Renewable Fuels Association

Committee on Agriculture
United States House of Representatives

Hearing on
Low Carbon Fuel Standard Proposals

Testimony of

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Good morning Chairman Peterson and Ranking Member Lucas. My name is Bob Dinneen and I am president and CEO of the Renewable Fuels Association (RFA), the national trade association representing the U.S. ethanol industry. The RFA promotes policies, regulations, and research and development initiatives that increase the production and use of fuel ethanol from all feedstocks. The RFA membership includes a broad cross-section of ethanol producers and suppliers, ranging from early-stage cellulosic and advanced ethanol producers to larger scale grain ethanol producers, as well as other businesses, individuals and organizations dedicated to the expansion of the U.S. ethanol industry.

This is an important and timely hearing, and I am pleased to be here to discuss our industry's perspective on low carbon fuels policies.

The Renewable Fuels Standard (RFS) was first established by the Energy Policy Act of 2005. The passage of this bill was an important step towards this country's energy independence, as well as providing economic and environmental benefits. By expanding the RFS ("RFS2"), the Energy Independence and Security Act of 2007 (EISA) capitalizes on the substantial benefits that renewable fuels offer to reduce foreign oil dependence and greenhouse gas emissions, and to provide meaningful economic opportunity across this country.

Background

Ethanol has become an essential component of the U.S. motor fuel market. Today, ethanol is blended in more than 70 percent of the nation's fuel, and is sold virtually from coast to coast and border to border. In 2008, approximately 180 biorefineries in 26 states produced 9.25 billion gallons of ethanol, displacing the need for 320 million barrels of oil. Today, another 18 facilities are under construction, while nearly half a dozen existing facilities are expanding. When these projects are complete, the industry will have the capacity to produce more than 14 billion gallons of renewable ethanol. Last year, the U.S. renewable fuels industry's operating capacity increased by 2.7 billion gallons, a 34 percent increase over 2007. This growth in production capacity was fueled by the completion, start-up, and operation of 31 new ethanol plants that will ensure that the industry is capable of filling the Federal requirements for ethanol use outlined in the RFS.

The U.S. ethanol industry continues to have a positive impact on our nation's economy. U.S. ethanol producers have long been on the cutting edge of the green economy. According to a report prepared for the RFA[1], spending by the U.S. ethanol industry in 2008:

- Contributed $65.6 billion to the nation's Gross Domestic Product (GDP);
- Supported more than 494,000 jobs in all sectors of the economy; and,
- Generated an estimated $11.9 billion in tax revenue for the federal government and nearly $9 billion of additional tax revenue for state and local governments.

Further, the report notes that the net benefit to the Federal government, after ethanol related tax credits, was more than $7 billion in 2008, providing a return on every dollar invested of 2.5 to 1.

Under the RFS in 2022, 35 of the 36 billion gallons of renewable fuels will be ethanol. Producing 35 billion gallons of ethanol will, according to the report:

- Add nearly $1.23 trillion (2000$) to real GDP by 2022;
- Support as many as 1.18 million jobs in all sectors of the economy;
- Displace the equivalent of nearly 11 billion barrels of crude oil between 2009 and 2022; and,
- Increase federal tax revenues by nearly $223 billion (2000$) between 2009 and 2022 while state and local tax revenues will increase $167.2 billion (2000$).

Technology and Innovation in Biofuel Production

As it has since its beginnings in the late 1970s, the U.S. ethanol industry continues to evolve. There is no question that corn has been the cornerstone of the industry, but as we speak, dozens of our member companies and scores of other innovative businesses across the country are working to commercialize the next generation of biofuels, including ethanol from cellulosic and other biomass feedstocks. The RFA member companies are building upon the solid foundation laid by the first generation of biofuels.

From coast to coast and border to border, RFA member companies are building upon the solid foundation laid by the first generation of biofuels. Pacific Ethanol, a California-based company, and Zeachem are developing technologies to process fast-growing poplar trees to ethanol in Boardman, Oregon; AE Biofuels will use switchgrass at its facility in Montana; Verenium will use sugarcane bagasse and specially-bred energy cane to produce biofuels in Louisiana and Florida; California Ethanol + Power, LLC, will use bagasse to power its sugar cane-to-ethanol plant in Brawley, California; Range Fuels will use wood residues as feedstock for its commercial-scale plant under construction in Georgia; Blue Fire Ethanol plans to use wood waste and cellulosic urban waste at two prospective sites in California; and Iogen and Abengoa will process agricultural residues like wheat straw at facilities under development in

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[1] *Contribution of the Ethanol Industry to the Economy of the United States*, Dr. John Urbanchuk, Director, LECG, LLC. Prepared for the RFA. February 23, 2009.

Idaho and Nebraska. These are just some examples of RFA member companies that are actively engaged in the rapid development and commercialization of the next iteration of feedstocks and biofuels.

Without a doubt, the commercial success of the second generation of biofuels will be contingent upon the continued success of first generation biofuels. Over the past 30 years, the first-generation ethanol industry has established robust transportation and storage infrastructure; cultivated an investment base and created financial networks; advocated policies that create market certainty; and, more generally, raised the nation's collective experience level related to introducing renewable fuels into a market dominated by fossil fuels.

