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HEARING TO REVIEW LOW CARBON FUEL STANDARD PROPOSALS

HEARING

BEFORE THE

COMMITTEE ON AGRICULTURE
HOUSE OF REPRESENTATIVES

ONE HUNDRED ELEVENTH CONGRESS

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HEARING TO REVIEW LOW CARBON FUEL STANDARD PROPOSALS

THURSDAY, MAY 21, 2009

HOUSE OF REPRESENTATIVES,
COMMITTEE ON AGRICULTURE,
Washington, D.C.

The Committee met, pursuant to call, at 10:33 a.m., in Room 1300, Longworth House Office Building, Hon. Collin C. Peterson [Chairman of the Committee] presiding.

Members present: Representatives Peterson, Holden, Boswell, Baca, Scott, Herseth Sandlin, Cuellar, Costa, Ellsworth, Kagen, Schrader, Halvorson, Dahlkemper, Massa, Bright, Kratovil, Schauer, Kissell, Boccieri, Murphy, Pomeroy, Minnick, Lucas, Goodlatte, Moran, Johnson, Rogers, King, Neugebauer, Smith, Roe, Luetkemeyer, and Lummis.

Staff present: Claiborn Crain, Nona Darrell, Adam Durand, Tyler Jameson, John Konya, John Riley, Anne Simmons, April Slayton, Rebekah Solem, Patricia Barr, Tamara Hinton, Josh Mathis, Josh Maxwell, Nicole Scott, and Jamie Mitchell.

OPENING STATEMENT OF HON. COLLIN C. PETERSON, A REPRESENTATIVE IN CONGRESS FROM MINNESOTA

The CHAIRMAN. The Committee will come to order.

Good morning, and welcome to today's hearing of the Committee. I think that maybe I got some people's attention last Committee hearing that we held talking about renewable fuels. These issues and how we address them, or don't address them, will shape the future of our nation's energy options.

I feel very strongly that right now we don't have the right policies to be sure that we can produce a cost-effective domestic supply of clean renewable fuels. Establishing a low carbon fuel standard is one method that can be used to reduce greenhouse gas emissions and to encourage the development of less carbon-intense fuels.

California has recently proposed a low carbon fuel standard, and other states, including Minnesota, have considered this idea, but rejected it. However, as with so many things in Washington, the devil is often found in the details.

The 2007 Energy Bill required EPA to look at indirect land use and utilize it at the EPA Administrator's discretion. However, how the international component came into the picture is not known, but it is a bad idea because scientists cannot agree on an accurate method to measure such indirect land use practices.

Despite serious concerns from scientists and the industry experts, the CARB Board has included this requirement in their low

carbon fuel standard. And we invited the California Board to testify at today's hearing, but they declined our request to be here in person.

Beyond addressing the problem of indirect land use, I am also concerned about proposals that include unnecessary and restrictive limits on renewable biomass that can be used, and we are trying to work through that.

So I welcome the witnesses to the hearing. I will make the rest of my statement part of the record and yield to Mr. Lucas, the Ranking Member.

[The prepared statement of Mr. Peterson follows:]

PREPARED STATEMENT OF HON. COLLIN C. PETERSON, A REPRESENTATIVE IN CONGRESS FROM MINNESOTA

Good morning and welcome to today's hearing of the House Agriculture Committee. I think that maybe I got some people's attention at the last Committee hearing we held to talk about renewable fuels. These issues and how we address them, or don't address them, will shape the future of our nation's energy options. I feel very strongly that right now, we don't have the right policies to be sure that we can produce a cost-effective domestic supply of clean, renewable fuels.

Establishing a low carbon fuel standard is one method that can be used to reduce greenhouse gas emissions and to encourage the development of less carbon intense fuels. California has recently proposed a low carbon fuel standard, and other states, including Minnesota, have considered this idea.

However, as with so many things in Washington, the devil is often found in the details. The 2007 Energy Bill required EPA to look at indirect land use and utilize it at the EPA Administrator's discretion. How the international component came into the picture is not known, but it is a bad idea because scientists cannot agree on an accurate method to measure such indirect land use. Despite serious concerns from scientists and industry experts, the California Air Resources Board has included this requirement in their low carbon fuel standard. We invited the California Board to testify at today's hearing, but they declined our request to be here in person.

Beyond addressing the problem of indirect land use, I am also concerned about proposals that include unnecessary and restrictive limits on renewable biomass that can be used. The 2007 Energy Bill passed by Congress contains a very limited definition of *renewable biomass.* We need to ensure that a diverse supply of potential biofuel feedstocks is available so that the industry doesn't get wrapped up in figuring out if their biomass is legal when they should be focused on helping us reach our energy independence goals.

The United States needs to have Federal energy policies that are flexible, practical, and innovative. That is why Ranking Member Lucas and most Members of the Agriculture Committee joined me to introduce a bill last week to address some of these problems that will limit the biofuel industry.

I hope that today's hearing will provide us with a chance to ask important questions about low carbon fuel standard proposals. Are low carbon fuel standards an effective alternative to renewable fuels standards? How will low carbon fuel standards impact the petroleum industry? These are important policy questions that have serious implications for the future of our nation's energy options.

I look forward to hearing from our witnesses today, and the Agriculture Committee will continue to address these important issues as Congress moves forward with energy and climate change legislation this year.

OPENING STATEMENT OF HON. FRANK D. LUCAS, A REPRESENTATIVE IN CONGRESS FROM OKLAHOMA

Mr. LUCAS. Thank you, Mr. Chairman.

I would like to thank you for holding today's hearing to review the low carbon fuel standard proposals.

While many are focusing on the debate surrounding the Waxman-Markey cap-and-tax legislation, we cannot shift our attention away from other important environmental proposals. The Waxman-

Markey bill currently being marked up by the Energy and Commerce Committee no longer contains a low carbon fuel standard. However, the original draft did.

California is currently implementing its own LCFS, and other states and regions may follow. These proposals tend to mandate the reduction of greenhouse gas emissions in the fuel supply.

Protecting the environment is a worthwhile effort, and I am for all of it. However, we must make sure our energy policies are not held hostage by those who are not friends to production agriculture. I believe we must focus on incentives, innovation, and research to address environmental issues, not mandates. I helped craft the greenest farm bill ever in 2002. It increased funding to incentive voluntary conservation programs by 80 percent. In 2008, I worked to improve and expand those conservation programs, and I helped draft a new energy title to encourage agriculture to produce second-generation biofuels.

Today, we will hear testimony on policies that continue to incorporate indirect land use change in determining a fuel lifecycle analysis. By using a very new method that incorporates many models together, both domestic and international, to determine a fuel's impact on the environment, we are arbitrarily limiting our fuel supply, driving up costs for consumers, including our farmers and ranchers.

This is another example of leadership and the Administration's environmental mandates that will increase fuel costs and input costs for production agriculture, which leads to higher food costs. That is why I cosponsored the legislation with Chairman Peterson to remove indirect land use from the RFS lifecycle analysis and create a new biomass definition, which expands the amount of eligible feedstocks that can be used to meet the RFS mandate.

We must continue to pave the way for second-generation biofuels to create energy diversity and not limit our home-grown feedstocks. We must make sure that the EPA is only administering policy as Congress intended, not developing its own environmental policy.

And let me repeat that: We must make sure that the EPA only administers policies intended by Congress, not developing its own environmental policy.

Again, if we want a real solution to climate change, then we should focus on incentives, not mandates. We must remember that farmers and ranchers are natural stewards, literally the original stewards, of the Earth, and they find new and innovative ways to reduce carbon or energy usage, reduce emissions, sequester carbon, while still providing America with an abundant and affordable food and fiber supply.

I look forward to hearing from our witnesses today, and I thank, once again, the Chairman for calling this hearing.

[The prepared statement of Mr. Lucas follows:]

PREPARED STATEMENT OF HON. FRANK D. LUCAS, A REPRESENTATIVE IN CONGRESS FROM OKLAHOMA

Mr. Chairman, I would like to thank you for holding today's hearing to review the low carbon fuel standard proposals.

While many are focusing on the debate surrounding the Waxman-Markey cap and tax legislation, we cannot shift our attention away from other important environmental proposals. The Waxman-Markey bill currently being marked up by Energy

and Commerce no longer contains a Low Carbon Fuel Standard (LCFS), however, the original draft did. California is currently implementing its own LCFS and other states and regions may follow. These proposals intend to mandate the reduction of greenhouse gas emissions in the fuel supply.

Protecting the environment is a worthwhile effort and I am all for it. However, we must make sure our energy policies are not held hostage by those who are not friends to production agriculture. I believe we must focus on incentives, innovation, and research to address environmental issues, not mandates. I helped craft the greenest farm bill ever in 2002. It increased funding to incentivize voluntary conservation programs by 80 percent. In 2008, I worked to improve and expand those conservation programs. And, I helped draft a new energy title to encourage agriculture to produce second generation biofuels.

Today, we will hear testimony on policies that continue to incorporate indirect land use change in determining a fuels lifecycle analysis. By using a very new method that incorporates many models together—both domestic and international—to determine a fuels impact on the environment, we are arbitrarily limiting our fuel supply and driving up costs for consumers—including our farmers and ranchers.

This is another example of how Speaker Pelosi and the Administration's environmental mandates increase fuel and other input costs for production agriculture, which leads to higher food costs. This is why I cosponsored legislation with Chairman Peterson to remove indirect land use from the RFS lifecycle analysis, and creates a new biomass definition which expands the amount of eligible feedstocks that can be used to meet the RFS mandate. We must continue to pave the way for second generation biofuels, to create energy diversity, and not limit our home grown feedstocks. We must make sure that the EPA is only administering policy as Congress intended, not developing its own environmental policy.

Again, if we want a real solution to climate change then we should focus on incentives, not mandates. We must remember that farmers and ranchers are natural stewards of the Earth and they find new and innovative ways to reduce energy usage, reduce emissions, and sequester carbon while still providing America with an abundant and affordable food and fiber supply.

I look forward to hearing from our witnesses on this issue.

The CHAIRMAN. I thank the gentleman.

I didn't take my full 5 minutes, so with the Committee's permission, I would like to yield the rest of my time to Mr. Boswell, who has been fighting these ethanol wars as long as I have.

OPENING STATEMENT OF HON. LEONARD L. BOSWELL, A REPRESENTATIVE IN CONGRESS FROM IOWA

Mr. BOSWELL. We have been fighting a long time.

And thank you, Mr. Chairman. I will be brief, if I can, and I guess you have a gavel, so that will take care of that.

I certainly associate myself with things that you said, and you, too, Mr. Lucas.

