National Corn Growers Association
www.ncga.com

April 17, 2009

Mary D. Nichols, Chairwoman
c/o Clerk of the Board
Air Resources Board
1001 I Street Sacramento, CA 95814

Chairwoman Nichols:

Now in its 51st year, NCGA is the premier organization representing the United States corn industry and represents more than 35,000 individual corn growers, 48 affiliated state-level organizations, and hundreds of thousands of growers who contribute to state corn checkoff programs. On behalf of these producers, I would like to thank the Air Resources Board (ARB) for the opportunity to comment on the proposed Low Carbon Fuel Standard (LCFS).

NCGA applauds your leadership in promoting alternative fuels. Increasing America's energy resources and protecting national security by reducing our dependence on foreign oil and continuing to grow our domestic renewable fuels industry are among the most important challenges facing our country. As corn growers, we play an important role in lessening our dependence on foreign oil. However, we have serious concerns about the trajectory of the current LCFS proposal in your state.

NCGA and its members look forward to providing the raw material so that California consumers can enjoy the benefits of lower-carbon transportation fuels through the use of corn-based ethanol. Please find our comments attached and feel free to contact us if you have any questions or require additional information. We thank you in advance for consideration of our comments and suggestions.

Sincerely,

Bob Dickey, President

NCGA Comments to the Air Resources Board
Regarding:
Proposed Regulation to Implement the Low Carbon Fuel Standard

Productivity:

Increasing corn yield per acre of corn grown is not a new development, and has been rising since the adoption of hybrid seed corn in the 1940's. That technological breakthrough was followed by the increased use of macronutrients in the 1950's and 1960's. This was followed by the use of herbicides and selective pest control tools in the 1960's and 1970's. Over the last 15 years, biotechnology and other new advancements continue to enhance yields with a concomitant reduction in inputs.

NCGA is extremely concerned with assumptions made by the report, in addition to the model's treatment of corn yields. GTAP is a static model that does not include a time element, and is based on 2001 data which does not reflect current conditions. In essence, this means the model is "stuck" in 2001 and must be "shocked" to achieve the desired conditions. Because of this, the model is unable to account for the significant improvements in grain yields that have occurred since 2001, documented below, and are projected to continue through 2015 and beyond.

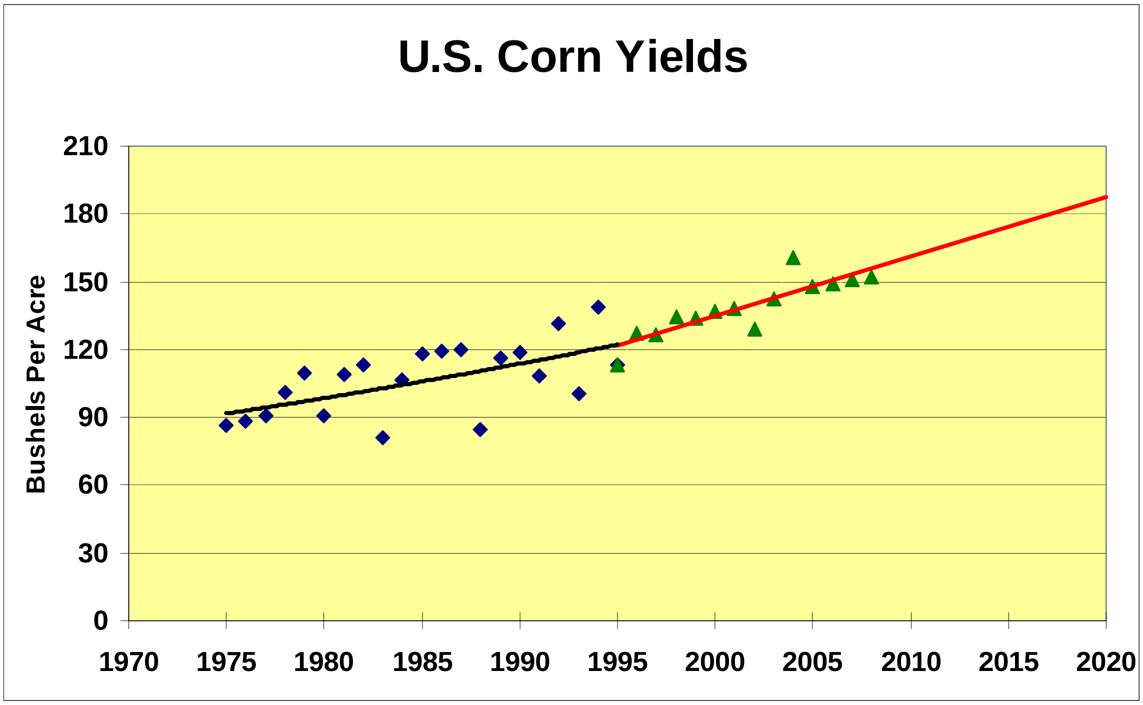
IV.C.3.a:
Due to the fact the model is unable to account for these yield improvements, ARB staff and Purdue University economists have proposed an external yield adjustment to the model. In making the exogenous yield adjustment, ARB has amended yield from 2001 through a 2006-2008 average yield. This is highly inconsistent with the years of the ethanol shock, which range from 2001 to 2015. Does ARB suggest that average corn grain yields will remain unchanged from current levels to 2015? This conclusion, which assumes historical yield advances suddenly stop, is contrasted by projections from the U.S. Department of Agriculture and a number of other public and private entities, who continue to project yield increases through 2015.