It is important to understand that cellulosic ethanol and other advanced biofuels are no longer "just around the corner" or "just over the horizon" — they are here today. Several pilot and demonstration-scale facilities are producing ethanol from cellulosic sources and waste products today. And nearly 30 cellulosic ethanol facilities — both pilot and commercial scale — are under construction or in various stages of development. The RFA's members have an intimate understanding of what is necessary to make advanced biofuel a commercial success.

While second-generation biofuels producers continue to make significant strides toward broad commercialization, innovation also continues in the existing grain-based industry. Producers of first-generation ethanol continue to make dramatic improvements in the energy efficiency and overall sustainability of the production process. A recent report by the U.S. Department of Energy's Argonne National Laboratory demonstrated how much more efficient today's ethanol plants are than even a few years ago. Since 2001, average electricity use is down 20 percent, average total energy use is down 15 percent, and water use is down 26 percent.[2] Such improvements have led to a significant reduction in the greenhouse gas (GHG) intensity of producing ethanol from grain. In fact, a recent paper published in Yale University's Journal of Industrial Ecology found that, "Direct effect GHG emissions were estimated to be equivalent to a 48 percent to 59 percent reduction compared to gasoline, a twofold to threefold greater reduction than reported in previous studies."[3]

These improvements will continue as new technologies are introduced and the industry continues to evolve. A recent paper published in the journal *Energy Policy* states, "For the future, it is estimated that solely due to technological learning, production costs of ethanol may decline 28–44 percent."[4] The article further states, "Future improvements in energy efficiency may lead to lower costs, but also to lower GHG emissions."

Lifecycle Analysis and Low Carbon Fuels Programs

As the U.S. ethanol industry continues to evolve, new technologies, improved efficiencies, and an increasingly low carbon footprint will ensure ethanol takes its place as a critical component of our nation's strategy for a more sustainable energy future. Ethanol is readily available today and is a logical first step in beginning the difficult work of addressing global climate change. As a renewable fuel,

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[2] M. Wu, Argonne National Laboratory. "Analysis of the Efficiency of the U.S. Ethanol Industry 2007." http://www.ethanolrfa.org/objects/documents//2007_analysis_of_the_efficiency_of_the_us_ethanol_industry.pdf

[3] A. Liska et al. "Improvements in Life Cycle Energy Efficiency & Greenhouse Gas Emissions of Corn-Ethanol." *Journal of Industrial Ecology* Available online 22 January 2009. http://www.ethanolrfa.org/objects/documents/2110/2009_jie_improvements_in_corn_ethanol-liska_et_at.pdf

[4] W. Hettinga et al. "Understanding the reductions in U.S. corn ethanol production costs: An experience curve approach." *Energy Policy*. Available online 30 September 2008.

greater ethanol use will help reduce carbon dioxide emissions from our nation's transportation fleet and start to move America away from its dependence on fossil fuels.

But Americans will only enjoy the future benefits of biofuels if developing energy and environmental policies are based on sound science, defensible modeling, rigorous validation, and meaningful peer review. We are greatly concerned that several emerging state and Federal regulations aimed at reducing carbon emissions don't meet these criteria. Accurate and consistent quantification of the greenhouse gas emissions associated with the production and use of all fuels is the cornerstone of any policy focused on reducing carbon emissions from transportation fuels; this quantification process is known as lifecycle analysis. Unfortunately, the lifecycle analyses for several evolving policies selectively assess tremendously uncertain penalties against biofuels for secondary, indirect greenhouse gas effects, while other forms of energy — including petroleum — are assumed not to cause any similar market-mediated, indirect effects at all.

More specifically, the U.S. Environmental Protection Agency's (EPA) lifecycle analysis of biofuels for the RFS2 Notice of Proposed Rulemaking penalizes ethanol for highly tenuous indirect greenhouse gas effects assumed to occur as a result of indirect land use changes in other countries. The Low Carbon Fuels Standard recently adopted by the California Air Resources Board (CARB) also includes a penalty against biofuels for international indirect land use change. The assessment of these penalties for an indirect carbon effect that is largely unpredictable results in the lifecycle GHG emissions of most forms of ethanol being comparable to emissions from gasoline. This seems totally unbelievable, given that a number of peer-reviewed studies over the past five years have shown that current ethanol reduces GHGs by 30-50 percent compared to gasoline, and ethanol from cellulosic feedstocks is likely to reduce GHGs by 80-100 percent. In California's case, the indirect land use penalty is such that U.S. ethanol made from corn is unlikely to be used by obligated parties — the oil companies — as a viable compliance option under the regulation.

My testimony today addresses three important positions held by the RFA related to low carbon fuels standards and the crucial lifecycle analysis that underlies these policies:

1. **There appears to be a general misunderstanding about the difference between direct and indirect, market-mediated effects and the pervasiveness of secondary impacts in energy markets.**

Every energy decision we make has secondary, market-mediated effects. Indirect land use change is just one of an infinite number of market-mediated, ripple impacts that occur as the result of a change in the energy marketplace.