In fact, as I look around the table at who is here, I see different Members, I have been to your districts; we are environmentalists.

Randy, you are an environmentalist, I know you are because I have been down to your community.

Frank, I know you are.

Tim, Collin, you are.

And I am, too. And I have often said, come and see the land that I have stewardship over and what I have done with it. And if you are not convinced, you can't be convinced.

Mr. Lucas said it exactly right, farmers and ranchers are naturally environmentalists. We are. And yet, we have to think about how we get into this next generation, this second effort. And we don't want to stall that. And some of us have said for years—and I have no quarrel, a lot of my friends are from what we call the "oil patch." And our friends and our states and our country, in the

sense of producing oil, can't do it. If we just said, okay, you do it all, you can't do it. And so it is not a threat to that business.

It is a threat to our future if we stay in bondage to OPEC. That is a threat, and we need to move away from that. And you can tell, as you go across the country, that is what our people in the United States expect us to do.

And so we have just got to deal with this straight up and in daylight, and be really, really straightforward about it. And I think we can. I think we can make big steps forward in improving the environment and the emissions and all those things, and still reduce our dependence on foreign oil.

And we certainly don't want to shift from that dependence there over to another dependence for products coming out of Brazil. I have nothing against Brazil. We have been down there, a lot of us have. But what is the point of shifting that dependence when we have a chance to work together and develop this next generation and keep moving?

Now, it is no small issue. I have heard the Chairman make the comment, and I agree, got caught under myself. It takes venture capital to make this move forward. And the farmers, ranchers and producers out there have been trying pretty hard, but they have taken a licking again.

Who is going to put the money up for this next generation if we don't get our arms around this and walk forward with some plain old—what my old dad used to say, how about a little horse sense, a little down-home common sense on this. And we can work it out. We can do it.

So, Mr. Chairman, I appreciate you having this hearing, and your courage to step on up and call it like it is. I know in your heart, because I have known you for many, many years, you are committed to the country. You are a patriot, and you believe in what we are trying to do.

But let's just do it right and not do harm. Harm is not necessary. We can do that. And we can work together as environmentalists—we are environmentalists, and we can get this done.

So I thank you for the time. And I look forward to what we can accomplish together at, in my opinion, a critical time. Thank you.

The CHAIRMAN. I thank the gentleman.

And the other Members' statements will be made part of the record, without objection.

I welcome the panel. Mr. Jennings from ACE; Mr. Buis from Growth Energy; Mr. Dinneen from Renewable Fuels Association; Mr. Riva from Verenium Corporation.

Welcome to the Committee.

And Mr. Jennings, you can begin. You are limited to 5 minutes. Your testimony will be made part of the record.

STATEMENT OF BRIAN JENNINGS, EXECUTIVE VICE PRESIDENT, AMERICAN COALITION FOR ETHANOL, SIOUX FALLS, SD

Mr. JENNINGS. Well, thank you very much, Chairman Peterson, Ranking Member Lucas, and Members of the Committee, for this timely and pivotal hearing.

My name is Brian Jennings, the Executive Vice President for the American Coalition for Ethanol. ACE believes that properly designed and implemented low carbon policies can help biofuels reduce greenhouse gases. And we would like to support a low carbon fuel standard.

However, as has been stated, because the California Air Resources Board and EPA are selectively enforcing the untested theory of international indirect land use change, we cannot support these policies as they stand.

I think it is instructive to distinguish between direct effects and so-called "international indirect effects" which contribute to this debate today. Direct effects are time-tested, peer-reviewed, verifiable models which enjoy scientific consensus. Indirect effects, and particularly international indirect effects, are new, unreliable, and controversial computer models which have not yet earned scientific acclaim.

Now, some might assume the inventor, the architect of international land use change is an agronomist or a scientist or an economist who has taken the time to study this issue for years and years. Well, that is not the case. The inventor of this theory is Mr. Tim Searchinger. He is an attorney, who has worked for years, much of his career, for an environmental organization attacking U.S. farmers, ranchers, and foreign policies. And the international indirect land use change theory predicts that using corn ethanol in the United States somehow causes ripple effects in food and feed systems that trigger farmers, literally halfway around the world, to make a land use decision to put virgin land into production, to replace feed, and then the carbon emissions resulting from this should be ascribed to corn ethanol.

Now, the predictions that he uses in his model depend upon the assumptions and the variables that he plugs into a computer program. And the only meaningful test of whether the computer model is sound is whether its predictions can be substantiated by on-the-ground measurements. And without these real-world substantiations, the model is simply theory; it is not science.

In the case of international land use change from biofuels, the fact is the real-world measurements do not corroborate the theory. I will give you one example. We all know that the Amazon Rainforest is the poster child, is Exhibit A for those who somehow accuse corn ethanol of causing deforestation. But if you look at the data, the real-world measurements would indicate, from 2004 to 2007, deforestation in the Amazon declined at the very same time the U.S. ethanol industry experienced its most aggressive compounded average growth rate. And this is illustrated on page four of my testimony if you would like to look at a graphic illustration.

The fact that the international land use change predictions are not validated by on-the-ground measurements should be persuasive enough to justify more scientific scrutiny before moving ahead in a policy context. But nevertheless, both CARB and EPA are embarking on these new policies, relying upon international land use change.

And to add another dimension of controversy to this debate, for some bizarre reason CARB and EPA are applying indirect effects to biofuels only. Yet, remarkably, both CARB and EPA are making

extreme assumptions about the international emissions from corn ethanol, adding an international land use change penalty to the carbon score, or the carbon intensity of corn ethanol, and amazingly assuming there are zero indirect effects from petroleum.

Now, my testimony discusses several remedies that we think need to be attacked in order to address this problem. I will focus on just three right now.

Number one, insist upon widespread scientific agreement on the real world data, or lack thereof, regarding international indirect effects before moving forward on policy. The science should drive the politics on this issue, not the other way around.

Number two, if comparing indirect effects, compare indirect effects for all fuels. Singling out biofuels for selective enforcement is simply bad public policy while you are holding petroleum harmless, as EPA and CARB are.

And finally, EPA needs to much more carefully examine the role that an ethanol co-product, distillers grain, plays in this entire debate. Distillers grain replaces both corn and soybean meal in livestock rations. And this mitigates the need, if proper credit is given to distillers grain, it mitigates the need to expand the global crop base in addition to looking at increased corn yields. This could be a graceful exit strategy for EPA if they choose to use it.

By arbitrarily ascribing greenhouse gas emissions from international indirect effects to biofuels, effects that cannot, in fact, be validated, which depend upon tortured use of computer models and that lack the confidence of scientists, CARB and EPA only invite cynicism about their motives and about the basic veracity of their work. And as we undertake this enormously important mission to literally reinvent the way humans both produce and consume energy, this is an unworkable and dangerous precedent to set.

In the final analysis, any low carbon policy that precludes corn ethanol from a fair shake in the market is also likely to unnecessarily jeopardize the future for advanced biofuels because, indeed, advanced biofuel technology innovations are going to depend upon corn ethanol to build the bridge to their successful commercialization.

So I thank you for your comments and this very timely hearing. I look forward to any questions that you might have.

[The prepared statement of Mr. Jennings follows:]

PREPARED STATEMENT OF BRIAN JENNINGS, EXECUTIVE VICE PRESIDENT, AMERICAN COALITION FOR ETHANOL, SIOUX FALLS, SD

Thank: you Chairman Peterson, Ranking Member Lucas, and Members of the Committee. My name is Brian Jennings and I am the Executive Vice President of the American Coalition for Ethanol (ACE), the largest grassroots biofuels advocacy organization in the U.S. uniting businesses and individuals that support ethanol production and use. Nearly 1,600 ethanol producers, prospective ethanol producers, commodity and farm organizations, farmers and ranchers, investors, and businesses that supply goods and services to the U.S. ethanol industry comprise the grassroots membership of ACE.

I am honored with the opportunity to discuss the timely and controversial issue of "indirect land use change" (ILUC) and how the indirect effects ideology is getting policy ahead of science with regard to many low carbon fuels initiatives, including the California Air Resources Board's (CARB) Low Carbon Fuels Standard (LCFS), the Renewable Fuels Standard 2 (RFS2) rule recently proposed by the U.S. Environmental Protection Agency (EPA) pursuant to the Energy Independence and Security

Act of 2007 (EISA), and historic climate change legislation working its way through the U.S. House of Representatives this week.

Today agriculture plays an integral role in providing income opportunities and energy security for all Americans. ACE is grateful for the leadership of Congressmen Peterson and Lucas and others on the Committee to explore how agricultural biofuels can play a role in America's clean energy future as well. We thank you for holding this hearing to examine the ramifications of a LCFS for the American biofuels industry and agricultural producers.

We believe climate change is a real and significant threat that needs to be addressed through efforts to reduce greenhouse gas (GHG) emissions and sequester carbon. ACE members are committed to making certain that biofuels from all feedstocks make meaningful contributions to our nation's clean energy economy and understand a LCFS will likely be part of the policy shift that leads to that clean energy future. ACE supports the concept of a LCFS and we believe that an appropriately designed and implemented LCFS can complement a national cap and trade policy to help reduce emissions from the transportation sector. The American biofuels industry looks forward to playing a central role in the development of low carbon fuels to meet a LCFS.

However, because of the selective enforcement of the controversial and untested theory of ILUC against biofuels by CARB and EPA, we cannot express our support for these policies as they stand today.

On behalf of ACE, I want to highlight specific issues related to the lifecycle assessment aspect of a LCFS that need to be addressed if such a policy is to be implemented in a fair and scientifically defensible manner:

- Get the science right then move forward on the policy. In other words, insist upon scientific consensus and real-world data of so-called indirect effects before moving forward on low carbon fuels policy;
- If comparing indirect effects, compare indirect effects for all fuels. Undertake a complete lifecycle assessment of the indirect emissions associated with petroleum;
- Ensure that the scope of lifecycle GHG assessments are consistent among all regulated activities under any greenhouse gas emission control regime.

Direct Effects Are Widely Accepted While Indirect Effects Lack Scientific Consensus

It is instructive to take a step back and contemplate that there are direct effects and indirect effects that contribute to today's debate about how truly low carbon a source of transportation fuel may be. Direct effects are time-tested, peer-reviewed, reliable and verifiable scientific determinations about the lifecycle carbon footprint of fuels or sources of energy that enjoy broad scientific consensus. Various models, including those developed by scientists at the U.S. Department of Energy, are widely accepted to do a verifiable job of calculating the carbon intensity of various forms of energy, including biofuels and petroleum.