In fact, using yields on a 10-year rolling average, the data shows an average yield increase of 1.66% per year for the last 24 years. For the last 10 years, that annual increase has grown to 1.77%.

The substantial increases in corn yields from a historical standpoint have added <u>"new bushels" to U.S. production from the same acres</u>. Increasing yield has provided more "new" corn production than has been required for the incremental increase in ethanol production each year. Averaged over the past nine years, a time when ethanol production grew dramatically, this ratio has achieved 2.89:1. **This means that for every bushel required for the increased ethanol**

market, 2.89 "new" bushels were grown on the same acres, thus requiring no additional acres be brought into production for the purpose of ethanol.

Figure 1: U.S. Corn Yields



Source: http://www.nass.usda.gov/

Worldwide, improvements in the productivity of agriculture have came through many technological advances, including mechanization, wide spread utilization of synthetic fertilizer, hybrid corn, dwarf rice and wheat varieties, precision agriculture, and genetic engineering of crops. These advances have helped global cereal production between 1961 and 2007 to increase from 877 million tons to 2,341 million tons — an increase of almost 300 percent.

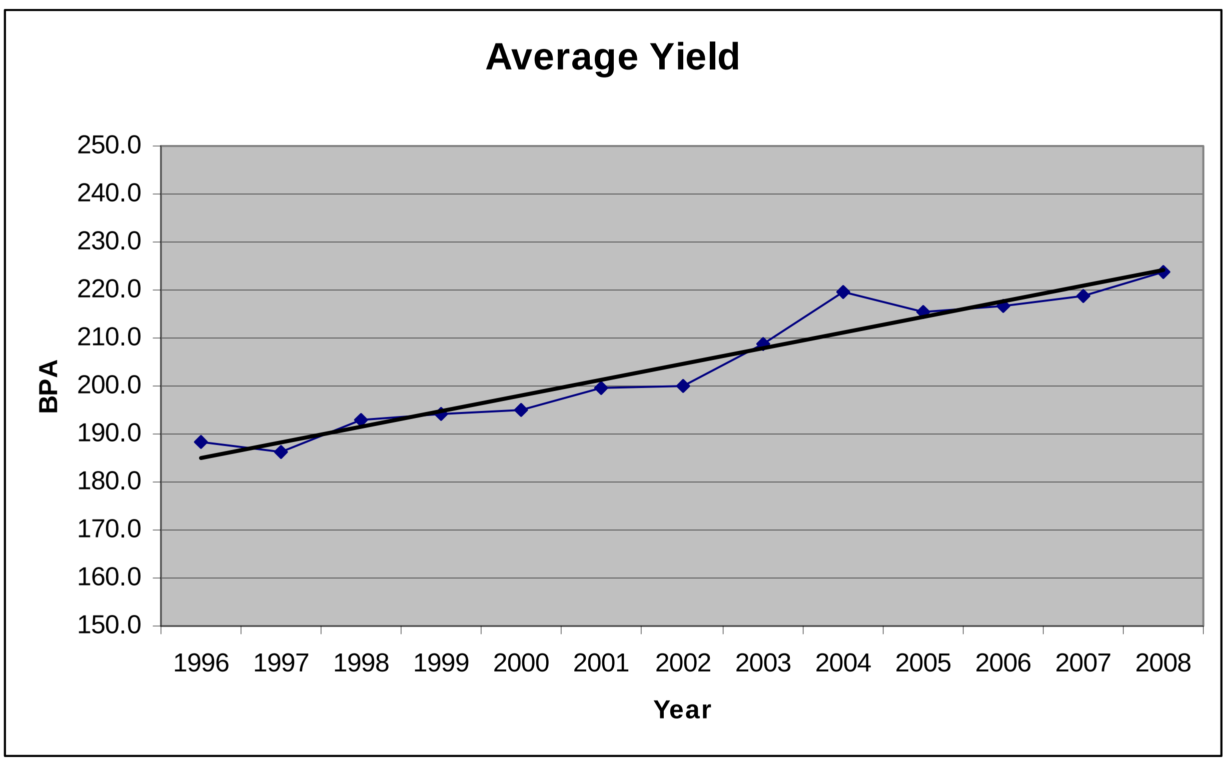
Future Yields:

