Biotechnology Industry Organization
Comments to the California Air Resources Board

On the Low Carbon Fuel Standard
Concept Paper and ILUC Revisions
April 10, 2014

The Biotechnology Industry Organization (BIO) appreciates the opportunity to submit comments on the Low Carbon Fuel Standard (LCFS) Concept Paper and ILUC revision.

BIO is the world's largest biotechnology organization with more than 1,100 member companies worldwide. Among its membership, BIO represents over 85 leading technology companies in the production of conventional and advanced biofuels and other sustainable solutions to energy and climate change challenges. BIO also represents the leaders in developing new crop technologies for food, feed, fiber, and fuel. BIO member companies represent many of the low carbon fuel producers that will supply the State of California with the fuels for Low Carbon Fuel Standard (LCFS) compliance.

BIO and its member companies commend CARB for its openness, inclusiveness and transparency throughout the LCFS rulemaking process. As a member of the LCFS advisory panel, BIO has appreciated the opportunity to guide and comment on the California Air Resource Board's (CARB) staff review of the LCFS regulation. BIO and its member companies have reviewed the recent LCFS Concept Paper and ILUC Revisions and wish to provide comments at this time, in response to specific issue areas highlighted within the two drafts.

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. Our comments are outlined below.

Fuel Pathways and Producer Facility Registration

BIO applauds CARB's efforts to streamline and simplify the fuel pathway certification and registration functions of the LCFS. However, BIO does have some concerns with the implementation of CARB's proposed system. First, what is the rationale that CARB is using to determine which feedstocks will be grouped together? Is there a timeline set to clarify this information? Is there a mechanism for companies to appeal if they believe they have been incorrectly grouped into the wrong feedstock bin? In addition, CARB has cited that there will be a three to six month registration phase in to the new tiered system. Will this delay the approval of new pathways currently undergoing evaluation?

Indirect Land Use Change Trends

Many recent scientific studies and data analysis have been completed since the California Air Resources Board (CARB) adopted the Low Carbon Fuel Standard (LCFS) in 2009 and the results of these studies, etc. indicate a definite need for a revised approach to greenhouse gas emissions with respect to corn ethanol expansion and other biofuel feedstocks as well. These studies most certainly support ILUC values significantly lower than those currently being used. Figure 1 provides a graphical display of the grams of carbon dioxide equivalent per MJ of energy produced (g CO_2 / MJ) for corn (maize)-based ethanol by numerous studies over the past six plus years. The graph contains portions of data from the most recent CARB presentation on March 11, 2014 as well as values from a very recent ILUC compilation by Ahlgren and Di Lucia (Ahlgren 2014). The graph clearly shows an obvious decreasing trend with respect to the ILUC values beginning with Searchinger's work in 2008 through recent studies/papers in 2013 and 2014. In addition, a possible convergence is beginning to appear ranging from below 10 g CO_2/MJ to the upper teens. This is vastly different than the current value of 30 g CO_2/MJ that CARB is using. The data shown in this graph are a direct result of more robust research being conducted and substantial improvement in both model and data quality by researchers. CARB should conduct a thorough review of all the latest studies in the Ahlgren and Di Lucia paper and take them into account when formulating their value(s).

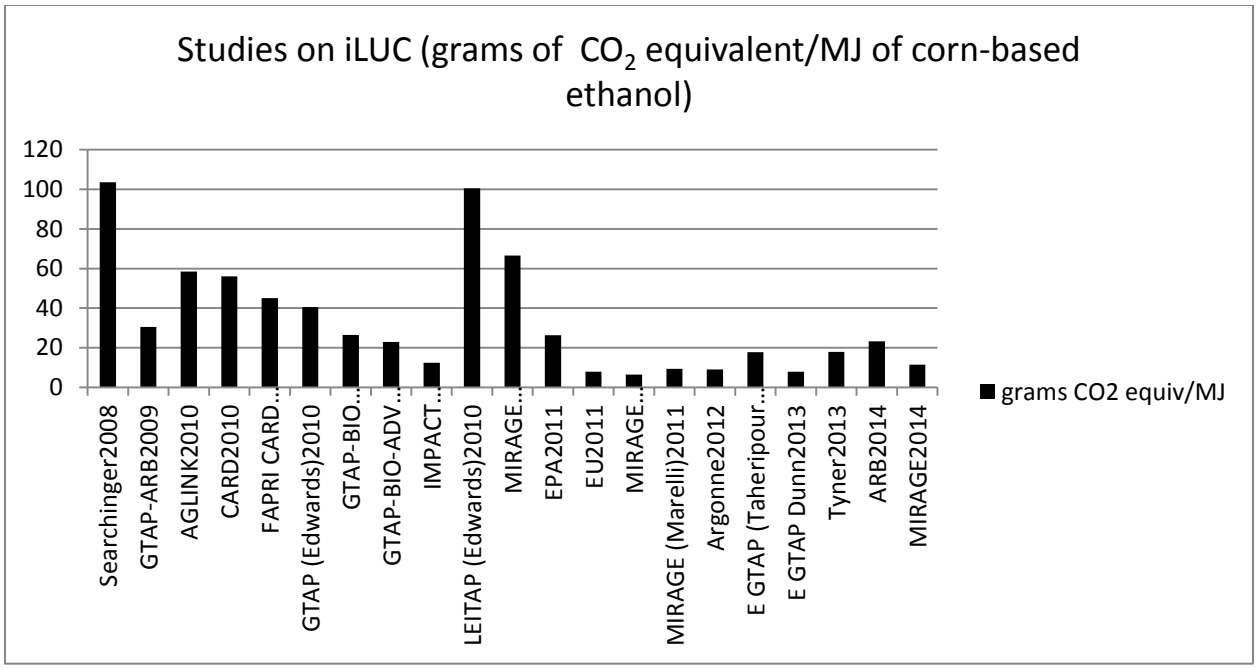

Figure 1. Indirect Land Use Change Data/Results from Ahlgren and Di Lucia (2014) for maize (corn) ethanol from 2008-2014.