So-called "indirect effects," such as ILUCs attributable to biofuels, are new, untested, unreliable, and controversial computer-generated predictions that are being selectively applied to corn ethanol only at this time. According to scientists, there are no peer-reviewed or published scientific models that accurately calculate the potential indirect carbon intensity of forms of biofuels today.

The architect of the ILUC theory, as it applies to biofuels, is not a scientist or economist who has studied the complicated causes of land clearing in the tropics throughout his career to develop a more complete understanding of this concept. The architect of the ILUC theory is Mr. Tim Searchinger. Mr. Searchinger is not a scientist or an economist. He is an attorney, who for most of his career worked at the environmental organization Environmental Defense, consistently attacking American farmers and ranchers and the public policies that ensure our stable supply of food, fiber, and fuel. During the last farm bill, Mr. Searchinger worked with the infamous Left-Right Coalition on behalf of Environmental Defense to convince Congress to eliminate key commodity programs. After failing to convince Congress to axe these programs during the farm bill debate, he left Environmental Defense to invent and promote his theory of ILUC, which is now being applied by some regulatory bodies in order to stop the growth in America's use of biofuels.

Simply put, as Mr. Searchinger devised it, ILUC is a market-induced change, or ripple effect, that is predicted to occur from using increasing volumes of corn ethanol. The theory is that if more corn is used for ethanol in the U.S., somehow less corn is available for livestock feed rations, causing land owners literally halfway around the world to plow virgin grasslands or slash pristine rainforests to plant soybeans to replace the "lost" opportunity to feed the corn used for ethanol.

(In reality, ethanol is distilled from just ⅓ of a bushel of corn, the starch, and that another ⅓ of that corn bushel, the fat, fiber, and protein, is processed into a high-protein source of feed, a co-product of the ethanol production process called distillers grains. This distillers animal feed product has proven to successfully replace corn and soybean meal in livestock feed rations, therefore mitigating the need to expand the global crop base as Mr. Searchinger would suggest).

Mr. Searchinger surmises that the resulting carbon emissions from the cultivation of these virgin lands should be ascribed to the carbon intensity of U.S. ethanol production. ACE is concerned that regulators are using rather arbitrary and naïve assumptions that biofuels are the cause of indirect land use changes without a sophisticated appreciation for the fact that socioeconomic, political, trade, and other factors may also result in land use changes. Today, agricultural markets are affected by global factors, and land use changes continue as a result of a wide variety of reasons, including but not limited to global economic growth, developing nations acquiring wealth and desiring the lifestyle of Americans, population growth, internal land use and land tenure policies, and weather factors.

Nevertheless, in order to make these computer-generated predictions, ILUC models assume that biofuels are the driving factor causing a land use change. There is no effort to determine the proportional charges or effects of other variables or factors that might be responsible for land use changes. ILUC models provide for interesting discussions, but they are not reliable enough to be used for determining policies with national and consequential ramifications.

Models for Estimating Indirect Land Use Impact Are Unreliable

In theory, computer models can be used to help understand and predict phenomena, whether it is focused on human behavior or the reaction of natural systems to the manipulation of independent variables like the concentration of GHGs in the atmosphere. For example, the International Panel on Climate Change (IPCC) has marshaled the efforts of hundreds of scientists over a long period of time to develop what most consider good, albeit imperfect models of how the world climate will change over time as GHG concentrations increase. Once a relatively high degree of confidence in these models was achieved, national governments appropriately began to act and establish policies to reduce emissions of those gases. That is how modeling and public policy should interact; first you get the science right and then you apply it in a policy context.

Computer models are entirely dependent on the assumptions that are employed by those who develop them. You or I could write a computer model that demonstrated that the Earth was flat or that gravity does not exist. We would be wrong, but we certainly could develop computer models to demonstrate those results. It all depends on what assumptions we want to use. Ultimately the only meaningful test of whether a computer model is sound is whether its predictions can be corroborated by actual on-the-ground measurements. Without these real-world substantiations, models are more theory than science. That is where we stand today.

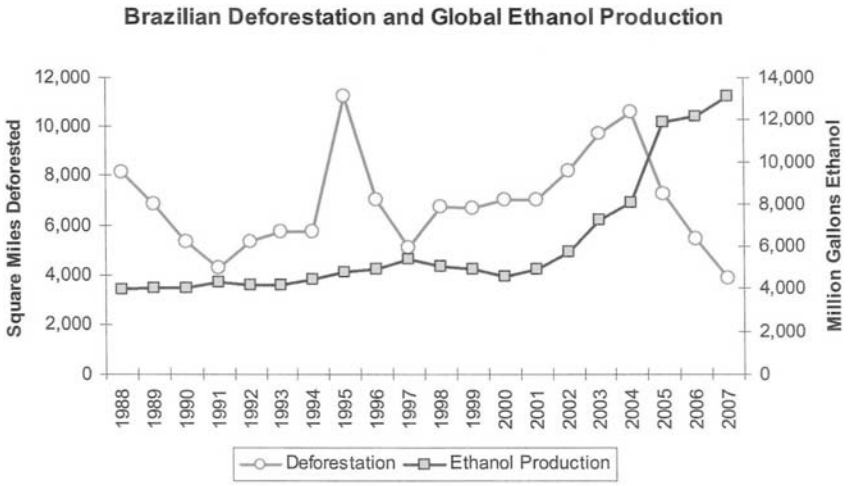
In the case of ILUCs from biofuels, the measurements of on-the-ground land clearing do not corroborate the predictions of existing models. To wit, according to testimony before the House Agriculture Subcommittee on Conservation, Credit, Energy, and Research recently, Mr. Brooke Coleman noted that in an analysis of the impact of biofuels on U.S. land use patterns, researchers at Purdue using the GTAP model (EPA relied upon the GTAP model for some of their RFS2 analyses) concluded the harvested area for coarse grains such as corn would increase 8.3 percent from 2001 to 2006, harvested area for oilseeds such as soybeans would decline 5.8 percent, and forested area would decline 1.5 percent during the same period. In reality, coarse grain harvested area declined by just two percent, oilseed area increased by .5 percent, and forested area increased by .6 percent from 2001 to 2006. *Simply put, the model predicted changes in land use between 2001 and 2006 that were actually the opposite of the real-world changes observed over time.*

Yet, this model and those like it are being used by CARB and EPA to ascribe to biofuels enormous amounts of GHG emissions that will in many respects determine how and to a degree whether biofuels will be used in America's transportation system. In no case should computer models be used to ascribe GHG emissions to biofuels or any other energy source until those models have been shown through years of corroborative data to accurately predict real-world changes in emission rates.

To reinforce that ILUC models predict an outcome that in fact does not occur, it is instructive to review deforestation rates in Brazil. Real-world data shows that deforestation of the Amazon Rainforest actually declined from 2004–2008, the same period of time in which U.S. ethanol production enjoyed its most aggressive com-

pounded average growth rate. *Figure 1* illustrates that Brazilian deforestation has declined at the same time ethanol production has expanded.

Figure 1.



Deforestation Sources: IEA; Butler, ***Mongabay.com*** *(FAO, NISR).*
Ethanol Production Sources: American Coalition for Ethanol and Renewable Fuels Association.

Study Indicates ILUC Requires More Analysis and Gets Policy Ahead of Science

Last year, in an effort to better understand lifecycle analysis and indirect effects, ACE commissioned a study by Global Insight entitled "Lifecycle Analysis of Greenhouse Gas Emissions Associated with Starch-based Ethanol." Key findings from that report include:

- Changes in land use have always occurred and are not new, nor are biofuels the primary driver of them. Global population growth cannot be ignored as a factor.
- The scientific literature available to date shows a huge variation in estimates of carbon release from land clearing in general, on the order of 50 percent plus or minus—a huge margin of error that should not be relied upon to make policy.
- *If* some land use change is due to increased biofuels production, the overriding challenge is to quantify which changes can indeed be directly attributed to biofuels.
- If the indirect GHG emissions of biofuels are counted toward the carbon footprint, so should be the indirect emissions associated with petroleum production.

The Global Insight report determines that computer-generated lifecycle predictions about indirect land use changes require considerably more analysis. According to the report, it is virtually impossible to accurately ascribe greenhouse gas impacts to biofuels based on indirect land use change. The report also discusses how technology innovations are making both corn and ethanol production more efficient and carbon-friendly, developments that have clearly not been captured not quantified adequately by CARB in its analysis and modeling for the proposed LCFS nor by EPA in measuring the carbon intensity of future sources of biofuels against future sources of petroleum.

The California Low Carbon Fuel Standard

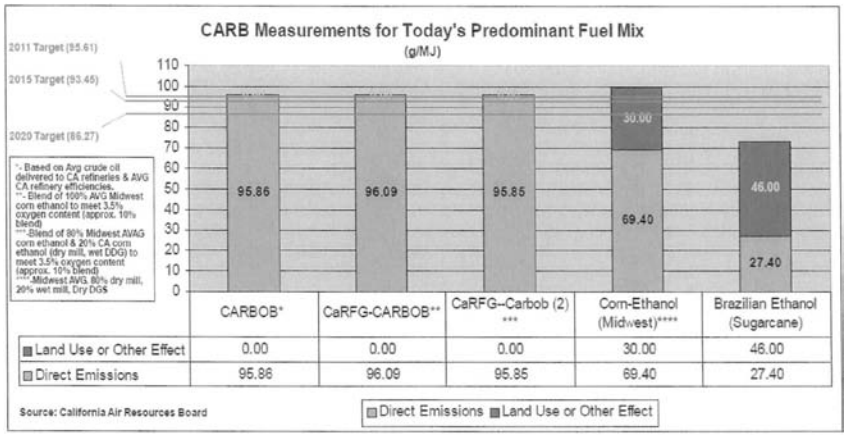
The California Air Resources Board (CARB) is moving forward with an initiative which seeks to reduce emissions from the transportation sector by ten percent by 2020. In formulating its estimates to determine which fuels can qualify for the LCFS, CARB calculated the direct GHG carbon intensity of gasoline and corn ethanol, and converted their findings to grams of carbon dioxide (CO_2) emitted per mega joule of energy (1 mega joule equals about 950 British Thermal Units of energy).

CARB determined that gasoline results in nearly 96 grams of CO_2 per mega joule of energy while average corn ethanol results in just 69 grams of CO_2 per mega joule. Indeed, comparing direct GHG emissions from gasoline and ethanol, CARB found that ethanol is a lower-carbon source of transportation fuel.