The 10 year recent trend provides a baseline yield projection of 159 BPA for 2010, 174 by 2015 and 207 BPA by 2025 (Borgman). The upturn which occurs in the more recent trend line is dramatic, but even more convincing is the lack of variability for the data points since 1995 (Figure 1). In spite of weather events and other outside factors, in the thirteen years since, only 2 of the 13 data points are not in contact with the trend line (one high, one low).

Many agricultural economists and agronomists have shown that new technologies introduced over the next few years will provide significantly higher yields during this timeframe. With the use of new technologies which allow desirable traits and genes to be identified and deployed much more quickly, annual yield increases may average 2.5% or greater into the future. These advances could produce increase yields of "183 bushels in 2015 and 265 bushels per acre by 2030." With the same harvested acres in 2015 and 2030 as in 2007, total production would be 15.6 billion bushels and 22.5 billion bushels, respectively" (PRX).

While the above projected yield increases seem significant compared to the U.S. national average corn yields in recent years, the yields are not large in relation to yields being achieved under good conditions using existing corn production technologies. In the National Corn Growers Association (NCGA) National Corn Yield Contest (CYC), many winners in recent years had yields of 250-300 bushels per acre in the non-irrigated categories. Winners in the irrigated categories increased yields even further, including yields of up to 368 bpa. Overall, contest entry yields have grown dramatically over the past several years, averaging 223.7 bpa in 2008, an increase of almost 40 bpa in 13 years (Figure 2). With over 26,000 entries, the CYC data illustrates the dramatic increases the American farmer has experienced, and the future wide-spread productivity that will be expected in the United States.

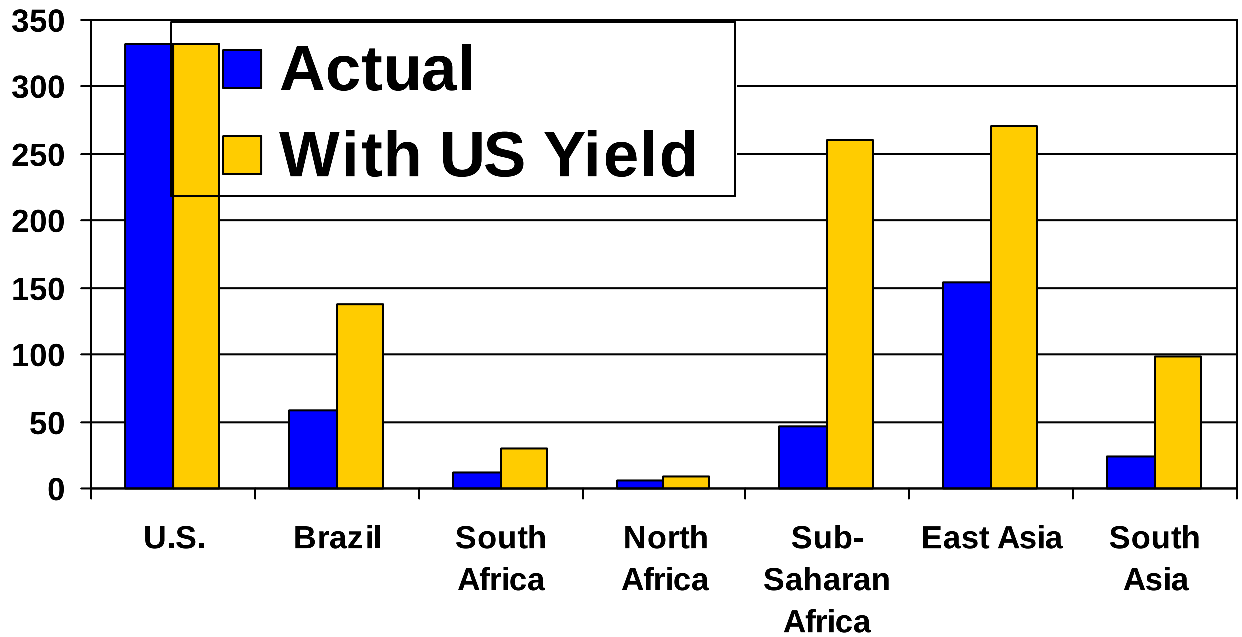
Figure 2: Yield History of NCGA CYC Entries:



