

**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 Hearing, April 23, 2009**

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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/

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The Biotechnology Industry Organization (“BIO”) is pleased to comment on the California Air Resources Board’s (the “Board” or “CARB”) proposed regulations to implement the State’s Low Carbon Fuel Standard (“LCFS”).¹ BIO is the world’s largest biotechnology organization, with more than 1,200 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. A list of BIO’s biofuels member companies headquartered in California is attached as Appendix I.

BIO wishes to thank the Board for the openness and inclusiveness of its rulemaking process to date. CARB has made every effort to be transparent in its approach, and has provided ongoing opportunity for stakeholder input throughout development.

BIO supports California’s efforts to reduce the carbon intensity of transportation fuels and believes that biofuels can and must contribute significantly to this important objective. Climate change is an urgent global issue, and California is to be commended for its leadership in addressing the contribution of transportation fuels to greenhouse gas emissions (“GHGs”). California’s implementation of this LCFS will inform the establishment of similar regulations in numerous other U.S. states, as well as lifecycle GHG calculations by the U.S. Environmental Protection Agency (“EPA”), and likely governments around the world.

CARB’s proposed approach also has profound implications not just for biofuels, but potentially for all agricultural activity – and arguably climate policy the world over. First, by applying ILUC penalties to California-produced biofuels, CARB is effectively assuming

¹ <http://www.arb.ca.gov/regact/2009/lcfs09/lcfs09.htm>.

responsibility – on behalf of California businesses – for land use decisions, and the resulting carbon emissions, of individuals and nations around the world. This is a sweeping policy decision that could well establish a precedent for all areas of economic activity in California. This approach could also serve as an endorsement of the position of China and other nations who seek to shift the responsibility for at least a portion of their domestic carbon emissions to the U.S. and other developed nations.

Secondly, if ILUC penalties are applied to biofuel feedstock producers, these penalties should arguably be applied to all agricultural producers and other land users. If this is the direction CARB seeks to pursue, it needs to approach this radical shift in regulatory policy very carefully, and with the greatest possible flexibility, to minimize economic harm and other unintended consequences.

Thus, it is critical that CARB approach this rulemaking with the utmost care, open-mindedness, and flexibility. To deliver the maximum real GHG reductions, CARB's computation of lifecycle GHG profiles must: (1) follow consistently applied and thoroughly vetted methodology; (2) be based on contemporary and complete data; and (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. BIO believes that CARB's approach fails at least partially in each of these areas.

With respect to methodology, BIO understands that, in assessing the carbon intensity of transportation fuels, CARB is directed to apply a "well-to-wheels" or "seed or field-to-wheels" life-cycle analysis of GHGs attributable to each fuel "pathway." BIO further recognizes that life-cycle analysis may – and arguably should – take into account clearly demonstrated *indirect* GHG effects of any fuel, including emissions from land use change ("LUC") attributable to market-mediated impacts of fuel production.

However, technology-neutral regulation requires that, if indirect GHG effects are attributed to one type of alternative fuel, such as biofuels, indirect GHG effects must also be

attributed for all other covered fuels, including the baseline fuel. The Proposed Regulations and the Board's Staff Report² fail this test of neutrality. Indirect GHG effects have been measured and assessed only against biofuels, but not against the baseline gasoline fuel, nor against other alternative fuels and alternative vehicles that rely on electricity or hydrogen, the production of which may entail considerable indirect impacts on GHG emissions.

Many commentators on the Board's Proposed Regulations have already pointed out the Staff Report's unjustified, selective recognition of indirect GHG impacts of land use change ("ILUC") attributable to biofuels. BIO concurs with this criticism.

A recent analysis from the Congressional Budget Office ("CBO")³ found that energy costs accounted for approximately twice the share of food price increase as ethanol production during the period April 2007 to April 2008. Yet gasoline and diesel, two of the dominant energy costs in food production, are assumed by the Board to have no market-mediated ILUC impacts.

A recent detailed analysis of direct and indirect emissions associated with petroleum fuels⁴ indicates that the Board has by no means considered the full range of possible indirect emissions from all fuel options. Board staff have pointed to a paucity of scientific estimates of indirect emissions from fuel sources other than biofuels as justification for excluding such estimates, but this paucity no more justifies a zero value for these fuels than the limited ILUC literature justifies a non-zero value for biofuels. BIO urges the Board to base its regulations on technology-neutral methodology and, therefore, that it not adopt final regulations that assess indirect GHG emissions only from ILUC attributable to biofuels.