However, because CARB subscribed the controversial ILUC theory to their LCFS policy, the board added a penalty of 30 grams of CO_2 per mega joule to the carbon intensity of corn ethanol to derive a total carbon "score" of just over 99 grams of CO_2 per mega joule. Inexplicably, CARB made extreme assumptions about the indirect effects of corn ethanol, assumed there are zero indirect effects from petroleum, and remarkably concluded overall that corn ethanol is a more carbon-intensive source of fuel than gasoline. *Figure 2* below illustrates that CARB will penalize biofuels, particularly corn ethanol, for ILUCs, while petroleum will be held harmless, as CARB has chosen to largely ignore indirect emissions from those fuels. This selective enforcement will place biofuels at an unfair competitive disadvantage in the California fuels market, the largest in the U.S.

We encourage Congress to learn from the mistakes that CARB is making and establish a fair, workable and scientifically defensible framework for comparing the lifecycle emissions of biofuels and petroleum in any LCFS that it may chose to enact in the future.

Figure 2. CARB makes corn ethanol appear more carbon intensive than gasoline by assuming there are extreme indirect emission impacts from ethanol but zero indirect emission impacts from petroleum. Carbon intensity of fuels is expressed in grams of CO_2 per Mega joule of energy (1 Mega joule equals 948 BTUs).



Graphic Credit: Tom Waterman, Publisher, ***The Ethanol Monitor.***

A group of more than 100 scientists and academics wrote a letter to Governor Schwarzenegger in March concerned by CARB' s proposal. Their letter warns that "indirect effects have never been enforced against any other product in the world. California should not be setting a wide-reaching carbon regulation based on one set of assumptions with clear omissions relevant to the real world."

RFS2 Rule

The RFS2 schedule also bases program eligibility with GHG reduction targets, and sets forth various categories for renewable fuels based on their ability to reduce lifecycle GHG emissions. Conventional biofuel is ethanol from corn starch which must achieve a 20 percent reduction in lifecycle GHG emissions compared to gasoline.

Consistent with the law, we believe it is appropriate that EPA's proposed rule determines that ethanol plants that commenced construction before the EISA enactment date are grandfathered into the GHG reduction provisions, and that for calendar years 2008 and 2009, any ethanol plant that is fired with natural gas, biomass, or any combination thereof is deemed to be in compliance with the 20 percent threshold. As a result, there is a strong likelihood that the 15 billion gallons of corn ethanol per year called for under the RFS2 program will be deemed to comply with the GHG reduction requirement.

However, by breathing life into the controversial ILUC theory, EPA, like CARB, is setting a dangerous precedent for future sources of biofuels. For example, under EISA, "advanced biofuel," from biomass (non-corn starch) must reduce GHGs by 50 percent compared to gasoline and "cellulosic biofuel" derived from cellulose, hemicellulose, and lignin must achieve a 60 percent reduction in GHG emissions compared to gasoline. If indirect effects are calculated to cause these "next generation" sources of fuel to fall short of the thresholds, these promising technologies will not be commercialized.

On Table VI.C.1–1 of the RFS2 rule, EPA breaks out the emissions estimates for corn ethanol and gasoline by lifecycle stage, including domestic and international agricultural production, domestic land use changes, international land use changes, fuel production, fuel and feedstock transport, and tailpipe emissions stages. It is instructive to note that if the ILUC penalty ascribed to corn ethanol is subtracted out, but all other direct lifecycle emissions and stages are calculated, the carbon intensity of corn ethanol is 61 percent better than that of petroleum. In other words, when comparing the direct lifecycle emissions of corn ethanol and gasoline, EPA determined that corn ethanol reduced GHG emissions compared to gasoline by 61 percent. When the ILUC penalty is added to the carbon intensity calculation for corn ethanol, it still is found to reduce GHGs compared to gasoline by 16 percent—better than gasoline, but failing to meet the arbitrary 20 percent threshold prescribed in EISA.

What has been largely overlooked is that EISA does not direct EPA to estimate the impact of *international* land use changes in its calculation of the greenhouse gas impact of biofuels. The law specifically compels EPA to examine significant direct and indirect land use changes, but EPA alone, with the strong backing of groups who do not want to see biofuels succeed, has loosely interpreted the law and unfortunately given credence to this controversial and untested theory of international ILUC.

Some steps that should be taken to remedy these problems:

1. Undertake a Complete Lifecycle Assessment of the Indirect Emissions Associated with Petroleum

CARB and EPA have put forth estimates of the GHG emissions of biofuels that purport to reflect both direct and indirect emissions. Those agencies compare these estimates of GHGs from biofuels with estimates of only the *direct* lifecycle GHG emissions of petroleum. Both agencies have chosen to ignore entirely the substantial indirect GHG emissions associated with protecting oil supplies and oil transportation routes around the world, when such data exists.

Clearly a significant percentage of the oil used in the U.S. is imported from nations such as Saudi Arabia, Iraq, and Columbia. These sources of oil have both direct and indirect effects. It has been pointed out that the direct effects include pumping seawater into the oil wells of Saudi Arabia to increase pressure and powering shipping vessels during transport of Middle East oil to the U.S. According to Tom Waterman, publisher of *"The Ethanol Monitor,"* a weekly oil and biofuels newsletter, the distance from the Persian Gulf to California is about 9,000 miles by sea. Even with the most efficient turbo-charged engines to power sea-going vessels, shipping cargoes carrying Persian Gulf oil to the U.S. will consume about 1,660 gallons of heavy oil per hour. At maximum fuel economy (which is just 50 percent thermal efficiency for the most efficient engines) a single cargo vessel will burn about 625,000 gallons of heavy fuel oil en route to California. Even this direct effect seems to be too difficult for CARB to include in its carbon intensity calculus for petroleum. Further, indirect activities, such as military operations to protect oil supplies and shipping lanes with ships, aircraft, tanks, jeeps, and trucks powered by oil are not accounted for by CARB or EPA in their analysis on the carbon intensity of petroleum.

2. Ensure that the Scope of Lifecycle GHG Assessments are Consistent Among all Regulated Activities under any GHG Emission Control Regime

Furthermore, ascribing GHG emissions from land clearing in developing countries to biofuels production in the U.S. would hold the domestic ethanol industry to a uniquely punitive standard, one that no other U.S. industry would face under any existing or proposed GHG control program. Under existing cap and trade proposals pending in Congress, including the one recently negotiated by Congressman Waxman, and those introduced in the House and Senate last year, certain U.S. industries such as oil companies and electric utilities will be responsible for obtaining permits for the fossil fuels that they introduce into commerce. Users of fossil fuels and products derived from the use of fossil fuels will be indirectly affected by such regulation as costs for those fossil fuels increases in response to annual rationing

of carbon credits under the cap. In no case would a U.S. industry be responsible for indirect effects of its activities on GHG emissions in other nations.

In a global economy, virtually all economic activity in the U.S. will have direct and indirect economic and environmental impacts around the world. Thus, to consistently apply the principle that U.S. entities should be accountable for GHGs emitted in foreign countries, one would need to hold U.S. businesses and individual consumers responsible for all direct and indirect GHG emissions from foreign factories used to produce the goods consumed in the U.S., because those businesses or individuals create the market demand that leads to the foreign economic activity. Similarly, we would need to demand that foreign nations that import grain from the U.S. be responsible for our domestic emissions generated in the cultivation or manufacture of those goods. This makes no sense, yet, if this ill-conceived theory is allowed to apply to biofuels, it could set a dangerous precedent that could be applied to other industries and sources of energy, such as new public transport on rail, wind, solar, and new factories that will product electric vehicles and their parts.

3. The President's Interagency Biofuels Working Group should be encouraged to insist that EPA get the science right before applying it in a rule.

President Obama should be thanked for creating the Interagency Biofuels Working Group on May 5, which, among other key priorities, will peer review the assumptions made by EPA in the RFS2 rule regarding the lifecycle carbon footprint of ethanol. We encourage Members of Congress to urge the Biofuels Working Group to insist that fossil fuels undergo rigorous and regularly updated lifecycle analyses as well. We believe if fossil fuels are held to the same standards as biofuels in this peer review, it will be demonstrated that future sources of petroleum are going to be more expensive to extract and more harmful for the environment, while future sources of biofuels will be more cleaner, more sustainable, more efficient, and less expensive.

4. The RFS2 comment period should be extended.

EPA should extend the comment period for the RFS2 rule, which is over 1,000 pages long and contains many complicated assumptions from various models, some of which have not been made public or available yet to peer-review, from the current 60 days to something that gives stakeholders a realistic opportunity to analyze the rule and provide meaningful and helpful comments to the agency.

5. EPA needs to more carefully consider the value of ethanol co-products (distillers grains) that are returned to the feed supply and the fact that corn yields are not fixed but are constantly improving thanks to improved farming methods and biotechnology.

ACE believes that if proper credit is provided to distillers grains co-products, which replace the need for corn and soybean meal in livestock feed, and if increased corn yields are considered, the 15 billion gallons of corn ethanol called for under RFS2 can be produced without any land use penalties.

On April 30, 2009, five leading university professors with expertise in agronomy, animal nutrition, agricultural economics and engineering wrote a letter to EPA Administrator Jackson, USDA Secretary Vilsack, DoE Secretary Chu, and White House Energy and Environment Advisor Browner, to point out that corn is a highly efficient feedstock for the simultaneous production of feed, food, and fuel. They stated that the recent accusations about ethanol ethanol's carbon footprint and alleged food *versus* food tradeoffs have been unfairly exaggerated.

This letter, sent by Dr. Ken Cassman and Dr. Terry Klopfenstein of the University of Nebraska-Lincoln, Dr. Robert Kratochvil of the University of Maryland, Dr. Kevin Kephart of South Dakota State University, and Dr. Robert Brown of Iowa State University states "Only the starch portion of the kernel [corn] is converted to ethanol, with the remaining protein, oils, and minerals concentrated into a valuable animal feed. Leading animal nutritionists confirm that for every 2 bushels of corn processed in an ethanol facility approximately 1 bushel of corn equivalent is used to displace bulk corn as livestock feed. Far too many of the recent studies and media reports on corn ethanol's land use effect either ignore, or incorrectly downplay, the importance of this co-product's value and the role in the feed and food chain."

The professors also point out that more bushels of corn can be grown on the same or less land, mitigating the need to expand the global crop base. "The number of acres planted to corn in the U.S. has declined by approximately 30 percent since its peak in 1932, when more than 110 million acres were planted to corn and mostly used to feed draft animals (in other words, as transportation fuel). While acres dedicated to corn have declined significantly, U.S. farmers' productivity has soared, achieving nearly a 400 percent increase in yields since World War II. Today, more

than 80 percent of the 84–85 million acres planted to corn in the U.S. are used to feed animals."