Source: NCGA

Worldwide, the opportunities are even larger. Today, the top seven high-yielding countries yield an average of 7.5 MT per hectare. In the 10 largest lower-yielding countries, corn yield only averages 2.8 MT per hectare (Table 1). Raising yields in countries that are producing yields well below the global average could result in additional production of 100 million MT of corn, which is approximately 80% of increased global needs for food and fuel by 2017, according to OECD-FAO (Edgerton).

Table 1: If The World Had United States Yield (MMT)



Source: USDA

NCGA feels strongly that the assumptions made concerning yields are incorrect. As previously mentioned there has been no accounting for increased production in future years. Are there specific reasons for the assumption that yields will not continue to increase after 2006-08 in the model? Using yield data updated only through 2006-08, on analysis up through 2015 assumes a stasis of growth, it is analogous to assuming that we will all use the same computer and same technology in 2015 as we currently use. Because of the lack of forward vision in anticipating the contribution of further productivity, we are concerned that the method upon which the external adjustment is based is logically flawed and does not go far enough in considering observed yield increases and projected improvements.

IV. 3. h.

With regard to the so-called “Food versus Fuel” debate, there is a growing narrative that demonstrates ethanol is not principally responsible for higher food prices despite what critics have led consumers to believe during the past 12 to 18 months. On April 8th, 2009 the Congressional Budget Office released a report, "The Impact of Ethanol Use on Food Prices and Greenhouse-Gas Emissions," which found that increased use of ethanol accounted for less than one percent of the total 5.1 percent increase, representing only 10 to 15 percent of the total increase in food prices, between April 2007 and April 2008. This is contrasted by the effect of higher energy costs on food prices, which represents approximately 36 percent of the overall food price increase. Indeed, while energy costs have since been reduced significantly, food prices remain static at the inflated price point set to offset the earlier higher input costs of energy.

Volume One of the Staff Report goes on to say that "(t)he demand for biofuel feedstocks may, however, be overwhelming a food supply system that was already overextended by weather-induced production shortfalls and surging demand from a worldwide population that is both increasing in size and affluence" (IV-43). The report assumes that an increase in demand contributes to an increase in prices and a decrease in supply. However, there is no discussion of these market forces supplying an incentive for increased ingenuity, new techniques, or increased efficiency and production. The increased demand for corn used in ethanol production provides incentives for commercial seed corn companies and other industry participants to invest in additional research for the development of new technologies. Furthermore, corn producers have been and will continue to develop new technology to achieve higher yields in response to market demand. As long as incentives remain in place, yields will continue to increase.

Increased supply in the marketplace supports a decrease in price. The agriculture sector and various other sectors in the world economy continue to go through cycles in which increased demand spurs increased productivity and efficiency.

Because ARB's modeled assumptions do not include an increase in yield past 2006-08, the report assumes that the LCFS will "…potentially lead to food shortages, increasing food price volatility, and inability of the world's poorest people to purchase adequate quantities of food" (IV-41). Based on the facts presented, this hypothesis is incorrect. It is simply negligent to omit any mention or analysis of increasing yields. This demonstrates that ARB staff is either outcome biased or has failed to accurately review available data.