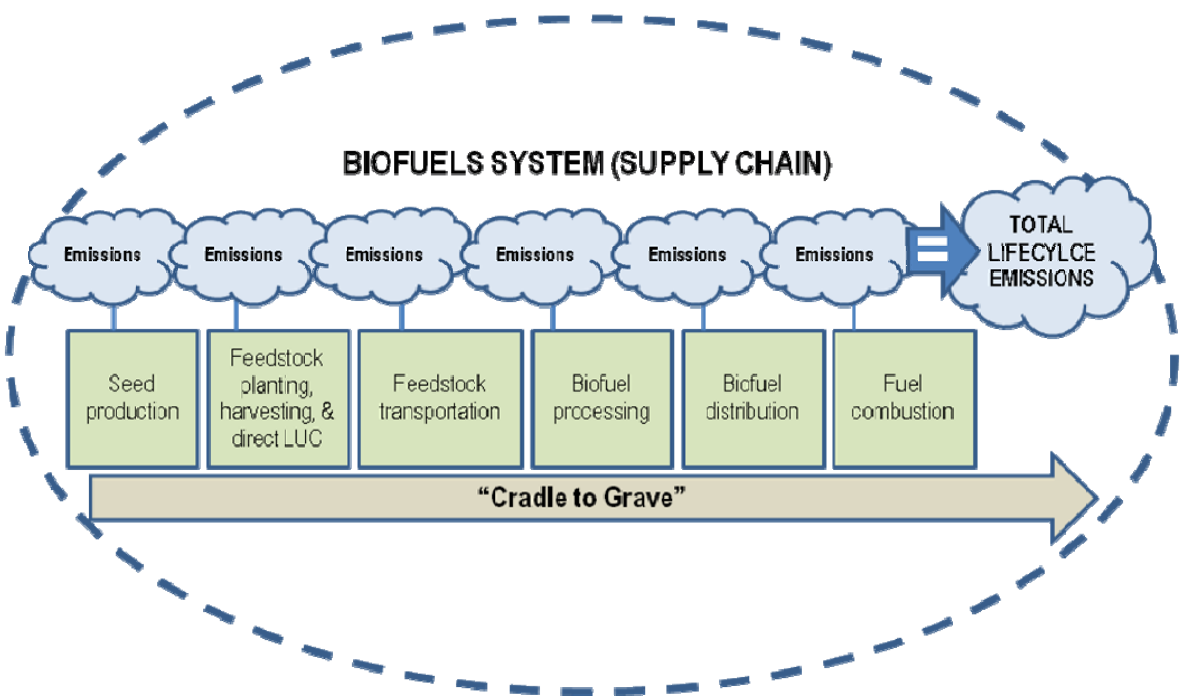
Here is an example to illustrate my point. Suppose for a moment that, as a result of higher gas prices, I decide to start bicycling to work rather than driving my car. The direct impact of this decision would be to eliminate the daily GHG emissions associated with driving my automobile to work. But there would also be numerous indirect impacts of this decision — some of which would likely be unknowable and immeasurable. For instance, because I am not buying nearly as much gasoline now, I am saving money. And I may decide to use the money I have saved to take a trip to Europe or to treat my family to a steak dinner. Does this mean the GHG emissions associated with my European vacation or the emissions linked to production of the steak dinner should be charged to my bicycle? As ridiculous as that sounds, this is an example of the type of logic being used to ascribe indirect emissions in the lifecycle analyses conducted for the RFS2 and other regulations aimed at reducing carbon emissions from transportation.

Let me be clear, we are not arguing that these indirect effects do not occur. As I discussed earlier, we agree that every energy decision we make, both as a nation and as individuals, carries with it a multitude of secondary impacts. Rather, we are highlighting the difficulties associated with positively identifying the cause of a second- or third-tier impact and raising questions about how to properly assign those ripple impacts.

The question of indirect effects takes on a new level of complexity when applied to global land use change. As the term implies, a direct land use change is a conversion of land that is directly attributable to the production of a biofuel feedstock. Existing lifecycle analysis models, such as the U.S. Department of Energy's GREET model, do indeed account for emissions from direct land use change along with other emissions directly related to the biofuel supply chain. Accounting of direct land use changes is straightforward and data-driven. To be clear, there is no debate over whether emissions from direct land use change should be included in biofuels lifecycle analysis.