Dr. Jerry Shurson, professor of Animal Science at the University of Minnesota, has also pointed out the lack of attention and understanding given to the use of distillers grains in animal feeds, explaining that in its LCFS policy, CARB assumes distillers grains replaces corn on a pound-for-pound basis, not the 1.24 pounds of base livestock feed he calculates. This miscalculation could reduce CARB's calculated ILUC for corn ethanol by around 50 percent.

In reality, net corn use for ethanol is dramatically lower than current USDA reports indicate. We believe USDA should consider methods to more accurately report on corn usage by sharing data about the percentage of U.S. corn bushels do not "disappear" into ethanol but instead are used to replace corn and soybean meal in livestock feed rations, and that the availability of these distillers grains co-products from corn ethanol production eliminate the need to expand the crop base here and abroad to supply feed for livestock. If USDA helps ensure more accurate reporting of these facts, ethanol will no longer be unfairly and habitually criticized for somehow removing "food" from the food supply and for ILUCs.

Recently-Introduced Legislation to Address These Problems

I would like once again to express my profound thanks to Chairman Peterson and Ranking Member Lucas and your staffs for holding this hearing and for developing legislation to address the application of ILUC by EPA in the RFS2 rulemaking. ACE supports your legislation and looks forward to working with you to enact it. ACE also appreciates the fact that the low carbon fuel standard provisions have been stripped from the House energy bill, since this will allow more time to design a program and associated lifecycle analysis protocols that are fair, scientific and thus more universally accepted.

I think you would agree that we shouldn't need legislation to fix this problem. Rather, EPA and other regulatory bodies should instead subject their assumptions to greater scrutiny, peer-review, and more carefully examine the scientific evidence or lack thereof before embarking on the use of ILUC. As you know, there are efforts underway to ensure greater peer review and scientific scrutiny through the establishment of the President's Interagency Biofuels Working Group, co-led by USDA Secretary Tom Vilsack. The establishment of this working group demonstrates that key officials within the Obama Administration understand ILUC is getting politics ahead of science, and the working group and peer review will be the perfect place to address this problem. However, legislation from Congress is also helpful because it empowers Secretary Vilsack and others to make a more compelling argument that ILUC needs to be remedied during the peer review. ACE believes the provision in the Chairman's legislation that ensures all Federal agencies, particularly USDA and DoE, are allowed to exercise authority in the regulatory process of determining the carbon intensity of biofuels and other energy sources would be helpful in returning rational thought to this policy.

We are especially supportive of provisions in Chairman Peterson's legislation to require the petroleum baseline which biofuels are compared to from a GHG reduction standpoint to be updated every 3 years. Currently, EISA freezes in time, based on 2005, the GHG impact of petroleum, and it is this baseline upon which biofuels must reduce GHG emissions by various percentages. But the law does not consider the practical reality that future sources of oil, such as Tar Sands and oil shale, are going to be much more carbon and emission intensive than 2005 oil. Requiring the oil baseline to be updated is good public policy and ensures a more fair comparison for GHG calculations.

The E10 Blend Wall and the E15 Waiver

While it is not a topic of this hearing, I want to highlight that the top priority for the U.S. biofuels industry today is to scale the E10 blend wall and gain EPA approval of our waiver for up to E15.

For nearly 30 years the Clean Air Act has imposed an arbitrary regulatory cap on the volume of ethanol permitted in a gallon of gasoline to just ten percent, commonly referred to as an E10 blend. Motor vehicles have been approved to use E10 for decades and E10 comprises more than 75 percent of the gasoline used by American motorists today. According to our estimates, this year, biofuel use will collide with the "E10 blend wall," a mathematical and practical limit on the use of ethanol in gasoline.

In other words, every gallon of gasoline that can contain ten percent ethanol will contain ten percent ethanol this year. If the EPA does not authorize up to E15 pursuant to the waiver request, demand for biofuels will come to a standstill in the near-term. In the long-term, failure to overcome the blend wall will put the future

of cellulosic biofuel in grave jeopardy. While there are many reasons why this waiver should be approved by EPA, ACE endorsed the E15 waiver application for two basic reasons.

First, ACE has reviewed the scientific literature and evidence available on higher ethanol blends and believes that the testing that has occurred on ethanol blends above E10 justifies this waiver. Specifically, Section 211(f)(4) of the Clean Air Act provides authority to the Administrator to waive the prohibitions of that section if it is determined that such a fuel will not cause or contribute to a failure of any emission control device or system to achieve compliance by the vehicle or engine with the emission standards to which it has been certified pursuant to sections 206 and 213(a) of the Act. We believe that the testing demonstrates that these criteria can be met with blends up to E15 and indeed by ethanol blends considerably higher than E15.

Second, ACE endorsed the waiver application because it has become clear that such a step is necessary if the nation is to meet the schedule for biofuels use set forth in the Energy Independence and Security Act of 2007 (EISA). The existing E85 and the E10 markets are not able to absorb the volumes of biofuels sufficient to allow regulated entities to meet the annual biofuels blending levels established in EISA. Moreover, the E85 fuel dispensing infrastructure, while growing, is not sufficient to allow that market to expand at a rate that will allow the EISA biofuels targets to be met in the coming years. As a result, to meet these legislated targets, mid-level ethanol blends clearly are needed. We are grateful to the many Members of this Committee who have expressed support for the E15 waiver.

ACE also applauds the President's vision in making biofuels market development a new national priority. The Presidential Directive on Biofuels issued May 5 contains an historic retail marketing effort which can best and most immediately be served through the use of ethanol blender pumps, which allow petroleum marketers the flexibility to offer unleaded gasoline plus a variety of ethanol blends from just one pump. The blender pumps provide more clean-fuel choices and therefore more meaningful choice to motorists.

Conclusion

In closing, ACE is genuinely concerned about the impact of global warming and the effects of climate change and wants to see low carbon energy policies implemented successfully throughout the U.S. and indeed the world.

At the same time, the politicization of lifecycle analysis—in this case to attack biofuels—undermines confidence in this emerging tool, which will become an increasingly important aspect of all state and national efforts to reduce GHG emissions. By insisting on arbitrarily ascribing GHG emissions to biofuels that cannot in fact be shown empirically, and which depend upon tortured use of computer models that lack the confidence of so many reputable scientists, CARB and EPA invite cynicism about their motives, about the basic veracity of their work, and about the potential use of this tool as a political weapon against other energy sources or products in future GHG control programs. As society embarks on this enormously important mission to reinvent the way humans produce and consume energy, this is a very dangerous precedent to set. Further, any low carbon policy that would preclude conventional biofuels from a fair shake in fuels marketplace may unnecessarily and irreversibly jeopardize promising advanced biofuel technology innovations that will depend upon entrepreneurial investment to be realized.

I appreciate the chance to offer our views today, and, on behalf of the members of ACE, I commend your leadership on ethanol issues. Biofuels have the potential to revolutionize American agriculture by ensuring rural communities can be a source of income generation, jobs, and energy security for all Americans for years to come. Importantly, agriculturally-derived biofuels will also continue to reduce our dependence on foreign oil and dramatically reduce emissions of GHGs from the transportation sector. But we must strive carefully to put in place biofuels policies that are scientifically defensible. I look forward to your questions. Thank you.

The CHAIRMAN. Thank you very much, Mr. Jennings, for your testimony.

Mr. Buis, welcome to the Committee.

STATEMENT OF TOM BUIS, CEO, GROWTH ENERGY, WASHINGTON, D.C.

Mr. BUIS. Thank you, Mr. Chairman, Ranking Member Lucas, and Members of the Committee. It is an honor to have the opportunity to testify today on the low carbon fuel standard proposals.

A national low carbon fuel standard is a worthy cause, and one in which the Growth Energy members could support if done correctly. It hasn't been so far, and that is part of the problem.

First, it should apply equally to all transportation fuels. No one should be singled out, as in the case of the CARB decision and EPA.

Second, it should be based on universally accepted science and economic modeling.

And third, the international land use requirements should be eliminated.

The proposals at both the state and Federal level that we have reviewed do not meet these requirements, and we have spoken out aggressively to address the shortcomings of these proposals.

California adopted a standard, as Brian mentioned, that singles out one fuel source, renewable fuels. And the indirect international land use component is the problem there because it starts renewable fuels out with a negative number, and it hasn't even studied the indirect effects of other transportation fuels.

On the Federal level, with EPA's proposed rule and the RFS2, they are basically saying that biofuels in America are forcing land use changes in Brazil, and other foreign countries, to destroy rain forests so they can produce farm commodities to replace projected reduced exports of these commodities from the United States.

You know, I have been in Washington for 21 years, and that is about the most bizarre concept I have ever heard. It reminds me of a quote by President Eisenhower, who once said, "Farming is mighty easy when your plow is a pencil and you are a thousand miles from the nearest cornfield."

Indirect land use changes are not based on universally accepted science nor economic modeling. In the debate in California, over 100 scientists from around the country sent a letter stating that the science does not support the inclusion of this concept. Mr. Chairman, I have a copy of the letter. I would ask if you would allow it to be submitted for the record.

The CHAIRMAN. Without objection, so ordered.

Mr. BUIS. The European Union considered indirect land use changes and decided that further study was warranted. They didn't even go down that road.

And a few weeks ago, President Barack Obama issued a Presidential Directive that created an Interagency Biofuels Working Group that requires a peer review of the science EPA used to establish the indirect land use penalty before proceeding.

So there is a lot of data out there. And the big question is, how can we possibly hold our American farmers responsible for farming practices in sovereign foreign countries? I think the more you look at it, the harder it is going to be.

A lot of factors affect land use changes in other countries. Brazil has been deforesting down there for 30 plus years. Part of the reason—or most of the reason for this is macroeconomic; they need

hard currency to repay their debt incurred back in the 1970s, and to do so, they had to export a commodity. They obviously had their domestic food needs. You have weather factors that come into play. You have currency valuations that come into play. And also into the equation goes productivity.

If you look at what has happened in this country over the past couple of decades, corn yields have virtually doubled; the acreage to plant that corn has remained the same. That trend is going to continue. And I know many of you have heard presentations from a lot of the people in the seed business that project those yields to go up even faster and quicker. And if that is the case, then there is no way you can make that connection that we are going to require virgin acreage to come into production in order to meet the RFS standard.

The land use change provision is probably the most problematic, and as many people have said, no one wants to take ownership for having stuck that into the 2007 bill. I don't think it was adequately debated. Had it been, I think everyone would have agreed that this is not an avenue that we want to go down.

The other thing that people have to keep in mind, and Brian alluded to this, if EPA uses the most recent data on deforestation, while ethanol production has tripled in the last 5 to 6 years in America, deforestation has been cut in half in Brazil. And so, not just the concept, but the manner in which EPA and the data that they have been using is just as much in question.