Efficiency/Sustainability:

NCGA would also like to take this opportunity to comment on the environmental aspects of the report. The nation's corn farmers are committed to meeting the growing demands of food, feed and fuel in a sustainable and environmentally responsible manner, by focusing on these specific, critical outcomes:

1. Increasing agricultural productivity to meet future nutritional needs while decreasing impacts on the environment, including water, soil, habitat, air quality,climate emissions, and land use;
2. Improving human health through access to safe, nutritious food; and
3. Improving the social and economic well-being of agricultural communities.

As a result of this commitment, corn producers have made many environmental and productivity advancements.

IV.3.h.
The report notes that: "More intensely managing land to improve yields may also exacerbate water quality problems: soil erosion along with fertilizer and pesticide runoff can increase as crop management intensifies (68, 69). Bringing non-agricultural lands into production can also increase erosion and runoff." The report also notes that "Conservation Reserve Program (CRP) lands are of special concern: the CRP was created, in part, to protect environmentally sensitive or highly erodible acreage."

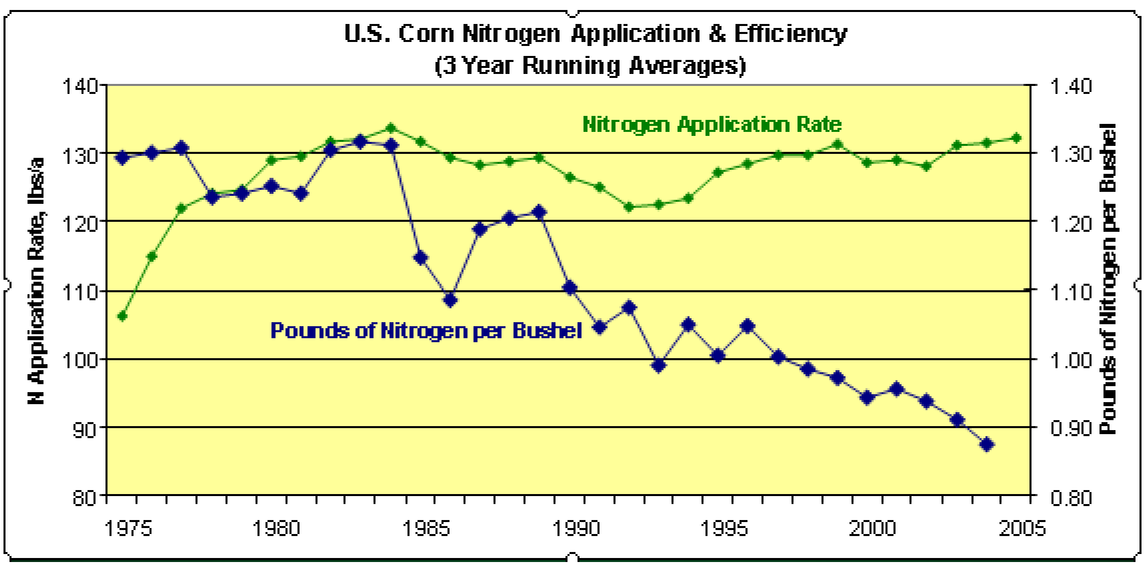
In 2008, corn growers produced enough corn to meet the demand for over 9BGY of ethanol in addition to meeting all other demands for corn. It is important to note that less than 2 million acres out of the over 38 million acres of CRP were shifted back to crop production. With the yield increases discussed above and additional technological advances, more than enough corn will be produced to meet food, feed, and fuel needs. Therefore, there are very few concerns resulting from CRP acres in the U.S. being utilized for biofuel feedstock production and producing ILUC.

Furthermore, according to the Field to Market Keystone Alliance for Sustainable Agriculture, soil loss over the past 20 years has been significantly reduced in all regions of the U.S., with a 43 percent decrease in tons lost per acre,.