² *Proposed Regulation to Implement the Low Carbon Fuel Standard, Volume 1: Staff Report Initial Statement of Reasons*, March 5, 2009 ("Staff Report").

³ *The Impact of Ethanol Use on Food Prices and Greenhouse-Gas Emissions*, April 2009.

⁴ Unnasch, S., et al. (2009). "Assessment of Life Cycle GHG Emissions Associated with Petroleum Fuels," Life Cycle Associates Report LCA-6004-3P. 2009. Prepared for New Fuels Alliance.

The role of land use in GHG sequestration and emissions is a serious climate change issue, which should be addressed in a comprehensive and consistent way in State, federal and, indeed, international climate change policies and programs. As the representative of the biotechnology community, BIO expects to be an active supporter of and participant in programs designed to reduce GHG emissions attributable to land use and to increase permanent GHG sequestration through improved land management practices. BIO believes that a rigorous scientific and economic analysis of ILUC effects of biofuels production will demonstrate that first and next generation biofuels produced in the U.S. make a positive contribution to reducing the carbon intensity of transportation fuels and overall GHG emissions. It is critical that at this early juncture for state, federal and international regulation of GHGs and carbon, regulatory agencies should develop a rigorous and consistent scientific approach to identifying and measuring GHG effects of indirect land use change attributable to a variety of activities, including the production of alternative fuels.

The critical question for the Board is whether the ILUC methodology and calculations on which the Staff Report relies are sufficiently rigorous and robust to support their incorporation into final regulations, at this time. BIO submits the answer to this question is, emphatically: No. The peer reviewer comments confirm that, at this time, ILUC calculations lack the requisite scientific rigor to support their incorporation into law. One peer reviewer underscores that the science and “art” of ILUC modeling and methodology is “in its infancy.”⁵ Another peer reviewer concludes that ILUC methodology exhibits an unacceptably large range of uncertainty, far exceeding the uncertainty associated with all of the other modeling relied upon in the Staff Report.⁶ A third peer reviewer concludes that “the values used to quantify the

⁵ Peer review comments of J. Reilly, *Review of Proposed Regulation to Implement the Low Carbon Fuel Standard*, April 6, 2009, (“Reilly comments”) at 5 (“The indirect emissions issue ... is a very new area where research that could establish with confidence such indirect emissions is in its infancy.”).

⁶ Peer review comments of L. Marr, *Scientific Review of the CARB’s Proposal to Implement the Low Carbon Fuel Standard*, Mar. 31, 2009, at 2 (“The largest uncertainties in the

carbon intensity due to land use change for ethanol from corn and sugarcane are not yet sufficiently developed to be scientifically confirmed; refinement and validation of those quantities is needed.”⁷

These peer review comments do not mean that CARB staff has not been conscientious in attempting to model ILUC impacts attributed to biofuels. BIO appreciates the efforts of the CARB staff to work with stakeholders on the all-important ILUC issue. However, even if one were to agree with the peer reviewer who noted that “the work developed in [the Staff Report] to estimate these indirect emissions is far beyond anything else that has been done in this regard,”⁸ that does not mean the estimates derived in the Staff Report meet the requisite test of scientific rigor. Indeed, the same peer reviewer concluded that “since there is virtually nothing else out there that is comparable it is difficult to determine how accurate these estimates are.”⁹ Moreover, this peer reviewer accurately identified the inherent difficulty of validating results of ILUC modeling with real-world data:¹⁰

The nature of the problem is that it requires a full model of the global economic system to separate out the partial effect of increased demand for biofuels on land use change, and this requirement is recognized in the report. The report accurately describes how any direct empirical evidence from recent changes in biofuels production, corn and soybean exports, and land use change are highly confounded by simultaneous changes in demand abroad for other purposes and possible supply-side shocks.

The choice before the Board should not be whether the “better” estimate of direct and indirect LUC impacts of biofuels is zero or a positive 18, 30 or 46 gCO₂e/MJ for cellulosic-based, corn-based, and sugarcane-based ethanol, respectively. The choice the Board must make now is whether (i) to fix in final regulations indisputably uncertain, untested and unverified

estimation of carbon intensities are associated with the indirect effects. Relatively speaking the magnitude of direct effects are much more certain.”).

⁷ Peer review comments of V. Thomas, *Review of Proposed Regulation to Implement the Low Carbon Fuel Standard*, posted to website, Apr. 14, 2009 at 3.

⁸ Reilly comments, at 5.

⁹ *Id.*

¹⁰ *Id.*

methodologies and carbon intensity values for selective biofuels, or (ii) to commit to a meaningful study process designed to produce scientifically and economically rigorous ILUC methodology that reduces uncertainties and achieves substantial professional consensus, while adopting the primary features of the LCFS proposed regulations.

