trade Responses” GTAP working paper number 52), show a range of 0.22 to 0.67 for these values. Berry “Technical Report for the ICCT: Empirical Evidence on Crop Yield Elasticities” shows that most crop yield improvements are due to technology advancements, and not necessarily caused by price increases. While the Berry model may do a good job fitting within crop year trends in the United States, it is not indicative of what happens in the medium to long term nor is it indicative of what happens on a global basis. For example, if crop prices are expected to be higher, BIO member companies will invest additional dollars in research and development. It takes approximately ten years for new biotech traits to reach the market, so these impacts will not be seen in one year. In addition, farmers are more likely to invest additional dollars in new releases of seeds that contain biotechnology traits if prices are expected to be high. Other investments by farmers may include more efficient equipment.

- BIO strongly recommends that the totality of literature be considered to set the range of price to yield elasticities, and that the analysis be done on a medium to long term basis.
- Given the long steady increase in historical crop yields, regardless of price, inputting projected yields is a more appropriate way to account for this factor in the model. BIO suggests the sensitivity should reflect the projected rate of yield increases.

*Sensitivity of land cover changes with respect to crop transformation elasticity*

- BIO appreciates the effort to match this elasticity to the actual data available. This method should be used wherever possible to determine the most accurate elasticity value to use in the model. We also anticipate the additional work on disaggregating land types will be issued.

*Sensitivity of land cover changes with respect to endogenous productivity change for cropland pasture*

- CARB has requested that the GTAP model be run with the endogenous yield adjustment set to zero for both regions as a sensitivity. As stated by Tyner on page 7 of his most recent report to CARB, “This is one of those cases where economic logic tells us that some positive value is appropriate for this parameter, but we do not have an empirical basis for what number to use.” CARB has argued that ILUC needs to be included in the regulation, even with its great uncertainties, because logic states that it should not be zero. For the same reason, setting the productivity change to zero should not be a valid scenario. The range for the sensitivity should be set to positive numbers, not including zero.
- UNICA, in comments previously submitted to CARB (Valesco, 2009), determined that the endogenous yield adjustment for pasture intensification was 0.6 rather than the 0.2 utilized in the base model.

BIO assumes that the potential GTAP model changes listed above utilize the most recently determined baseline GTAP runs, that were used to calculate overall indirect effects, and subsequent CI values, updated through the CARB look-up table as of January 2011. BIO wishes to clarify this point. With respect to the overall notion of indirect effects inclusion, the US will soon be producing about 13.5 billion gallons of corn grain ethanol. Is it possible to now see what effect this increase in grain ethanol has had on land use? Further, CARB is only considering some indirect emissions in their analysis. We understand this work by Purdue is focused on the ILUC effects, specifically the economic model behind CARB’s separate ‘indirect effects’ numbers, shows that biofuels production leads to a decrease in paddy rice fields as well as livestock production. It is well known that paddy rice fields emit methane, and that the livestock sector is also a major source of GHG emissions (see e.g. the report ‘Livestock’s Long Shadow’ by the United Nations Food and Agricultural Organization). On this basis, we recommend that CARB also commission a sensitivity analysis estimating the GHG implications of the indirect effects on paddy rice and livestock production, [similar to the analysis conducted by Winrock for the EPA RFS2](#).

BIO has included a list of recent ILUC information and studies for further review:

- The EU Commission has put a hold on applying specific crop ILUC factors until 2016 at the earliest - <http://www.trust.org/alertnet/news/update-1-eu-to-delay-action-on-biofuels-indirect-impact/>
- F. Taheripour, W. Tyner, M. Wang , [GTAP Cellulosic Biofuels Analysis of Land Use Changes](#), 2011.
- Analysis by Hertel et al. (2010) as improved by Tyner et al. in the report called [Land Use Changes and Consequent CO2 Emissions due to US Corn Ethanol Production: A Comprehensive Analysis](#)
- Indirect Land Use Change for Biofuels: Testing Predictions and Improving Analytical Methodologies, Seungdo Kim and Bruce E. Dale, 2011

We thank you for your consideration of these comments.