Nutrient Efficiency
It is vitally important to note that corn production is becoming increasingly more efficient. Today, through technological advances America's corn growers have the ability to apply fewer inputs to produce larger crops on the same land. Currently it takes about 40 percent less land to grow a bushel of corn than in 1987, and energy used to produce a bushel of corn has fallen by an average of 50 percent. According to Keystone Center's "Field to Market" Report released in January 2009, the production of corn in the U.S. has made significant measurable improvements in reducing energy, water, land use and carbon emissions. U.S. farming practices are advancing and will continue to advance in terms of sustainability and productivity. However, the CA-GREET model requires that as yield increases, crop inputs also increase by a similar ratio. Since the early 1980's, farmers have continued to increase corn yields while maintaining a stable

application of nitrogen, with regard to pounds per acre. In fact, as previously mentioned, the amount of nitrogen required to produce a bushel of corn has decreased from approximately 1.3 pounds per bushel in the mid 1980's to approximately 0.9 pounds per bushel today (Figure 3). Plant breeding, genetics, and biotechnology are largely responsible for this 30% increase in nitrogen efficiency. Counting only the nitrogen efficiency improvements to date, today's corn farmer uses more than 1 million BTUs less than it took to produce an acre of corn in 1985 (Borgman). What carbon impact does a vast increase in efficiency provide, and how is it reflected in the model? As noted, improvements and technical advancements will continue. In addition, continued advancements in the use of DNA sampling in seed production and mapping the corn genome promises another step function increase in nitrogen efficiency over the next 3-5 years and an even greater decrease in BTUs consumed per acre. As molecular breeding technology is combined with transgenic advancements, seeds will be produced that will withstand more and more environmental stress while increasing yields beyond today's trend line projections.

Figure 3: U.S. Nitrogen Application and Efficiency



Source: USDA

In addition to nitrogen efficiency, private-sector companies and several universities have developed corn varieties that have exhibited significant improvements in water efficiency. Therefore, occasional drought conditions and other weather variability in today's Corn Belt will have significantly less impact on yields than in the past. In addition, areas with much lower historical yields due to limited rainfall and lower soil water holding capacity will see substantial increases in yield potential.

Nitrous oxide (N2O) is a greenhouse gas that is estimated to have 300 times more global warming potential on a per unit basis than CO2. Research has shown that N2O emissions are lower when nitrogen fertilizer application rates are not in excess of amounts needed to achieve optimal yields. The Intergovernmental Panel on Climate Change (IPPC) calculates direct N2O emissions as 1.25 percent of total nitrogen fertilizer applied, and is currently used as a standard by many universities and industry researchers. The GREET life cycle greenhouse gas emissions model from Argonne National Laboratory uses 2.0 percent. Actual in-field multiple year data from multiple cropping systems shows results in-line with an estimated global average of 0.9% (Adviento-Borbe).

The EPA has recently released their annual report on national greenhouse gas emissions, which concludes that although agricultural soils contribute to N2O emissions, "this source ha(s) not shown any long-term trend, as they are highly sensitive to the amount of N applied to soils, which has not changed significantly over the time-period, and to weather patterns and crop type" (EPA).

Similarly, ethanol production continues to make sustainability and efficiency advances, including the following:

1. Ethanol yield per bushel of corn has increased over the last five years by 6.4% for dry mills and 2.4% for wet mills.
2. Total energy use (fossil and electricity) has decreased by 21.8% in dry mills and 7.2% in wet mills since a 2001 survey.
3. Water consumption in dry mills has decreased 26.6% since a 2001 survey.
4. Finally, direct effect GHG emissions were estimated to be equivalent to a 48% to 59% reduction compared to gasoline

Land Use Change

Global demands for feed, fuel, and food can be met without the commitment of large new land areas or the transition of other crops to new production by continuing to develop new technologies and deploying them on a global basis (Edgerton). NCGA disagrees with CARB's assessment that a shift in corn usage to generate 15 billion gallons of ethanol will cause such a significant shift in worldwide land use that it renders ethanol nearly carbon neutral to CARBOB. NCGA shares the consensus among the agriculture and ethanol industries as well as several in academia, that the modeling used by the ARB has not been sufficiently validated scientifically. We recognize that shifts in markets for corn will have effects domestically and internationally, but the true impact of those shifts are not understood to the point of making science based policy decisions, as exemplified by the recent EU decision to allow further research in the area prior to making policy on the effects of land use change (European Parliament legislative resolution of December 17, 2008 on the proposal for a directive of the European Parliament and of the