Even while initiating implementation of the LCFS without positive carbon intensity values attributed to ILUC, the Board can immediately spur significant emission reductions from alternative fuels, while coordinating development of ILUC methodology with important parallel efforts of the federal Environmental Protection Agency, the European Parliament, and, possibly, the National Academy of Sciences. This is not an all or nothing approach. By postponing adoption of ILUC carbon intensity values for specific pathways, pending coordinated, rigorous scientific study, the Board can take the time to get the science – the data and the methodology – “right,” or at least to the point of more widespread scientific consensus and validation by real-world data.

I. The ILUC Modeling and Calculations in the Staff Report and Proposed Regulations Are Not Scientifically Robust Sufficient To Justify Their Immediate Incorporation into Final Regulations

The Proposed Regulations call for incorporation by reference of ILUC methodology – the Global Trade Analysis Project Model (“GTAP”) – into official Board regulations that will have the force of law. The Proposed Regulations also call for incorporation of output from ILUC models, i.e., indirect GHG emission calculations, into binding Lookup Tables containing specific carbon intensity values associated with discrete biofuel pathways. Since the Proposed Regulations establish a credit and debit system under which fuel producers accrue valuable credits for exceeding annual GHG intensity targets and incurring financial penalties for falling short of annual GHG intensity targets, such credits and debits will become a form of currency. Accordingly, the indirect GHG emission and carbon intensity calculations incorporated into final

regulations will determine not only compliance with the LCFS, but the value of this “carbon currency.”

The Board has a special responsibility to assure that its regulations are based on economically and scientifically robust models. These models must “not tolerate needless uncertainties in [their] central assumptions,” which must be verifiable from reliable, real-world data.¹¹ As quoted above, the peer reviews conducted of the methodology employed in the Staff Report and Proposed Regulations demonstrate that the ILUC methodology falls short of the level of rigor that the Board should demand as a basis for assigning carbon intensity values to different alternative fuel pathways. While the peer reviews generally express the view that ILUC attributed to biofuels should have *some* non-zero, positive value, none of the peer reviews finds that the GTAP model (including its assumptions of causal relationships and its parameter values) is robust, that the assumptions and parameters underlying the model have been validated by real world data, or that the uncertainties in the indirect ILUC numbers inserted into Lookup Tables are comparable to uncertainties in the calculations of the *direct* life-cycle GHG emissions included in the Lookup Tables.

The peer review submitted by John Reilly of MIT most fully describes how GTAP and the Staff Report fall short of the standard of a rigorous, economically and scientifically robust model based on verifiable data. Mr. Reilly describes the ILUC methodology as in its “infancy,” and how GTAP involves a full model of the global economic system that predicts results which are “highly confounded” by empirical evidence.¹² Mr. Reilly also describes how a rigorous scientific methodology would attempt to resolve ILUC uncertainties: “ideally one would want to have had the scientific community investigate these issues and to have published competing estimates, resolving among them better or worse approaches and identifying

¹¹ *NRDC v. Herrington*, 768 F. 2d 1355, 1391 (D.C. Cir. 1985).

¹² Reilly comments at 5.

uncertainties.”¹³ However, Mr. Reilly notes that because “there is virtually nothing else out there that is comparable, it is difficult to determine how accurate these estimates are.”¹⁴

Thus, the Board is presented with a decision as to whether to adopt ILUC calculations from a model “in its infancy” that has not been rigorously tested, compared, and validated through considerable scientific study. Mr. Reilly does state that “including an estimate of indirect [land use] emissions is better than leaving this emissions source out completely because of uncertainty.”¹⁵ But, this is a false choice for the Board at this time. The Board is not limited to the choice between finalizing ILUC impacts at zero or adopting as final the specific calculated ILUC values included in the Proposed Regulations. Rather, the Board should direct the undertaking of further rigorous scientific review of these difficult ILUC issues, and postpone incorporation in final regulations of the GTAP model and ILUC calculations for each biofuels pathway.

BIO wishes to highlight significant areas of uncertainty in the ILUC methodology and the extreme sensitivity of ILUC calculations to assumptions of certain key parameters in the applicable model. These are a few among many unvalidated assumptions as to the parameters of the GTAP model. The resulting sensitivity of indirect carbon intensity calculations to reasonable changes in assumed parameters in the ILUC model undermines any basis for the Board to incorporate the ILUC values in the Staff Report into final regulations.