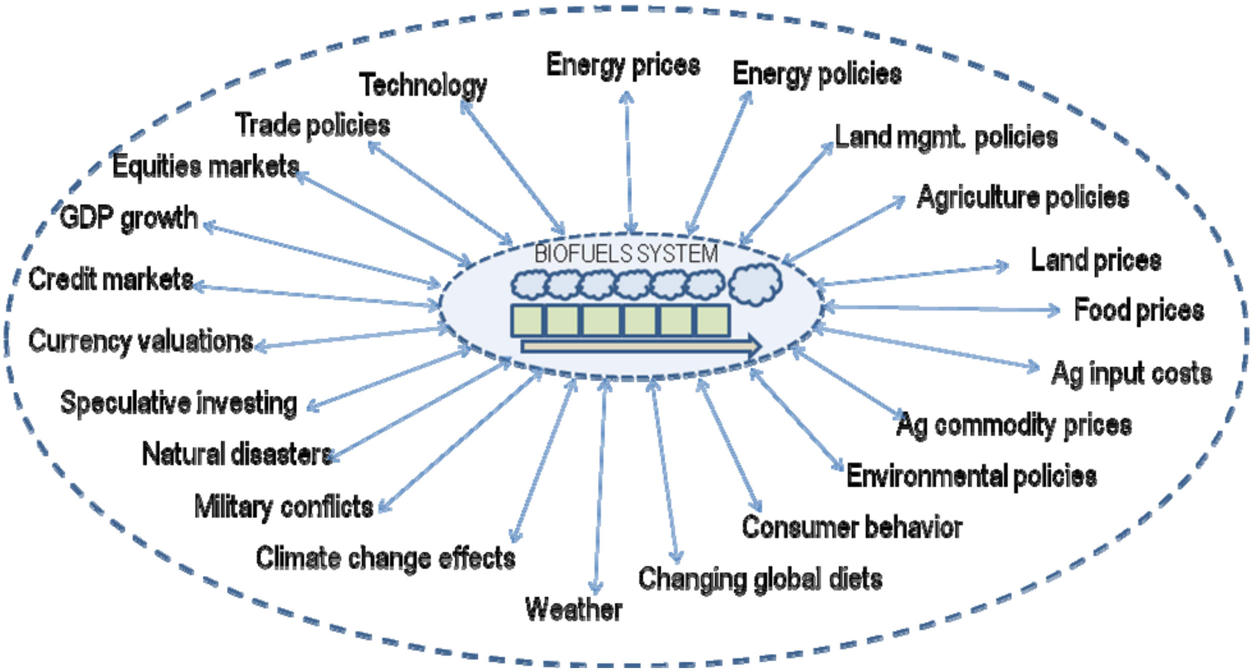
Indirect land use changes, on the other hand, are those that purportedly occur in the global marketplace as a result of shifting economic, social, or political behaviors. Specifically, the notion of indirect land use change in the context of biofuels lifecycle analysis suggests that if a farmer in the United States reacts to signals from the marketplace and plants corn on land that might have otherwise grown soybeans, the lost soybean production must be made up somewhere else in the world. But in the real world, things are not nearly that simple. Accurately assigning cause for land conversion and quantifying indirect land use changes in the real world is a virtual impossibility. Further, there is no empirical data or proven methodology that can positively link land conversions halfway around the world with a farmer's decision here in the United States.

BOUNDARIES FOR DIRECT LIFECYCLE GHG ANALYSIS USING GREET MODEL



BOUNDARIES INCLUDING SUPPLY CHAIN EXTERNALITIES

These external factors "push" and "pull" on the system (direct supply chain) *and each other*.
"Indirect effects" are interactions between (and among) the direct supply chain & external factors.



U.S. biofuels are being penalized for market-induced behaviors around the globe over which our industry exercises absolutely no control. Further, U.S. biofuels, as a class of products, are being held responsible for the carbon footprint of a distinctly separate and disconnected class of products. Take, for example, the a scenario where a new acre of soybeans was planted in the Brazilian savannah theoretically in response to a reduction of soybean acres and increase in corn acres in the United States (ignore, for a moment, the fact that U.S. corn acres are declining for the second straight year and soy acres are projected to achieve a new record in 2009). Then assume that those soybeans grown in Brazil are processed into animal feed and used to produce pork that ends up on someone's dinner plate in China. According to the indirect land use change theory adopted by the EPA, U.S. corn ethanol would be responsible for the carbon footprint of that plate of moo shu pork being consumed in China.

While predicting international indirect land use changes is highly tenuous and driven by assumptions, there are *domestically occurring* indirect greenhouse gas effects that may be easier to identify and quantify. For example, domestic indirect land use change may be estimated with a much higher degree of certainty than indirect land use changes occurring internationally. Increased grain demand as a result of the RFS2 could plausibly lead to indirect changes in the U.S. crop mix. These changes to the crop mix could potentially lead to GHG emissions from land conversion, but it is expected that these indirect land conversions would be minimal, if they occur at all. For example, if a farmer in Indiana forgoes his typical corn/soybean rotation in favor of a corn/corn scenario, the demand for that soybean acre may be shifted elsewhere in the U.S. agricultural system (provided that a necessary price signal is sent to a farmer in a different area). As a result, a farmer in Alabama, for instance, may opt to produce soybeans on an acre previously dedicated to a crop for which global demand has cooled, such as cotton, or an acre of idle cropland or pasture. If soybeans are introduced on ground previously dedicated to cotton, there are essentially no emissions from the land conversion. If, instead, the farmer converts idle cropland or pasture, some carbon may be released as a result of the land conversion. Proving with certainty that the Alabama farmer's decision to plant soybeans was the result of the Indiana farmer's decision to plant corn would still be quite difficult, given currently available models, but such a linkage could likely be determined with much more confidence than international indirect land conversions. Indirect changes to the U.S. crop mix can be identified retrospectively through data collected by the National Agricultural Statistics Service (NASS). Further, potential short-term indirect changes to the future domestic crop mix may be anticipated with a relatively high degree of certainty using domestic agricultural models and/or NASS forecasting and survey data on planting intentions.

Indirect emissions effects can also provide "GHG credits" to the ethanol lifecycle. For instance, research by university animal scientists and government labs shows that feeding of distillers grains (the animal feed co-product associated with grain ethanol production) reduces lifecycle methane emissions from beef cattle due to the fact that beef fed distillers grains spend a shorter amount of time on feed.