Council on the promotion of the use of energy from renewable sources, available at: http://www.europarl.europa.eu/sides/getDoc.do?pubRef=*IIEP/ITEXT*+TA+P6-TA-2008-0609+0+DOC+XML+VOIIEN&language=EN)

Over the past 2 crop years, corn acres have decreased, and productivity continues to increase. To claim that the increase in corn demand (some 2 billion bushels) during the last 4 years is the primary driver in land conversion is overstated. Land use change is a function of greater economic variables such as population growth, increased wealth of developing nations and energy commodity prices, specifically oil. To account for land use change in biofuels independent of the affects oil price and world food consumption practices have on land use is negligent. Likewise, in the ARB's analysis that indirect land use change totaling 9.6 million acres (IV.3.a.) over a 13.5 billion gallon increase in corn ethanol production is founded in the GTAP model and valued in assumptions made in the 2008 publication by T. Searchinger, et. al. that have been put into question by the scientific community.

IV,C:
The ARB central argument is: "When farmland devoted to food and feed production is diverted to the production of that biofuel crop, supplies of the displaced food and feed crops are reduced. Supply reductions cause prices to rise, which, in turn, stimulates increased production. If that production takes place on land formerly in non-agricultural uses, a land use change impact results."

This is restated in IV,C,1: "Increasing worldwide demand for biofuels will stimulate a corresponding increase in the price and demand for the crops used to produce those fuels."

NCGA disagrees with this statement based upon the EPA determination in Texas' request for a waiver from the Renewable Fuel Standard (RFS) requirements, wherein the price of corn was not significantly affected by the ethanol production and a reduction of the RFS was not granted.

Also, within this section the ARB claims: "Not all biofuels have been linked to indirect land use change impacts.…Feedstocks such as native grasses grown on land that is not suitable for agricultural production are unlikely to cause land use change impacts."

NCGA sees this as a misguided assumption based upon the thinking that land not suitable for agricultural production is not somehow contributing in some meaningful way to the agricultural economy. Many of the lands considered for significant energy grass cultivation are in use as pasture land, and are vitally important to the hay and livestock industries. If the ARB is to remain consistent in its analysis of shifting land use, displacement of pasture land should be considered in an indirect land use test.

IV. 3. g.

The staff report notes "(t)he GTAP brings new land into agricultural production from forest and grassland areas. It isn't specific about exactly where that land will come from. Some could come from the Conservation Reserve Program (CRP)….If sufficient CRP land is not available to indirectly support an expansion of corn acreage, a large supply of non-CRP pasture land that was formerly in crops could be brought back into production. It is the availability of this non-CRP former crop land that is behind the GTAP's projection that about 40 percent of the land converted worldwide in response to the increased demand for corn ethanol biofuel will occur in the U.S."

The staff report goes on to state "(t)he GTAP modelers assumed that no CRP land would be converted in response to increased biofuel demand. Although some CRP land has been released for cultivation, an abundance of previously farmed pastureland is also available. These pasture lands are generally more productive than the lands released from the CRP system. Before it becomes economical to convert the least productive domestic land areas, land use change tended to shift overseas."

In addition to omitting CRP land, the GTAP model also does not include idle land and cropland pasture. These land sources are significant. Purdue estimates there are 14.7 mha of idle land and 22.7 mha of cropland pasture. Together, this is more than twice as much land as is in the current CRP (about 14.9 mha). Perhaps not all of these lands would support crops, but a significant portion of them probably would. If GTAP were to include CRP, idle land, and cropland pasture, there would have to be an elasticity of land transformation assigned to the land in GTAP (as assumed for pasture and forest), and the model would convert some CRP land to crops, along with pasture and forest. But the key factor here is the net change would be less conversion of forest with the CRP land added in (in the U.S.) than without. And since forest conversion drives the corn LUCs, less forest means a lower LUC.

There also seems to be a lack of consistency in the LUC evaluation. As a part of its assessment of cellulosic land use impacts, Purdue examined these land sources as possible land for cellulosic feedstocks. <u>Therefore, are CRP, idle land, and cropland pasture land sources available for use by cellulosic feedstocks in the model, but not available for corn-based ethanol in the LUC assessment?</u>

IV,C,2,a:

The ARB determined that the GTAP model is the most suitable model to measure indirect land use, yet fully admits that the model is only "relatively mature" and was originally developed to model "international economic effects." This model was then "extended" for evaluation of land use modeling. NCGA strongly disagrees with utilizing an economic based model that has not been scientifically validated for accuracy in a new application as a basis for land use change regulatory impacts.