1. Switchgrass carbon debt. The extreme sensitivity of results to reasonable changes in parameters is effectively illustrated by reference to the Staff Report’s preliminary assessment of LUC impacts of cellulosic ethanol based on switchgrass. Similar sensitivities apply to the Staff Report’s calculations of ILUC impacts of corn-based ethanol.

¹³ *Id.*

¹⁴ *Id.*

¹⁵ *Id.* at 5-6.

The Staff Report calculates that switchgrass has a direct LUC intensity impact of 18 gCO₂e/MJ. This calculation depends critically on the following assumed parameters:¹⁶

- 16 billion gallons cellulosic ethanol from switchgrass
- 250 gallons/acre
- 64 million acres of grassland or marginal land in the US converted
- Carbon emission rate is considered to be 25% of the Woods Hole rate for US grassland conversion to corn, which is 0.25*110 Mg CO₂/ha = 27.5 Mg CO₂/ha

These parameters have not been validated. Professional studies reach very different conclusions as to the appropriate parameter values. For example, the Board's assumptions significantly underestimate the ethanol yield from switchgrass. Empirical studies by professional agronomists support ethanol yields per acre of switchgrass at levels of 400-720 gallons/acre.¹⁷ Substituting the upper and lower range of these values for the value presented in the Staff Report reduces the LUC carbon intensity value to between 6 and 11 gCO₂e/MJ.

Similarly, the Staff Report makes unverified assumptions relating to the carbon debt that occurs from the conversion of grasslands to cultivation of switchgrass. The Staff Report takes a carbon debt calculation for conversion of grasslands to corn ethanol and arbitrarily applies a 75% discount for conversion of the same marginal lands to switchgrass.¹⁸ However, one recent study presents calculations that support a very different carbon debt parameter for

¹⁶ See Staff Report at IV-36.

¹⁷ Schmer M, Vogel K, Mitchell R, Perrin R (2008) "Net energy of cellulosic ethanol from switchgrass." *Proc Natl Acad Sci USA* 105:464-469. Varvel G, Vogel K, Mitchell R, Follett R, Kimble J (2008) "Comparison of corn and switchgrass on marginal soils for bioenergy." *Biomass Bioenergy*, 32:18-21. Vogel, K.P. and Mitchell, R. "Heterosis in Switchgrass: Biomass Yield in Swards." *Crop Sci* 48:2159-2164 (2008); Schmer, M.R., Vogel, K.P., Moser, L., Mitchell, R.B. 2002. Field scale evaluation of establishment year stands on switchgrass biomass production in the northern plains. *Agronomy Abstracts*. In Annual Meeting Abstracts [CD-ROM]. ASA, CSSA, SSA. Madison, Wi.

¹⁸ Staff Report at IV-36.

conversion of grasslands to switchgrass.¹⁹ This study demonstrates that the majority of the carbon debt for converting grasslands to corn ethanol (128 of 134 Mg CO₂/ha) is from below ground carbon loss from soil and decaying grass roots. Soil is only disturbed once for planting switchgrass, so soil carbon losses are minimal and are quickly replaced from the switchgrass. Because switchgrass is a native grass, it can be assumed that the root carbon content would be similar to the grassland displaced, so decay from old roots and growth of new roots should offset. The above ground biomass carbon loss for grassland (6 Mg CO₂/ha) is calculated by assuming that all existing biomass is either burned or killed with an herbicide. This is unlikely, as the majority of grassland would be cut for use as feed prior to using an herbicide. Thus, this study supports use of a carbon debt rate of 6 MgCO₂/ha, which is approximately 5% of the rate assumed for conversion of grassland to corn ethanol, rather than the carbon debt rate of 27.5 MgCO₂/ha assumed in the Staff Report. If this one changed parameter were inserted in the Staff Report's calculations, the ILUC carbon intensity value for switchgrass falls from 18 gCO₂e/MJ to about 4 gCO₂e/MJ. If both of the two parameters were changed from the Staff Report's assumptions, the ILUC carbon intensity value for switchgrass falls to 2 gCO₂e/MJ. Thus, the range of uncertainty with respect to LUC carbon intensity values resulting from changes to two parameters, using values established in recent empirical studies, is approximately 90%. Quite simply, this is, in the words of a leading court case, "needless uncertainty" for promulgating final regulations.

Indeed, BIO points out that professional studies conclude that conversion to switchgrass does not produce a carbon debt at all, but instead produces a carbon sink, sequestering more carbon than is emitted from the converted land.²⁰ Again, the Staff Report's

¹⁹ Fargione, J., Hill, J. Tilman, D., Polasky, S., Hawthorne, P. "Land Clearing and the Biofuel Carbon Debt," *Science* 29 February 2008: Vol. 319. no. 5867, pp. 1235 – 1238.