Yield:Price Elasticities (YPE)

CARB currently has selected a yield:price elasticity (YPE) between 0.05 and 0.30 as shown on slide 26 of their March 11, 2014 presentation which in effect implies a median value of 0.175. The 0.175 value is contrary to the expert workgroup recommendations in 2011 that the yield price elasticity value be set at a midpoint of 0.25 and is also in conflict with new studies produced since that time stating the long term price yield elasticity should be *at least* 0.25 (Goodwin, Marra et al. 2012; Rosas 2012). Based upon a thorough literature review, the GTAP model utilized by Purdue University adopted a default yield price elasticity of 0.25.

The major concern associated with CARB's use of this lower YPE value is that it (the range, and hence the median value) is based on older studies that conclude farmers/landowners do not respond to changes in the marketplace (i.e., pricing signals). In his testimony, March 11, 2014, Dr. Wallace Tyner of Purdue University clearly stated 1) short term (i.e., 1 year) estimates for YPE are irrelevant and do not reflect what would happen in real agricultural situations, and 2) the YPE used in the current GTAP model is not based on a short term one year elasticity, but instead on responses farmers/landowners would make in a more "medium" term (~ 8 year) which

is a conclusion of a recent work by Berry (2011). Additionally, other numerous literature studies have agreed that intra-season price yield elasticity values are small (Babcock, Gurgel et al. 2011; Berry 2011)).

Another major point of concern is that CARB staff asserts YPE's could even be zero or possibly negative (slide 27). In practical terms this means farmers would not make enhancements or any kind of improvements in their farming/land stewardship operations related to yield. Simply put, this is not the case, the current literature does not support this conclusion, nor did the expert workgroup recommend such factors.

We highly recommend CARB rely on the expert workgroup recommendations and their use of the peer-reviewed, published literature with respect to the YPE.

Emissions Factors for Cropland-Pasture

Of particular concern is cropland-pasture. It is our understanding that the GTAP model currently uses significantly large transitions which can have extremely profound greenhouse gas emissions effects. Carbon sequestration/stocks associated with the transition of cropland to pasture do vary by region. We believe the soil carbon analyses conducted for Argonne's CCLUB that looks specifically at different feedstocks is more in line with what is happening in "real world" agricultural land use transformations and is a definite improvement over the AEZ emissions factor model currently used by CARB due to the fact that it makes a very general assumption of an emissions factor equal to one half the pasture to cropland emissions factor.

DDG (Distillers Dry Grains), Corn Gluten Meal (CGM), and Corn Gluten Feed (CGF)

Significant nutritional displacement substitution exists for corn and soybean meal from use of ethanol production by-products of distiller's dry grains (DDG), corn gluten meal (CGM), and corn gluten feed (CGF). Utilization of these co-products in dairy, beef, poultry, and swine diets/feed rations displaces corn grain and soybean meal typically needed to supply an equivalent amount of metabolizable energy and protein. The most current GTAP model uses a 1:1 substitution of DDGs for corn. However, research by Shurson indicates significant soybean meal substitution impacts also exist related to DDG's. Land (acres) allocated to corn and soybean production are then no longer needed for feed replaced by DDG, CGF, and CGM. New research shows the "net acres" actually attributable to corn-based ethanol production through

DDG, CGM, and CGF by-product nutritional substitution amount to between only 40-49% of the total gross ethanol acres (Nelson (2014)).

Agricultural Efficiency Aspects

Significant improvements have been made over the past 50 plus years regarding the efficiency of agriculture to produce food, feeds, fiber, and/or fuel which directly impact land use and stewardship. Specifically, more people are being fed by a factor of five (5) since the early 1960s, and energy use per bushel of grain has decreased nearly 45% and soil erosion has decreased by two-thirds in this time.

In addition, breeding technologies have helped promote yield improvements and increase planting density as well as allowing plants to better adapt to drought and pests. GPS-guided planters, sprayers, and harvesting equipment are being used more frequently enabling farmers to more accurately manage their input resources. This means farmers make fewer passes across their fields and the passes more accurately apply less nutrients and chemicals which translates into less fuel/energy used. All of this translates into more food, feed, fiber, and fuel produced per unit of land area and therefore less greenhouse gases being emitted per unit of land farmed.

Conclusions

We believe the following should be implemented by CARB when considering all aspects if indirect land use change:

1 Review all corn (maize) studies on indirect land use data and analysis conducted since the 2009 LCFS implementation, especially those outlined in the recent paper by Ahlgren and Di Lucia (2014), and incorporate their findings into CARB's decision process and analysis.
2 Use the expert workgroup recommendation of 0.25 for YPE and also consult current literature when deciding possible ranges for this value by individual crop.
3 Use the data/analysis from the Argonne CCLUB model when considering carbon sequestration effects for cropland-pasture transitions.

4. Take into account the nutritional displacements of distillers dry grain (DDG), corn gluten meal (CGM), and corn gluten feed (CGF) and correlate these with "net acres" approach and its effect on direct emissions as well as indirect land use.
5. Incorporate agricultural efficiencies associated with less fuel, nutrient, chemicals, etc. into all future land use and area projections.

Thank you for the opportunity to submit these comments. BIO and its members look forward to continued dialogue with CARB staff as they work to review and update the LCFS. Please do not hesitate to contact BIO for any additional data or information that may help to further the success of a low carbon future in California.

References

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