There are also positive indirect GHG effects affiliated with ethanol's displacement of certain petroleum sources. Ethanol is reducing and delaying the need for gasoline from marginal, high carbon sources of crude oil, such as Canadian tar sands and Venezuelan extra heavy crude. So, while a specific gallon of ethanol may not be directly replacing a gallon of gasoline derived from marginal oil, it is displacing the need for that high carbon gasoline at the margin of the fuels supply. Therefore, the indirect effect in this case is that additional GHG emissions from higher carbon oil sources are avoided. So far, this effect is being overlooked in the EPA's analysis for RFS2, in which a gallon of biofuels is assumed to replace a gallon of 2005 average gasoline or diesel fuel.

These are the types of indirect effects we were expecting the EPA to analyze as a result of the requirement in the EISA to consider indirect greenhouse gas emissions. We were not expecting the EPA to overreach into the realm of international indirect effects, where positively assigning cause to land use changes is beyond both the scope of the policy and the capabilities of current methodologies.

Here is another example to illustrate the dangers of assigning one product's carbon footprint to another distinctly different product. Suppose a factory in New York exclusively produced televisions for the last 30 years, but because of rising labor costs and any number of other factors, the factory stopped producing televisions and started producing toaster ovens using a cost-reducing automated production line. Meanwhile, a new television factory is constructed in Japan, indirectly as a response to the reduction in television output that occurred when the factory in New York switched to toaster ovens. Should the carbon footprint of that new television factory in Japan be attributed in some way to the toaster oven factory in New York that formerly produced televisions? Common sense would tell us that the new factory in Japan should be accountable for its own carbon emissions. The same should be true for agriculture — the farmer who converts the land and grows the new crop should be responsible for his own carbon footprint.

The issue of understanding direct and indirect effects is very closely related to the need for consistent boundaries for lifecycle analysis. That is, if indirect effects are analyzed for one type of fuels, they must be thoroughly analyzed for all fuels. For the RFS2 analysis, indirect, market-mediated effects of petroleum were not considered in constructing the baseline against which all renewable fuels are compared. Similarly, the California Low Carbon Fuels Standard lifecycle analysis assumes dramatically increased use of electricity for plug-in vehicles, hydrogen for fuel cell vehicles, and natural gas for compressed natural gas vehicles would not cause any significant market-mediated impacts at all.

It is a basic concept that because oil is deeply imbedded throughout our global marketplace, even a slight change in the energy markets can cause cascading effects throughout the world economy. As an example, changes in the oil market have significant direct and indirect impacts on the agricultural decision-making process world-wide. According to a 2008 paper by Purdue University economists, rising oil prices were the key driver of the boom in ethanol production over the last several years.[5] Thus, the impact of oil prices must be strongly considered in any discussion of ethanol's impact on agricultural commodity prices and the resulting land impacts. According to the Purdue paper, "Essentially, the mechanism is higher crude [price] leads to higher gasoline [price], which leads to higher ethanol [price], which leads to more ethanol production, which increases corn demand, which increases corn price." In fact, the Purdue study attributed 75 percent of the 2007-2008 increase in corn prices to rising crude oil prices.

2. **We believe the EPA's lifecycle greenhouse gas analysis of ethanol is inconsistent with Congress's intent as expressed in the EISA.**

When it passed the RFS2, Congress sought to increase the use of renewable fuels and decrease this country's dependence on petroleum, while simultaneously recognizing biofuel reductions in greenhouse gases compared to petroleum. To promote advanced biofuels and incentivize carbon reducing technologies for producing biofuels (e.g., using natural gas versus coal at the fuel production plant), the EISA requires carbon reductions for these new fuels to count towards the renewable fuel volumes in the Act.

These reductions were based on well-established methods for assessing the direct fuel lifecycle emissions. Congress also included in a late amendment provision for the EPA to take into account indirect effects not caused directly by the fuel production process, including in this provision "significant indirect emissions such as significant emissions from land use changes." Congress also defined the terms "advanced biofuel," "biomass-based diesel," and "cellulosic biofuel," stating that to qualify under these categories, a fuel "*has* lifecycle greenhouse gas emissions" less than specified percentages than the baseline petroleum-based fuel has.

Three aspects of this language are remarkable and important for the EPA to address in its rulemaking: (1) emissions must be related to the "fuel" lifecycle; (2) indirect emissions must be significant and indirect land use change emissions must be significant themselves; and, (3) there must be a credible causal link between the biofuel and the effects caused as shown by the use of the term "has lifecycle greenhouse gas emissions" in the definitions of the terms "advanced biofuel," "biomass-based diesel," and "cellulosic biofuel."

- ***First: Emissions must be related to the "fuel" lifecycle.***

Congress specifically limited such consideration of indirect emissions to those "related to the full *fuel* lifecycle, including all stages of fuel and feedstock production and distribution." Congress' limitation to the "fuel" lifecycle and specific reference to fuel and feedstock production indicate a clear limitation to "fuel effects" and no indication of including the types of speculative effects being considered in the models used for the RFS2 proposal, such as the "food" lifecycle example given above related to pork consumed in China.