²⁰ Schmer M, Vogel K, Mitchell R, Perrin R (2008) "Net energy of cellulosic ethanol from switchgrass." *Proc Natl Acad Sci USA* 105:464–469. Varvel G, Vogel K, Mitchell R, Follett R, Kimble J (2008) "Comparison of corn and switchgrass on marginal soils for bioenergy." *Biomass*

parameters are at best single estimates, which are contradicted by many other respected professional studies. There has been neither consensus nor rigorous validation of the parameters assumed in the Staff Report.

2. Assumption of land constraint and effect of future yield assumptions. A second example of the Staff Report's sensitivity to assumptions can be seen in a new independent analysis prepared by John Sheehan for BIO on the impact of varying model inputs on ILUC emissions.²¹ The author examines the impact on land use of varying future yield assumptions of both first and second generation feedstocks. He finds that if yield improvements in first generation crops continue at the current historical rate, "the total amount of land required in the agricultural stock will begin to decline," if food demand also continues to increase along historical trends. "In other words," he continues, "historical trends in yield improvement are more than sufficient to offset growing demand from world population. To the extent that this demand declines, there is now room in the future for biofuels expansion that does not lead to new land clearing."

While continued improvements in crop yield along historic trends is not assured, it is certainly possible. (Indeed, BIO's seed developer members anticipate yield improvement in excess of historic trends in the coming decades.) Likewise, while food demand increases may depart from historical trends in the years to come, extrapolation is at least a reasonable assumption. Thus, as Sheehan points out in his analysis, under at least one scenario based on reasonable assumptions, "We are not necessarily locked into a future of land deficits," and thus the *a priori* assumption of land clearing built into the CARB/GTAP model – and that drives all

Bioenergy, 32:18–21. Vogel, K.P. and Mitchell, R. "Heterosis in Switchgrass: Biomass Yield in Swards." *Crop Sci* 48:2159-2164 (2008); Schmer, M.R., Vogel, K.P., Moser, L., Mitchell, R.B. 2002. Field scale evaluation of establishment year stands on switchgrass biomass production in the northern plains. *Agronomy Abstracts*. In Annual Meeting Abstracts [CD-ROM]. ASA, CSSA, SSA. Madison, Wi.

²¹ *Sustainable Biofuels: A Commonsense Perspective on California's Approach to Biofuels and Global Land Use*, J. Sheehan, April 2009. Attached as Appendix II.

model outcomes – may be fundamentally flawed. This point cannot be over-emphasized. To further quote Sheehan, “The CARB/GTAP and Searchinger models for land use change are, in a way, based on circular reasoning. They set up conditions... which make it almost impossible to avoid indirect land use changes.” The analysis demonstrates the fundamental shortcomings of static economic equilibrium models, such as that used by CARB, and indicates that estimations of ILUC impacts based on such models do not hold up under at least one reasonable alternative set of assumptions. Indeed, in at least one reasonable future scenario, the very existence of ILUC impacts may not be supported.

Even under scenarios in which future land is constrained, Sheehan demonstrates that ILUC emissions are highly dependent on future yield improvements in both first and second generation crops, and that carbon debts can be dramatically reduced or eliminated. Taken together, these findings clearly argue the need for further review of ILUC methodology before drawing quantitative conclusions. To quote Sheehan:

The number of factors affecting the carbon impacts of land use change for biofuels is significant. Many of them are outside the control of the biofuels industry. The model shows any number of scenarios in which the carbon debt of land use change for biofuels can be almost eliminated. For these reasons, indirect land use change should be regulated in [a] flexible way that incentivizes sustainable land management practices, rather than in a way that a priori penalizes the biofuels industry.

3. Causality. The GTAP model is premised upon an assumption that U.S. consumption of biofuels causes land somewhere in the world to be converted to food cultivation to replace the acreage devoted to growing the biofuel feedstock. The rate of such conversion is a heroic assumption. Indeed, peer reviewer John Reilly puts it well when he describes how ILUC modeling “requires a full model of the global economic system to separate out the partial effect of increased demand for biofuels on land use change.”²² This separation of the impact of one global economic factor, increased production of biofuels in the United States, on marginal land

²² Reilly comments at 5.

use around the world, is “highly confounded by simultaneous changes in demand [for food and land] abroad for other purposes and possible supply-side shocks.”²³ As Mr. Reilly concludes, separating out these multi-variable contributors to land-use change one from the other is not possible from available data. Accordingly, there is an inherent uncertainty in the parameter specifications in the global economic model that is GTAP.