But the end result will be that we will devastate our domestic ethanol and biodiesel production and just ensure our continued addiction to foreign oil.

We have witnessed many, many foreign oil disruptions since the early 1970s, the OPEC embargo, most recently this past year with $4 gasoline, and it is all because of our dependence on foreign oil. How many wake-up calls, Members of Congress, do we need?

Since the birth of this great nation, American agriculture has been the backbone of our economy. Americans enjoy the lowest per capita expenditure of food of any nation in the world. And while some well-funded campaigns tried to paint farmers, specifically corn ethanol, as the culprit of higher food prices last year, the truth is we were a minor factor of increased food prices.

Ironically, the real culprit was energy, energy prices; unregulated, excessive speculation, Mr. Chairman, that you and the Committee are trying to deal with, and a weak dollar that led to record exports. I think the ethanol industry, the farmers of America, were framed in this debate.

A better way to decrease carbon, obviously—and that is not the purpose of the hearing, Mr. Chairman, but I do want to point out, in following up on what Brian said, if we are going to get to that next generation of feedstock, a couple of things have to happen.

Number one, we have to have a market. We are currently capped at ten percent of our gasoline which, turned around and stated properly, really means it is a Federal mandate that 90 percent be gasoline, which 60 percent is probably imported from countries that don't like us. We can do better than that. We know higher oil prices are coming. Let's capture that creativity in rural America. That is what has driven this industry that we represent. That is

what has made this country great for a long time. And we stand ready to work with you.

Finally, I would just like to say, I commend you, Mr. Chairman, Mr. Lucas, and virtually all the Members of the Committee, for your introduction of legislation last week to correct many of these inequities and stand ready to work with you.

[The prepared statement of Mr. Buis follows:]

PREPARED STATEMENT OF TOM BUIS, CEO, GROWTH ENERGY, WASHINGTON, D.C.

Mr. Chairman, Ranking Member, and Members of the Committee I appreciate the opportunity to testify here today on the various state and Federal efforts to create a low carbon fuel standard. My name is Tom Buis, CEO of Growth Energy.

Growth Energy is a group committed to the promise of agriculture and growing America's economy through cleaner, greener energy. Growth Energy members recognize America needs a new ethanol approach—Through smart policy reform and a proactive grassroots campaign, Growth Energy promotes reducing greenhouse gas emissions, expanding the use of ethanol in gasoline, decreasing our dependence on foreign oil, and creating American jobs at home. Our members do more than support a low carbon fuel standard; they have been working to perfect and produce low carbon fuels for decades. All of their work has paid off. Based on a recent study published in Yale's *Journal of Industrial Ecology*, ethanol produced from corn in modern facilities reduces greenhouse gas emissions by more than 50 percent in comparison to gasoline.

The LCFS is a worthy cause, and one that Growth Energy members would support if done correctly. First, it should apply equally to all transportation fuels. Second, it should be based on universally accepted science and economic modeling. Third, the international land use requirement should be eliminated.

The low carbon fuel standard proposals at the state and Federal level that we have reviewed do not meet these two requirements. Oddly, science and parity have not been part of the equation—which makes us seriously question the motivation.

In California, the California Air Resources Board approved a low carbon fuel standard that measures the direct effects of all transportation fuels, but singles out only ethanol for the indirect effects by including a penalty for indirect land use changes in other countries. It's a complicated scheme—that appears nothing less than a frontal assault on American agriculture.

On the Federal level—while the Climate Change/Energy legislation under consideration by the House Energy and Commerce Committee does not include a low carbon fuel standard, the recently proposed rule to implement the RFS provisions of the Energy Independence and Security Act of 2007 creates a *de facto* low carbon fuel standard, and again it singles out renewable fuels.

The RFS2 rule would assess a penalty for indirect effects to only ethanol and biodiesel production in the United States. Basically, the EPA has determined that the production of ethanol in America is forcing land use changes in Brazil and other foreign countries to destroy their valuable rain forests to produce farm commodities to make up for reduced exports of these commodities from the United States. Mr. Chairman, I have been in Washington for a long time, but I have never heard of a more bizarre concept.

These so-called Indirect Land Use Changes (ILUC) are not based on universally accepted science nor economic modeling. In the debate in California over 100 scientists sent a letter stating that the science does not support the inclusion of this concept. In addition, the European Union considered ILUC and decided that further study was warranted. Also, President Barack Obama issued a Presidential Directive that created an Interagency Biofuels Working Group a few weeks ago that requires a peer review of the science EPA used to establish an ILUC penalty to biofuels before proceeding.

It should be obvious to everyone but a few misguided advocates that ILUC is not ready for prime time. This is so complex—applying international indirect land effects can never be achieved. How can we possibly hold Americans responsible for farming practices in sovereign, foreign countries? This provision is not being advocated by scientists but by those who don't like ethanol and agriculture. To regulate an industry based on untested and unproven theory and not science or reality would undermine our nation's efforts to reduce carbon emissions in the long term, and interfere with our efforts to reduce **our dependence on foreign oil, create green jobs in America, and revitalize our rural communities.**

Land use changes are dynamic. Changes occur for a variety of reasons. Macro-economic issues such as monetary policy, currency values, domestic food needs, weather, and productivity are considerably bigger factors than one specific use for a commodity that can be used for a variety of products.

I also believe that the EPA has overlooked the productivity of American agriculture. In the past 2 decades yields have nearly doubled and are projected to increase significantly in the next twenty years. The net usage of corn should be factored into their modeling. If included, no new virgin acreage should be brought into production to produce the 15 billion gallon mandate required by the RFS and thus the indirect land use for ethanol should be zero. Deforestation in Brazil has been ongoing for the past 3 decades, long before the production of ethanol was a significant industry in the United States. EPA used data of deforestation in Brazil during the period of 2000 to 2004, and did not use the most recent 5 year time frame, during which the production of ethanol in the United States has nearly tripled, while deforestation in Brazil has been reduced by 50%.

The end result of enacting ILUC is that it will cap domestic ethanol production and ensure our addiction to foreign oil. As a nation, we have witnessed many foreign oil disruptions, beginning in the early 1970's with the OPEC embargo that created shortages of gasoline and long lines at gas stations throughout America. Every few years we face a new oil shock to our economy because of our dependence on foreign oil, the most recent this past year when gasoline prices topped at over $4 per gallon. How many wake-up calls do we need? It has been demonstrated many times that our dependence on foreign oil jeopardizes our economy, our national security, jobs and our environment. We can do better. Brazil did! They took the first oil crisis seriously, and committed to making their country energy independent by developing a viable ethanol industry.

Since the birth of this great nation, agriculture has been the backbone our economy. Our forefathers understood that for our great experiment as a democracy to work, the production of safe, affordable, abundant food and fiber was essential. This country was founded on agriculture and, despite the critics, Americans enjoy the lowest per capita expenditures on food of any nation in the world. ILUC that will dictate how we farm in America threatens the future of American agriculture and possibly whether we farm in America at all. To think that we can control other countries farming decisions is naïve at best, and will ultimately lead to the downfall of the most successful industry in the history of the United States. We cannot afford to have questionable theories dictate our nation's efforts to achieve energy independence.

Where do we draw the line on indirect land use changes? Is it fair to only penalize the production of ethanol for land use changes when other factors were the cause? For example, if farmland is idled in the United States for conservation, housing developments, strip malls, highways, parks, recreation, *etc.,* these could impact land use changes in other countries. These are all factors that should be considered before blaming all land use changes in other countries on renewable fuels.

How can anyone believe that continuing our dependence on foreign oil from Saudi Arabia, Iran, or Venezuela is better for the future of our nation than the production of renewable fuels in America?

A far better way to decrease the carbon content of our fuels is to use more low carbon fuels. This is the reason that Growth Energy filed a waiver with the EPA to increase the amount of ethanol that can be used in our nation's fuel from 10% to up to 15%. This waiver request, would reduce the need for an additional 7 billion gallons of imported gasoline annually, create 136,000 new jobs in America, reduce carbon emissions and revitalize our rural communities. More science, technical data and legal precedent exists today than in the history of the EPA waiver process. We have a window of opportunity to do the right thing. High oil prices WILL come back. In fact gasoline prices have increased 20% in the last few weeks during the biggest economic recession in modern history. The next oil shock to face our nation because of our reliance on foreign oil is not if, but when. Every day that America is held captive to a 90 percent oil mandate is a day that we continue to enrich foreign oil exporting countries. An incremental move to E15 is the equivalent to knocking out oil imports from Venezuela—something we should all agree is a worthwhile cause. For the sake of our economy, rural America, national security, and energy independence we absolutely need to move quickly to E15. Despite the rhetoric—the science is there. It is time to act. The only question is whether or not we are committed. I can tell you with certainty that those I represent are standing ready to do their part.

In closing Mr. Chairman, I commend you, Ranking Member Lucas and nearly the entire House Agriculture Committee for introducing legislation to eliminate the international land use provision included in the 2007 energy legislation. As you

have stated, this provision was included at the last minute and not debated by Congress. To proceed as EPA has proposed would devastate the ethanol industry which is the only currently viable alternative to foreign oil, creates American jobs, improves the environment and provides economic opportunity to rural America. As gasoline prices continue to rise again, our nation must not go to sleep again on our efforts to end our addiction to foreign oil.

Growth Energy supports your legislation, and urges its adoption.

Thank you for the opportunity to testify today on this important issue.

ATTACHMENT

March 2, 2009

Hon. ARNOLD SCHWARZENEGGER,
Governor,
Office of the Governor,
Sacramento, CA.

RE: Opposed to Selective Enforcement of Indirect Effects in CA LCFS

Dear Governor Schwarzenegger,

We are writing regarding the California Air Resources Board's (ARB) ongoing development of the Low Carbon Fuel Standard (LCFS). With the rulemaking nearing its final stage, we would like to offer comments on the critical issue of how to address the issue of indirect, market-mediated effects.

As you are aware, ARB staff continues to push a regulation that includes an indirect land use change (iLUC) penalty for biofuels. To be clear, this effect is not the direct land conversion from growing crops for fuel. It is the alleged indirect, price-induced land conversion effect that could occur in the world economy as a result of any increase in demand for agricultural production. The ability to predict this alleged effect depends on using an economic model to predict worldwide carbon effects, and the outcomes are unusually sensitive to the assumptions made by the researchers conducting the model runs. In addition, this field of science is in its nascent stage, is controversial in much of the scientific community, and is only being enforced against biofuels in the proposed LCFS.