This limitation makes sense, of course, because Congress was establishing a policy of promoting and expanding renewable fuels in a responsible way. It would not make sense under such an approach to

[5] Tyner et al. "What's Driving Food Prices?" Farm Foundation Issue Report. July 2008. http://www.farmfoundation.org/news/articlefiles/404-FINAL%20WDFP%20REPORT%207-28-08.pdf

include the types of effects that are being included in the EPA's lifecycle analysis at this time. The EPA's approach to the lifecycle analysis has lost sight of the statutory language and the policy underlying the program by including speculative effects that are in no way part of the fuel lifecycle. In addition to being inaccurate, the approach directly violates the terms of the EISA.

Instead, the EPA should be using the lifecycle analysis to help improve the environmental performance of biofuels consistent with the direction the industry is already taking. Corn ethanol plants built since 2004 have substantially increased their efficiency, resulting in greater reductions of GHG emissions.[6] The importance of these innovations and technological improvements (e.g., thermo-compressors for heat reuse, raw starch hydrolysis, collocating with animal feeding operations) may be lost if uncertain emissions which are also not attributable to the *fuel* lifecycle are included in the analysis. This is particularly true because the causal link between those emissions and the biofuel production is not only more attenuated, but is simply unproven given the numerous other factors that influence land use decisions. In other words, if the biofuel production has little to no influence over such emissions, do those emissions rise to the level of "significance" or are they even "related to the full fuel lifecycle" to warrant inclusion in the analysis?

Fundamentally, the requirement that emissions be related to the fuel lifecycle means that there must be some link to the fuel production process. While the use of the word "full" is expansive, the limitation that the emissions be related to the "*fuel* lifecycle" indicates that more attenuated effects were not contemplated as within the fuel lifecycle. For example, the clearing of lands in other countries for domestic food production, is more appropriately part of the lifecycle of the food product, not part of the lifecycle of *fuel* production and we believe, was not intended by Congress to be swept into the fuel analysis and imposed as a penalty on biofuels.

- ***Second: Indirect emissions must be significant and indirect land use change emissions must be significant themselves.***

Even without the limitation to the fuel lifecycle, a major problem with the EPA's lifecycle approach is that it fails to take into account Congress' use of the term "significant." The EPA has neither defined, nor placed parameters around, how to determine when effects and emission stemming there from are "significant" enough to be included in its analysis. Rather, the EPA conducted the analysis, found that it changes the projected emissions reductions and therefore is "significant" -- for corn ethanol from natural gas plants it reduces the amount of GHG reductions from over 60 percent to 16 percent. In actuality, corn production in the U.S. has not affected the ability to export corn. This is largely due to the continued efficiencies in increasing corn yields and in increasing ethanol production per bushel of corn. Under the EPA's analysis, these important and ongoing efficiencies are rendered meaningless.

- ***Third: There must be a credible causal link between the biofuel and the effects caused as shown by the use of the term "has lifecycle greenhouse gas emissions" in the definitions of the terms "advanced biofuel," "biomass-based diesel," and "cellulosic biofuel."***

While Congress directed the EPA to take into consideration significant indirect effects, including significant land use changes, nothing in the statute indicates that the EPA is to consider calculated effects that are not based on reliable and credible information. As the EPA Administrator Lisa Jackson noted in her statement during her confirmation hearing, the EPA must operate with "scientific integrity" and

[6] Liska, Adam J., Haishun S. Yang, Virgil R. Bremer, Terry J. Klopfenstein, Daniel T. Walters, Galen E. Erickson, and Kenneth G. Cassman. "Improvements in Life Cycle Energy Efficiency and Greenhouse Gas Emissions of Corn-Ethanol." Journal of Industrial Ecology. Vol. 13, Issue 1 (February 2009).

within the "rule of law." Unfortunately, the EPA's use of models to predict international land use change lacks scientific integrity because the Agency compounds the error that exists in any model by using results of one as input for the next, and applying the models to situations for which they were not designed. Indeed, the EPA's result of a single lifecycle number for each pathway is itself an indication of the inaccuracy of its analysis. If anything is clear there is a range of potential outcomes.

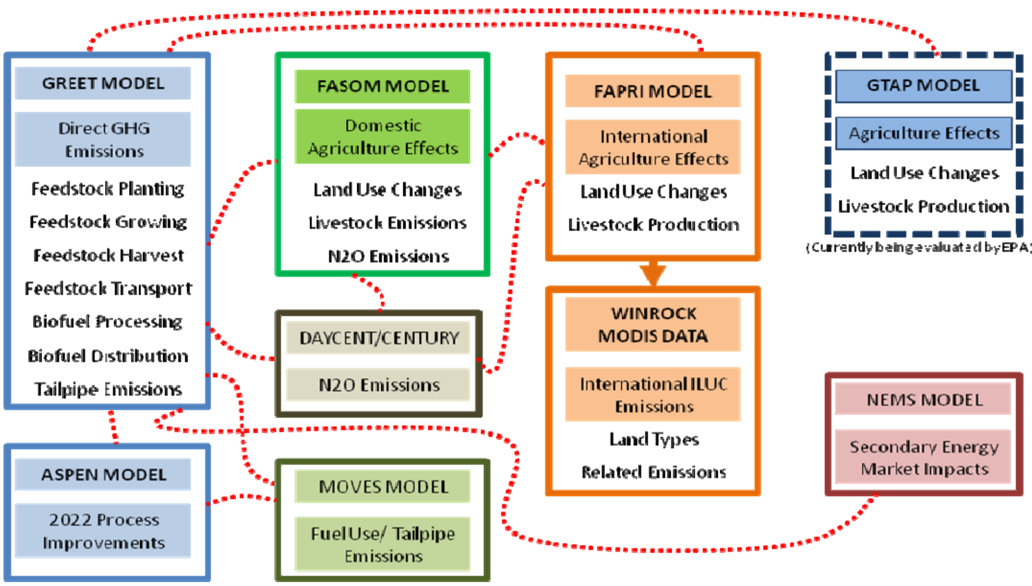
The EPA's justification for its approach is entirely circular. The EPA has used an uncertain methodology to "prove" that indirect international land use emissions are "significant" and then said that because the emissions are "significant," this methodology must be used to estimate them. This type of "Alice in Wonderland" reasoning cannot be applied to validate the use of fundamentally inaccurate models. The EPA cannot rely on an unsystematic methodology to show significance and then turn around and say that because such emissions have now crossed that significant threshold, they must be considered – and the very same methodology used to project them.