A paper published by the National Academy of Sciences in 2007 found that the complex factors that drive land use change globally “tend to be difficult to connect empirically to land outcomes, typically owing to the number and complexity of the linkages involved.”²⁴ In a compendium of papers from a conference of 75 leading scientists in September 2008, under the auspices of the SCOPE workshop in Germany, the leading paper on land-use change concludes that “assessment of the GHG implications of land use and land conversion to biofuel crops is a very complex and contentious issue. A complete assessment of the GHG implications would require an accounting [of numerous international activities for which] the present assessment is limited due to the lack of data required to address all of these issues.”²⁵ Thus, the best scientific assessment of indirect land-use change is that currently available global economic models are not robust, and that parameters and output calculations cannot be validated with available data.

BIO believes there are many factors ignored in the GTAP modeling of these indirect land use changes. Chief among these are the many factors driving conversion of land in less developed countries. Poverty and efforts to escape poverty are a leading cause of land-use change. Uses of marginal land in less developed countries are changing rapidly due to factors other than biofuel production in the United States and other industrialized nations. Productivity

²³ *Id.*

²⁴ Turner, B. L. II, E. Lambin, and A. Reenberg. 2007. “The Emergence of Land Change Science for Global Environmental Change and Sustainability.” *Proceedings, National Academy of Sciences of the United States of America*, 104(52): 20666-20671.

²⁵ Ravindranath, N.H., R. Mauvie, J. Fargione, J.G. Canadell, G. Berndes, J. Woods, H. Watson, J. Sathaye. “Greenhouse Gas Implications of Land Use Change and Land Conversion to Biofuel Crops.” *Proceedings of the Scientific Community on Problems of the Environment (SCOPE)*, Ch. 6, p. 112-13 (2009).

of farm land in less developed countries may rise sharply, reducing the demand for land conversion attributable to lost food stocks from biofuel production in the United States. The list of relevant factors goes on and on. Set against this complexity is a simplistic conversion rate built into the GTAP model. This parameter is neither validated nor capable of validation with available world-wide macroeconomic and land use data. Thus, at its core the GTAP model is plagued by “needless uncertainty.”

II. The Proposed Procedures (Methods 2A and 2B) for Modifying ILUC Carbon Intensity Values from the Lookup Tables Are Not Sufficiently Responsive to the Uncertainties in the ILUC Modeling and Calculations

The only modifications to the fixed Lookup Table values contemplated by the Proposed Regulations would be pursuant to so-called Methods 2A and 2B.²⁶ A producer bears the burden of demonstrating the “scientific defensibility” of alternative calculations used for either Methods 2A or 2B.²⁷ This burden is unduly heavy and of uncertain application, since there are no standards in the Regulations by which the Executive Officer would determine “scientific defensibility” to overcome the presumptive values incorporated in the Lookup Tables. Moreover, Method 2A, which must be used for producers of existing fuel pathways, limits modifications to the Lookup Table values based solely on modified “inputs ... in CA-GREET,” and may “not add any new inputs (e.g. refinery efficiency).”²⁸ Method 2B, which is available only for producers of fuels using a “new pathway,” such as cellulosic ethanol, requires a producer to submit a full life-cycle model with fully specified modified parameters for use in CA-GREET.²⁹ GHG emissions attributable to land-use changes from new pathways must be

²⁶ See Proposed Regulation, §§ 95486(a)(2), (b)(2)(B) (“a regulated party for any other fuel [other than CARBOB, gasoline or diesel fuel] must use Method 1 [i.e., “the carbon intensity value in Lookup Tables that most closely corresponds to the production process used to produce the regulated party’s fuel”] to determine the carbon intensity of each fuel for the regulated party’s fuels, unless the regulated party is approved for using either Method 2A or 2B ...”).

²⁷ *Id.*, §§ (c) and (e).

²⁸ *Id.*, § (c).

²⁹ *Id.*, § (d).

based on the GTAP model, unless the producer can persuade the Executive Officer to utilize a different model “at least equivalent to the GTAP model.”³⁰

Thus, although the Proposed Regulations contemplate development of models to calculate carbon intensity values for new pathways, such as cellulosic ethanol, it appears quite likely that the Executive Director will have unreviewable discretion to specify the application of CA-GREET, GTAP and data sources for use by producers. Moreover, there is no procedure for further Board review or public comment of new Lookup Table values specified in the future for advanced biofuel pathways, such as for different types of cellulosic ethanol production. Indeed, the Staff Report implies that the staff is already locked in on its model for LUC from cellulosic ethanol and looking to add ILUC impacts for converting marginal land to cellulosic feedstock production by “working to integrate the necessary databases for this analysis into GTAP.”³¹ Such rigidity in the methodology for calculating carbon intensity values of cellulosic ethanol is plainly not justified.