GTAP is a static model, and does not include a time element. To simulate ethanol expansion called for in the Renewable Fuels Standard (RFS), the model is “shocked” for a 13.25 billion gallon increase, to simulate the increase in ethanol production between 2001 and 2015. Certainly, the RFS does not occur “all at once in a given year,” as modeled by CARB staff. Modeling the RFS (or any other form of generally increasing demand for ethanol) requires a dynamic approach, including an analysis of changing independent variables and their interaction over time.

In contrast to the above land use modeling from 2000/2001 to 2015/2016, corn yield increases, as discussed above, stop increasing at 2006-08.

IV,C,2,b:
The ARB identifies the baseline year for inputs into the GTAP model as 2001. While this may be the most recent data available, this data is not reflective of current conditions. World population alone has increased over a half a billion people since 2001, and the world has experienced dramatic economic volatility during that time. Without a model and data that can sufficiently track and understand world land use over a significant time frame before biofuel adoption and compare that land use patterns after biofuel adoption, land use impacts cannot be determined and validated.

Likewise, the GTAP model is limited and inaccurate in several functions - mainly in the area of crop yield estimates, as previously noted. Without accurate yield inputs, one of the basic foundations of any agricultural model, validity of results should be called into question. What are the impacts on the land use changes if yields are significantly higher, as indicated by actual yield data and recent USDA projections?

Additionally, to apply indirect effects such as land use change to only one segment of liquid transportation fuels is inequitable,and represents an agenda, which taints much of the other analysis as well.

Dried Distillers Grains with Solubles (DDGS)
Domestic use of DDGS has expanded rapidly with ethanol production capacity because co-products are an excellent supplement or replacement as the base feed for many animals. Further, DDGS exports to a number of countries have expanded rapidly as well. Appendix C11 of the Staff Report notes there are “significant barriers” to the use of DDGS. If this was true, there would be enormous excess supplies of co-products accumulating as ethanol production has increased. This has not happened.

ARB currently assumes that 1 lb of DDGS replaces 1 lb of corn only in livestock and poultry feed rations. This results in a 33% land use credit for corn ethanol. At this level, it has a very significant land use impact. However, there is ample evidence to suggest the land use credit of feed co-products may be greater than 33%. The latest research from Argonne National Laboratory shows that 1 lb of DDGS from an ethanol plant replaces 1.28 lbs of base feed for beef, dairy cattle, and swine, which consists of both corn and soy meal. Thus, we have raw corn going into an ethanol plant, and a higher-quality processed animal feed *and* ethanol coming out of the plant. These differences in DG feed replacement have a very significant effect on the land use credit for corn ethanol.

Summary

In closing, no state or federal regulation has ever assessed penalties against a specific product because of that product's predicted indirect economic or environmental effects because of lack of consensus on methods to analyze indirect effects. Several different stakeholder groups, including the 111 scientists who submitted a letter to your office on March 2nd, recommended that ARB adopt an LCFS regulation based on direct carbon effects, or those emissions directly attributable to the production and use of the particular fuel, while taking the lead on the further assessment of the indirect carbon effects of all fuels. It is our strong feeling that a regulation based on direct effects will be balanced and represents the "level playing field" your office envisioned at conception of the program. Although it is an admirable task that the State of California is undertaking, we request that only sound, scientific and updated, peer-reviewed data be used in adoption of any regulations.

America's corn growers are eager to play a central role in the decarbonization of transportation fuel. However, if adopted as currently proposed, the LCFS will uniformly dissuade the production and use of all forms of biofuels that utilize land and undercut what is a tremendous opportunity to spur economic growth in agricultural communities and reduce carbon emissions with American farming.

Thank you for your time and consideration in this matter of mutual interest. Again, NCGA thanks ARB for the opportunity to provide the above comments on behalf of more than 35,000 individual corn growers, 48 affiliated state-level organizations, and hundreds of thousands of growers corn producers who participate in our programs.

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