The EPA's analysis of international land use changes simply does not comport with the statute's requirements and undermines Congress' intent. The RFA does not dispute that indirect emissions should be considered, but they must be significant and related to biofuel production. There is simply no evidence that biofuel production in the U.S. has significant influence over land use decisions in other countries, and we have deep concerns regarding the EPA's methodology. As Congress debates a broader climate change bill, it should become acutely aware that GHG emissions must be attributed to the appropriate industry so that real reductions can be made. The EPA should not penalize biofuels for emissions over which they have no control.

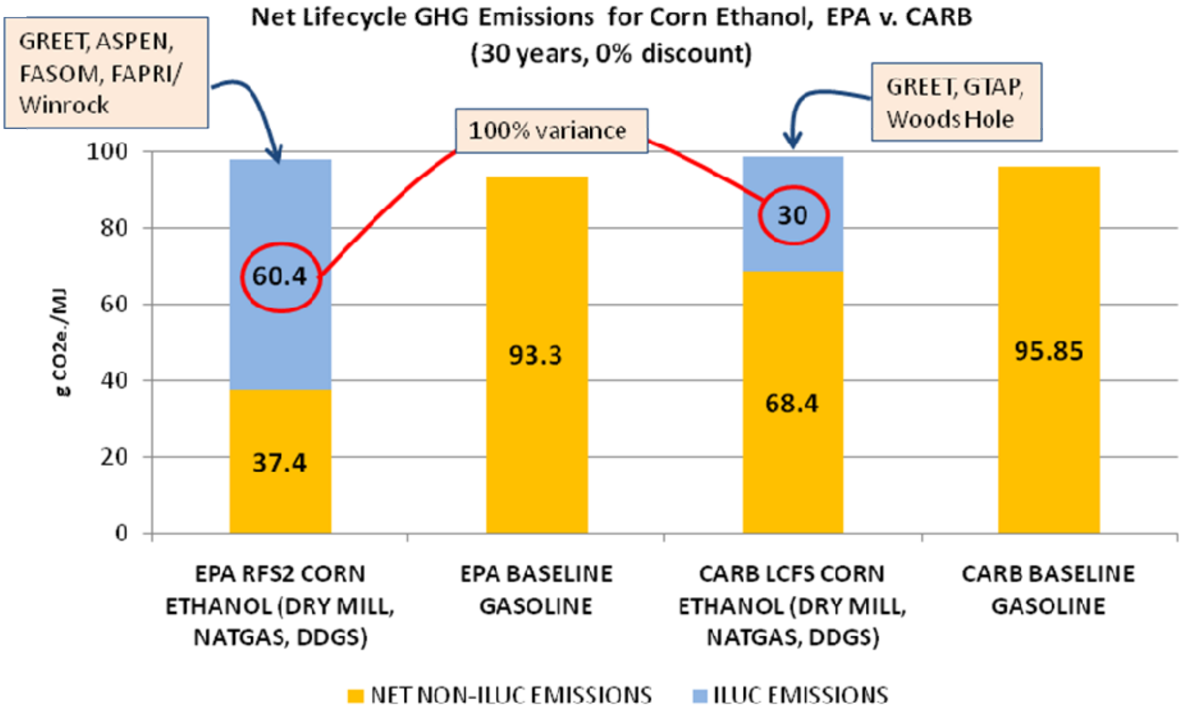
3. The inherent uncertainty and limitations associated with current methodologies used to estimate indirect international land use change render the results highly questionable.

The EPA is using no less than nine separate models and data sets to conduct its biofuels lifecycle analysis, including its evaluation of indirect international land use change. This is because, as the EPA states in the RFS2 Notice of Proposed Rulemaking, "...no single model can capture all of the complex interactions associated with estimating lifecycle GHG emissions for biofuels, taking into account the 'significant indirect emissions such as significant emissions from land use change' required by EISA." Many of these models were not initially designed to conduct this type of analysis, nor were they intended to work together in parallel. While each model has been peer-reviewed individually, the EPA agglomeration of models has not peer-reviewed as arrayed for the RFS2 analysis.