Cellulosic ethanol is an emerging technology, with many different feedstocks available for use and many different refinery processes. It is far from clear that the Executive Director will be able to develop technology-specific and feedstock-specific models to measure accurately carbon intensity values for cellulosic-based fuels. This uncertainty will disadvantage producers of cellulosic fuels and stifle innovation in the use of disparate feedstocks and refinery processes, since producers will not have a clear regulatory basis upon which to monetize carbon intensity credits they should be entitled to. Inevitably, the value of credits to cellulosic producers will be heavily discounted due to this uncertainty.

Thus, while the Proposed Regulations ostensibly afford producers the opportunity to propose improved models, using updated data based on actual performance, these flexible methods will likely be of limited applicability. The Executive Director is granted broad

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Id.

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Staff Report at IV-36.

discretion to reject the use of either new data or new models; the proponent bears the burden of demonstrating the “scientific defensibility” of new models, parameters and data sources; and the controversial CA-GREET and GTAP models are afforded a presumptive accuracy. Together, these factors make it highly questionable whether Methods 2A and 2B will have any vitality in the LCFS program.

III. Finalizing the ILUC Calculations Will Have Adverse Economic Consequences for the Biosciences and Cleantech Sectors

The Staff Report’s proposal that the Board move ahead with implementing ILUC penalties on biofuels, but without assessing similar penalties for indirect GHG emissions attributable to any other alternative fuel pathway, risks chilling investment in the very biofuel technologies and businesses that offer the greatest promise of reduced GHG emissions. This would come at a time when advanced biofuel developers are already challenged by a profound scarcity of capital due to the current economic crisis.

There are more than 6,000 bioscience companies in California, employing nearly 200,000 people. Of these, nearly 200 companies and 5,000 workers are in the agricultural and chemical (including biofuels) sectors.³² These businesses are a vital component of the State’s clean tech economy.

Investments by these companies in first generation biofuels are catalyzing efficiency across the entire agricultural sector. These efficiency gains have the potential to greatly lessen demand pressure on land, and, thus, to reduce GHG emissions from undesired land conversion. The proposed ILUC penalties for first generation corn-based ethanol threaten the industry with a substantial competitive disadvantage relative to all other fuels. Resulting reductions in investment in first generation technologies will, in turn, threaten recently realized agricultural efficiency gains, and will discourage investments in allied technologies – such as advanced fractionation, cold fermentation, and renewable repowering – that could further improve the

³² “Technology, Talent and Capital: State Bioscience Initiatives 2008.” Battelle Technology Partnership Practice, June 2008. <http://bio.org/local/battelle2008/>

direct GHG profile of biorefineries, while increasing production of food, feed and other co-products from the same acre of land.

Premature regulatory implementation of ILUC methodology and calculations will also chill investment in second generation biofuels. Even though cellulosic ethanol is indicated to have a lesser ILUC penalty than corn-based ethanol, the penalty is still substantial. Moreover, were the Board to adopt the ILUC methodology in final regulations, it would signal to potential investors in this fledgling industry – and to other emerging technologies – that California can and will apply environmental restrictions on new fuel technologies even in the absence of scientific consensus on environmental impacts.

BIO understands that California may desire to take a lead role in spurring alternative transportation fuels, and, more generally, in reducing GHG emissions across the State and the national economy. The Staff Report declares that an important goal of the Board “is to establish a durable fuel carbon regulatory framework that is capable of being exported to other jurisdictions.”³³ However, by incorporating ILUC methodology for biofuels in final regulations, the Board will be out of step with regulatory efforts at the national level – by EPA in its pending rulemaking to determine carbon reductions from biofuels – and internationally – where the European Parliament recently decided to postpone inclusion of ILUC in biofuel regulations, pending completion of an expected two-year study of the complex methodology. BIO counsels the Board to not lock in ILUC methodology, but to continue serious scientific studies aimed at improving modeling, securing reliable data, and resolving uncertainties. Such studies would be most usefully undertaken in conjunction with EPA’s analyses of ILUC, which will also afford opportunity to share information with European and other nations studying the same issue, perhaps under the auspices of the National Academy of Sciences.