The push to include iLUC in the carbon score for biofuel is driven at least partially by concerns about global deforestation. There is no question that global deforestation is a problem, and that indirect effects must be looked at very carefully to ensure that future fuels dramatically reduce GHG emissions without unintended consequences. The scientific community is actively seeking ways to mitigate deforestation, enhance efficient land use, feed the poor and malnourished and reduce global warming. Because of the complex and important issues involved, it is critical that we rely on science-based decision-making to properly determine and evaluate the indirect effects of all fuels, as well as any predicted changes in agricultural and forestry practices. In a general sense, it is worth noting that most primary forest deforestation is currently occurring in places like Brazil, Indonesia and Russia as a direct result of logging, cattle ranching and subsistence farming. Adding an iLUC penalty to biofuels will hold the sector accountable to decision-making far outside of its control (*i.e.,* for decisions related to the supply chains of other products), and is unlikely to have any effect on protecting forests or mitigating GHG emissions as a result of land management practices. But because indirect effects are not enforced against any other fuel in the proposed LCFS, an iLUC penalty will chill investment in both conventional and advanced biofuel production, including advanced biofuels made from dedicated energy feedstocks such as switchgrass and miscanthus, which have the potential to make the agricultural sector far less resource-intensive and could provide a significant carbon negative source of transportation fuel.

More than 20 scientists wrote to the ARB in June 2008 suggesting that more time and analysis is required to truly understand the iLUC effect of biofuels. In addition to iLUC, we know very little about the indirect effects of other fuels, and therefore cannot establish a proper relative value for indirect effects among the various compliance fuels and petroleum under the LCFS. In consideration of this and other rulemaking activities and research conducted since June 2008, we, the undersigned 111 scientists, continue to believe that the enforcement of any indirect effect, including iLUC, is highly premature at this time, based on the following two principles:

(1) The Science Is Far Too Limited and Uncertain For Regulatory Enforcement

ARB staff is proposing to enforce a penalty on all biofuels for indirect land use change as determined by a computable general equilibrium (CGE) model called GTAP. This model is set to a static world economic condition (*e.g.,* 2006), then

shocked with a volume of biofuel to create the perceived land conversion result. The modeling outcome is applicable to the set of assumptions used for that particular run, but is not particularly relevant when there is a shift in policy, weather, world economic conditions or other economic, social or political variables. For example, by definition, these models assume zero innovation, which means they could not have predicted the 500% increase in corn yields since 1940, the tripling of wheat yields since 1960, or the 700% increase in yield that can occur if farmers in developing countries adopt higher yield seed varieties and more efficient farming practices. This inability to predict innovation is not limited to agriculture; similar attempts to use economic equilibrium models in other emerging markets like telephony or computing would have been equally unsuccessful. As discussed, the model runs are unusually sensitive to the assumptions made by the modelers, which is why the iLUC modeling results published thus far differ by a factor of at least four, and under some scenarios, are actually zero for today's biofuels. Even at this late stage in the LCFS process, the GTAP model runs still do not reflect basic on-the-ground realities, such as the use of marginal and idle lands. They do not reflect recent articles about the potential for energy crops to absorb carbon at higher rates than previously thought. A partial solution to this problem is to conduct a series of model runs with different assumptions and adjustments. Unfortunately, this has not occurred at ARB (researchers have run limited sensitivity analysis within the current set of primary assumptions). We are only in the very early stages of assessing and understanding the indirect, market-mediated effects of different fuels. Indirect effects have never been enforced against any product in the world. California should not be setting a wide-reaching carbon regulation based on one set of assumptions with clear omissions relevant to the real world.

(2) Indirect Effects Are Often Misunderstood And Should Not Be Enforced Selectively

In basic terms, there is only one type of carbon impact from a commercial fuel: its direct effect. Direct carbon effects are those directly attributable to the production of the fuel, which in the case of biofuel includes the land converted to produce the biofuel feedstock. Indirect effects, on the other hand, are those that allegedly happen in the marketplace as a result of shifting behaviors. As such, penalizing a biofuel gallon for direct *and* indirect land use change is the equivalent of ascribing the carbon impact of land converted to produce biofuel feedstock as well as the land needed to produce another, allegedly displaced supply chain (*e.g.,* soy production for food). Leaving aside the issue of whether these effects can be predicted with precision or accuracy, or whether such a penalty is appropriate for the LCFS, it is clear that indirect effects should not be enforced against only one fuel pathway. Petroleum, for example, has a price-induced effect on commodities, the agricultural sector and other markets. Electric cars will increase pressure on the grid, potentially increasing the demand for marginal electricity production from coal, natural gas or residual oil. Yet, to date, ARB is proposing to enforce indirect effects against biofuel production only. This proposal creates an asymmetry or bias in a regulation designed to create a level playing field. It violates the fundamental presumption that all fuels in a performance-based standard should be judged the same way (*i.e.,* identical LCA boundaries). Enforcing different compliance metrics against different fuels is the equivalent of picking winners and losers, which is in direct conflict with the ambition of the LCFS.

Proponents of iLUC inclusion claim that all regulations are uncertain. This is true. However, the level of uncertainty implicated here far outweighs that found in other regulatory fields. For example, the European Parliament declared in December that the iLUC of biofuel "is not currently expressed in a form that is immediately usable by economic operators."[1] They decided not to incorporate iLUC penalties in their biofuel programs and initiated further analysis of the issue. It is also not enough to suggest that iLUC is a significant indirect effect, while other indirect effects are likely smaller. The magnitude of the alleged iLUC effect ranges from zero to very large, depending on the assumptions utilized. This is also likely true for other fuels, especially with regard to the marginal gallons of petroleum that are coming into the marketplace, such as heavy oil, enhanced oil recovery, and tar sands. Either way, even small effects are significant under the LCFS. Just a few g/MJ separate corn ethanol from petroleum in the proposed regulation, and advanced biofuel is very close to CNG and hydrogen under certain scenarios. We agree with the sentiment expressed by many experts that while indirect effects are important to understand, enforcing them prematurely and selectively on only certain fuels in a performance-based standard could have major negative consequences, even for

[1] *http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+TA+P6-TA-20080613+0+DOC+XML+V0//EN&language=EN#BKMD-27.*

GHG mitigation. Put another way, no level of certainty justifies asymmetrical enforcement of indirect effects.

Given the limited time, a reasonable solution to the challenges discussed above is to submit an LCFS regulation based on direct carbon effects (including direct land use impacts) and support a rigorous 24 month analysis of the indirect, market-mediated effects of petroleum and the entire spectrum of alternative fuels, regardless of source. The analysis could be conducted in collaboration with other institutions and governments implementing carbon-based fuel standards, and should include a consideration of the best way to prevent carbon effects outside the primary system boundary, including promoting sound land use practice with more direct policy solutions. This approach is consistent with the principle that all fuels should be judged through the same lens in a performance-based standard, as well as the approach taken by the European Parliament. It is worth noting that an LCFS policy based on direct effects already favors non-land intensive, advanced biofuel production over conventional biofuel production.

The LCFS provides an incredible opportunity to reduce the carbon intensity of transportation fuel and promote a more sustainable transportation fuel marketplace. We commend your leadership and the ARB staff for their ability to process a challenging set of scientific data resources into a workable regulation. However, it is critical that the LCFS stay on course with regard to its primary mission of establishing a level, carbon-based playing field for all fuels.

We are writing this letter as researchers in the field of biomass to bioenergy conversion, but the signatories do not represent the official views of the home institutions, universities, companies, the Department of Energy, the United States Department of Agriculture, or any of the National Laboratories. We look forward to working with ARB to ensure that the regulation reflects the best science available, and takes a policy approach that is balanced across all fuel pathways.

Sincerely,

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The CHAIRMAN. Thank you very much, Mr. Buis.

Mr. Dinneen, welcome to the Committee.

STATEMENT OF BOB DINNEEN, PRESIDENT AND CEO, RENEWABLE FUELS ASSOCIATION, WASHINGTON, D.C.

Mr. DINNEEN. Thank you, Mr. Chairman.

Thank you, Ranking Member Lucas and Members of the Committee. Thank you for holding this hearing, and thank you as well for bringing attention to the inadequacies of the EPA's modeling of the RFS2 rule.

Americans will only enjoy the future benefits of biofuels and low carbon fuel standards if developing energy and environmental policies are based on sound science, defensible modeling, rigorous validation, and meaningful peer review.

Unfortunately, the U.S. EPA's lifecycle analysis for biofuels in the RFS2 rule does not meet that test because it selectively penalizes ethanol for highly tenuous indirect greenhouse gas effects assumed to occur as a result of indirect land use changes in other countries.

In short, EPA has over-read the statute and under-evaluated the science and, as a consequence, has threatened the continued development and evolution of the biofuels industry and, more importantly, may have undermined the continued movement towards climate change policy in this country.

With regard to the law, EPA has read into the statute international land use impacts while the statute did not require it; I don't believe Congress intended it; and the science cannot support it.

At the same time, EPA seemingly reads out of the statute the requirement to do a full fuel-cycle analysis, choosing instead to do a seemingly full food-cycle analysis. And again, I don't think the modeling for international commodity price impacts is mature

enough to set a regulatory framework in the way that EPA proposes.

Now, with regard to the science, I want to make a couple of points. First of all, EPA has failed to recognize all of the factors impacting international land use change, focusing, instead, on only commodity prices. But as this chart demonstrates, there are many, many more factors influencing a farmer's decision to plant someplace else in the globe.

EPA is focused on commodity prices; okay, that is an impact. But they have ignored changing environmental policies, changing global diets. They have ignored currency valuations. They have ignored equity markets, and most importantly, they have ignored energy markets.

Now, this debate isn't terribly similar from the food *versus* fuel canard that we were dealing with a year ago, when ethanol was singularly responsible for driving up the price of food. But experience has shown, and data has demonstrated, that the actual cause of rising food prices last year was largely the result of energy prices. Other factors, sure, demand, weather, speculation in the marketplace, but Purdue University studies concluded 70 percent of the rise in food prices last year was attributable to energy prices.

The same is the case here. But in this case, EPA is assigning all of the impact to biofuels. Now, this chart circles around a biofuels metric. And those are the direct effects; people understand what those are. But I want to make sure that this Committee understands as well that that is a cradle-to-grave analysis. That includes the energy it takes to produce the: grain, the energy and transportation costs to get that commodity to the plant; the energy conversion cost at the plant; the energy it takes to move that product to the marketplace. It even includes the energy and inputs associated with the seed that is grown for the corn.