EPA LIFECYCLE ANALYSIS MODELING FRAMEWORK FOR RFS 2



It is important to understand that each model's results have their own inherent uncertainty and, when combined, that uncertainty is not just additive — it is multiplicative. The case could likely be made that the uncertainty of the EPA's lifecycle analysis overwhelms the usefulness of the results. The high degree of uncertainty associated with this type of analysis is clearly demonstrated by a comparison of the EPA's results to the estimates derived by the CARB for California's Low Carbon Fuels Standard. While different modeling approaches were used by the two agencies, the analytical questions being asked were essentially the same. When the results of the two analyses are converted into the same emissions units, we see that the indirect land use change analysis results vary by 100 percent and the estimates for emissions from non-indirect land use change factors vary by 83 percent. How can the results vary that widely when both analyses are essentially being asked to answer the same question?



Unfortunately, we have very little to compare to the results of the EPA's and CARB's land use change analyses for the sake of validation. This is because indirect land use change is a nascent field of study. The entire body of published research on the topic of indirect land use changes and biofuels consists of only a dozen or so papers, most of which have been written in the last two years. Compare that to the body of research available on global climate change, which consists of thousands of scientific papers. One of the few papers available on indirect land use changes and corn ethanol was commissioned by the RFA and conducted by Air Improvement Resource, Inc. The RFA-commissioned paper concluded that "…no new pasture or forest land should be converted in the U.S. or outside the U.S. to meet 15 billion gallons per year of corn ethanol in 2015, and the land use change emissions therefore are likely zero."[7]

While we have very little research to compare to the EPA's results, we can compare modeling outcomes to real-world data through back-casting, calibration and validation. It is not clear if the EPA has conducted this type of back-casting with its amalgamated modeling framework. Many of the assumptions underlying the collective understanding and modeling of the interaction of U.S. biofuels expansion and global land use change – such as the idea that U.S. corn exports will be drastically reduced, or the idea that U.S. soybean production will be dramatically reduced – have not proven to be true.

Further, it is currently impossible to replicate the EPA's indirect land use change analysis or clearly follow how the agency got from "Point A" to "Point B." In the interest of transparency, we believe all of the models and every input used by the EPA should be made available to stakeholders in the exact configuration in which they were used by the agency. This would allow stakeholders to experiment with the models, conduct their own modeling runs and sensitivity cases, and most important, gain a better understanding of how the EPA arrived at its various estimates. According to a March 2009 EPA publication from the Office of the Science Advisor, "To promote the transparency with which decisions

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[7] T. Darlington. "The Land Use Effects of US Corn-based Ethanol." Prepared for the RFA, 24 February 2009. http://www.ethanolrfa.org/objects/documents/2191/land_use_effects_of_us_corn-based_ethanol.pdf

are made, EPA prefers using nonproprietary models when available."[8] However, several elements of the agency's RFS2 analysis rely on proprietary or otherwise unavailable models and data sets.

Further, according to the EPA's own guidance, "When a proprietary model is used, its use should be accompanied by comprehensive, publicly available documentation. This documentation should describe:

- The conceptual model and the theoretical basis for the model;
- The techniques and procedures used to verify that the proprietary model is free from numerical problems or "bugs" and that it truly represents the conceptual model;
- The process used to evaluate the model and the basis for concluding that the model and its analytical results are of a quality sufficient to serve as the basis for a decision; and,
- To the extent practicable, access to input and output data such that third parties can replicate the model results."

Unfortunately, the information currently available regarding the lifecycle analysis conducted for RFS2 does not meet these standards.

We fully recognize that the statute requires the EPA to consider significant indirect emissions such as those believed to occur as a result of international indirect land use change. But the tremendous uncertainty and inherent lack of transparency associated with analysis of international indirect land use changes makes it extremely difficult for regulators to legitimately use these results to assign penalties for international indirect effects to the carbon score of various biofuels. Rather, these models and results should be used to inform and guide public policy more holistically. As articulated recently by Jan Rotmans, one of the founding fathers of integrated assessment and an expert in the field of integrated modeling and scenario analysis, "Models should be seen as learning tools, not truth machines."[9]

We think it is important to recognize that due to the highly uncertain nature of indirect land use change modeling and the lack of consensus on methodology, European institutions recently decided to postpone inclusion of indirect land use change as a factor in determining the carbon intensity of biofuels in the European Union (EU) Renewable Energy and Fuels Quality Directive.[10] Rather, the EU institutions directed the initiation of a two-year study aimed at gaining a better understanding of the land impacts of biofuels and methods for minimizing land effects.

[8] http://www.epa.gov/crem/library/cred_guidance_0309.pdf

[9] Kaffka. "Crop-based biofuels and the LCFS Standard." Presentation to Calif. Air Resources Board. March 26, 2009. ftp://ftp.arb.ca.gov/carbis/board/books/2009/032609/kaffka.pdf

[10] http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+TA+P6-TA-2008-0613+0+DOC+XML+V0//EN&language=EN#BKMD-27

Conclusion

The Energy Independence and Security Act of 2007 and the 2008 Farm Bill clearly put our nation on a new path toward greater energy diversity and national security. By continuing the strong foundation the U.S. renewable fuels industry has built for new, green American jobs, we can begin the hard work necessary to mitigate the impact of global climate change, reduce our dependence on foreign oil, and provide a tremendous economic stimulus across rural America. But in order to achieve the goals of reduced GHG emissions from transportation fuels, it is imperative that we allow our public policies to be guided by sound science and defensible modeling.

Thank you.