ILUC methodology should also be coordinated with policies being undertaken at all governmental levels to improve agricultural practices (yields, sustainability of marginal lands,

³³ Staff Report at ES-4.

GHG sequestration from changed practices, such as no tilling, etc.) and to reduce pressures for deforestation and conversion of sensitive lands in at risk countries. With land and forestry practices sensibly managed, increased biofuel production world-wide should not result in substantial net carbon emissions attributable to land use conversion in at risk countries.

IV. BIO Recommends Process for Further Study and Development of Rigorous Scientific Consensus in Support of Robust ILUC Methodology

For the reasons stated above, BIO recommends that the Board take the following actions at its public hearing on April 23, 2009, to postpone incorporation of ILUC modeling or calculations in final regulations:

1. The Board should direct its staff to continue soliciting input from all stakeholders and from the scientific community on appropriate ILUC modeling and reliable data sources, without any fixed commitment to GTAP or the parameters used in GTAP, for a period of up to 2 years. As the attached analysis by Sheehan suggests, ILUC science is rapidly evolving in response to policy demand. An additional review period of 18 to 24 months will yield a much stronger consensus on both methodology and appropriate data, and establish a strong scientific foundation on which to base regulation.

2. During this period, the Board should coordinate its review of ILUC modeling with EPA's process for developing sounder science to support its rulemaking on the GHG emissions associated with different alternative fuels. Coordination with European regulatory processes studying ILUC should also be pursued. Comprehensive review by the National Academy of Sciences may also be warranted.

3. Following the review period, the Board should again publish a staff report and proposed regulations and transmit the report for peer review. This next time, peer reviews should be completed and posted for public comment before the public comment period on the proposed regulations begins.

4. During the period in which ILUC methodologies are finalized in California, the LCFS regulations should be implemented without ILUC penalties. This period of further scientific study and subsequent rulemaking proceeding should be recognized for what it is – a transitional regulatory period and not a permanent elimination of ILUC penalties. During this transition period, the Board should authorize the periodic publication of best estimates of carbon intensity values for different pathways, with and without tentative ILUC values indicated by the current state of scientific modeling. These estimates will provide important guidance to investors and encourage investment in perceived best technologies, while providing flexibility to perceived lagging technologies to make investments to improve their GHG profile.

5. The Board should establish as its legal standard for adopting ILUC methodology and calculations the development of an economically and scientifically robust, consensus model that is capable of validation by meaningful real-world data that would result in tolerable ranges of uncertainty. Until there is much greater consensus concerning the modeling and calculation of ILUC, the Board should refrain from incorporating even best estimates of ILUC impacts in lookup tables.

6. If, using scientifically rigorous models or analysis, Staff determines that certain biofuel pathways have a net ILUC benefit, i.e., they will sequester more carbon than they emit through land-use change, the Board should consider early adoption of regulations that lock-in these net benefits for these “best technologies.” The early recognition of these net benefits of “best technologies” should drive the evolution of the biofuels industry towards such technologies. Later, after the requisite period for scientific studies, the Board can consider adoption of final regulations that fix ILUC penalties for “lagging technologies.”

An initial period of incentives for perceived ILUC best practices, followed – once rigorous methodology is approved – by regulation of ILUC impacts, is the best way to achieve the Board’s objectives of long-term reductions in carbon intensity of the State’s fuel supply.

7. The Board should also consider adopting ILUC mitigation rules to allow producers to offset ILUC impacts, or further improve their GHG profile through verifiable investments in (i) activities that improve land use efficiency, (ii) conservation of undisturbed landscapes, (iii) research and development of fuel production efficiencies, including biorefinery energy and co-product efficiencies, and (iv) other activities that secure direct carbon benefits in the California economy.

8. Finally, to encourage and protect investments in technologies endorsed by the Board's analyses, facilities must be able to "lock in" the lifecycle GHG profile available at time of investment as a guarantee against future revisions in ILUC methodology that increase estimated carbon debt. Investment in even the best technologies will be severely curtailed if a facility at any time could have its lifecycle GHG profile downgraded as a result of revised methodology. To further drive investment in low carbon alternatives, facilities *should* be permitted to adopt *lower* lifecycle profiles resulting from revised methodology.

BIO believes that the Board's adoption of these measures will allow it to implement the LCFS and to secure substantial carbon intensity savings from the use of transportation fuels in California, without imposing insufficiently justified ILUC penalties only on biofuels.

We thank you for your consideration of these comments.

Respectfully,



Brent Erickson
Executive Vice President
Industrial and Environmental Section
Biotechnology Industry Organization