They are counting the angels on the head of a pin for direct effects. And then, in addition to that, they want to show these indirect effects as well that are somebody else's direct impacts. Biofuels are being penalized for market-induced behavior around the globe over which our industry has absolutely no control.

Now, Mr. Chairman, I found just recently a study that I would submit for the record as well from Greenpeace that concludes that deforestation in Brazil is the result of cattle. I am sorry, if it is the result of cattle, it can't be the result of biofuels. You can't count this carbon emission many, many times.

Now, while predicting international and direct effect changes is highly tenuous and driven by assumptions, there are some domestically occurring indirect effects that do make sense to take into consideration. The byproduct of ethanol production, DDG, actually reduces methane emissions because cattle is not on feed as long. That is an indirect effect. It needs to be taken into account. It is domestic. It is something that EPA can demonstrate, there is much more data on it, and we think that is what was intended when indirect effects was put into this bill.

There are other indirect effects, of course. And it is most certainly associated with energy and petroleum. If ethanol is being used to displace petroleum, then we are not importing more tar sands. We are not using more heavy crude. We are not having the

environmental consequence of an increased dependence on petroleum. And those indirect effects are not contemplated by EPA at all in this rulemaking, and they need to be.

The second issue I really want to address as well is just the uncertainty and the limitations associated with the current methodologies used to estimate indirect international land use change, which render the results highly questionable.

The EPA has used nine separate models to reach its conclusion. Each of these models were designed for some other purpose. None of them were designed to assess the carbon footprint of an industry. There is the GREET model, which they use to assess the direct effects. They validated that to a certain degree with the ASPEN model. They have used the FAPRI model for indirect effects internationally, the FASOM model for indirect effects domestically. They have used Winrock data to try to assess the carbon impact of land use change and several other models.

There are uncertainties associated with each of these models. And when you cobble them together in the way that EPA has, you don't just get the additive effect of this uncertainty; you get an exponentially increased effect. That is crystal clear when you look at the results of the modeling that has been done.

Both EPA and the California Air Resources Board were asked to look at essentially the same question: What is the carbon footprint of ethanol? And they both looked at international land use impacts. They both looked at direct effects. And the two leading environmental organizations in the universe came to essentially the same conclusion, but very different ways because CARB's assessment of indirect effects is twice that of EPA's. EPA's assessment of direct effects is half that of CARB's. Now, I am sorry, if these two organizations, looking at the same factors, evaluating all of the inputs, come to a 100 percent difference with respect to indirect effects and an 84 percent difference with respect to direct effects, I would suggest to you that the modeling is not yet right for regulatory frameworks. And that is what we have.

Now, one of the architects of this modeling recently stated or acknowledged that models should be used as learning tools, not truth machines. That is clearly what we have here. These are issues that need to be addressed. We need to understand them more, but trying to assign the carbon footprint of ethanol based on models that are not well understood, cannot be back-casted, that you cannot rely upon for forecasting, makes no sense.

In order to achieve the goals of reduced greenhouse gas emissions for transportation fuels that were envisioned by the Energy Policy Act of 2005 and 2007, and for future low carbon fuel standards, it is imperative that we allow our public policies to be guided by sound science and defensible modeling. And I look forward to working with this Committee to continue the effort to bring sound science back to this process.

Mr. Chairman, thank you.

[The prepared statement of Mr. Dinneen follows:]

PREPARED STATEMENT OF BOB DINNEEN, PRESIDENT AND CEO, RENEWABLE FUELS ASSOCIATION, WASHINGTON, D.C.

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

[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.

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; BlueFire 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 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 two-fold 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, 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.

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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.

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 5 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.

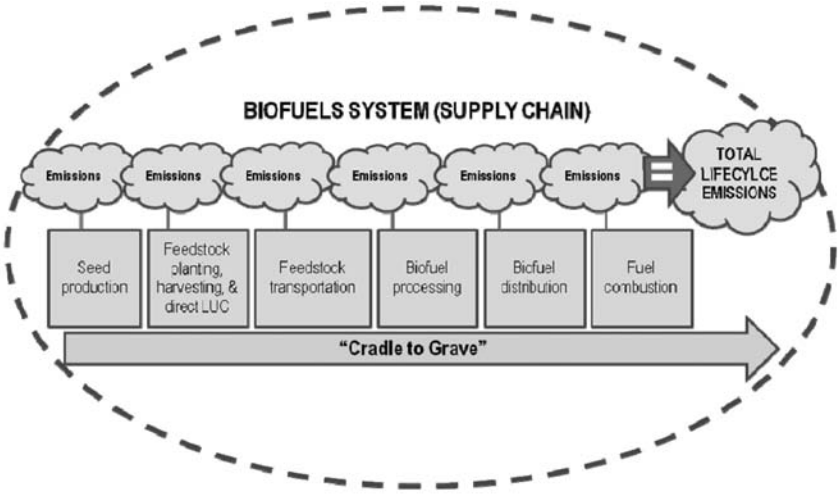
Let me be clear, we are not arguing that these indirect effects do not occur. As I discussed earlier, we agree that every energy decision we make, both as a nation and as individuals, carries with it a multitude of secondary impacts. Rather, we are highlighting the difficulties associated with positively 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

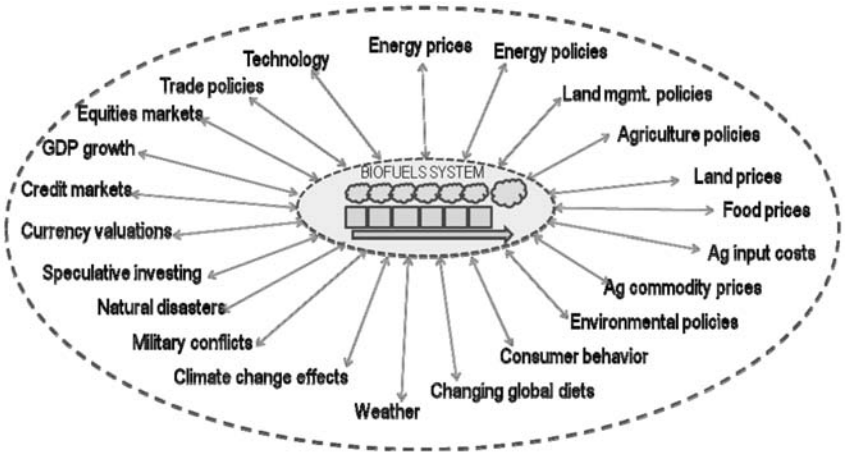
marketplace and plants corn on land that might have otherwise grown soybeans, the lost soybean production must be made up somewhere else in the world. But in the real world, things are not nearly that simple. Accurately assigning cause for land conversion and quantifying indirect land use changes in 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 sec-

ond 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 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

[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.*

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 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

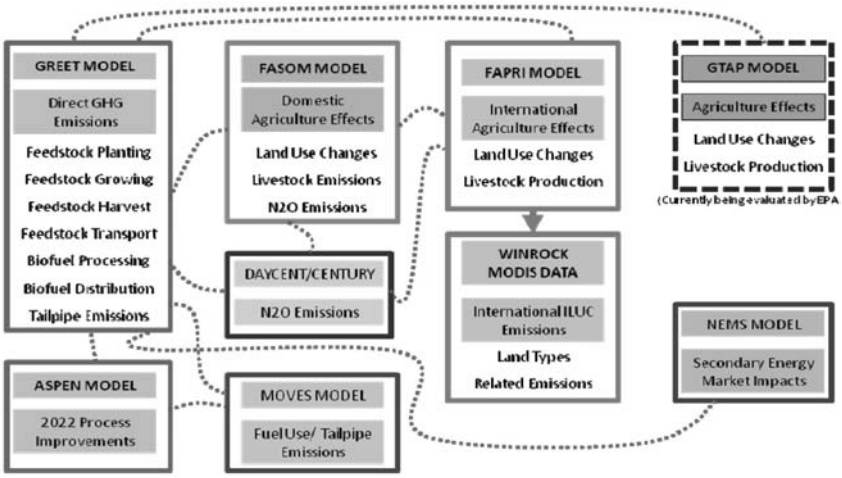
[6] Liska, Adam J., Haishun S. Yang, Virgil R. Bremer, Terry J. Klopfenstein, Daniel T. Walters, Galen E. Erickson, and Kenneth G. Cassman. "Improvements in Life Cycle Energy Efficiency and Greenhouse Gas Emissions of Corn-Ethanol." *Journal of Industrial Ecology.* Vol. 13, Issue 1 (February 2009).

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.

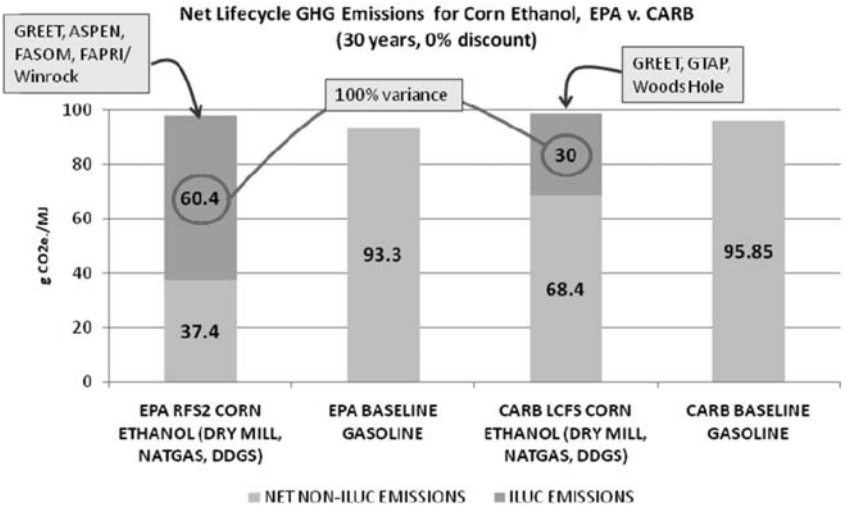
3. The inherent uncertainty and limitations associated with current methodologies used to estimate indirect international land use change render the results highly questionable.

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 RFS2



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 2 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 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;

[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.*

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

- 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 2 year study aimed at gaining a better understanding of the land impacts of biofuels and methods for minimizing land effects.

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.

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[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.*

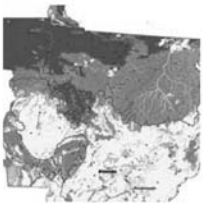
[10] *http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+TA+P6-TA-2008-0613+0+DOC+XML+V0//EN&language=EN#BKMD-27.*

ATTACHMENT

AMAZON CATTLE FOOTPRINT

MATO GROSSO:
STATE OF DESTRUCTION

GREENPEACE



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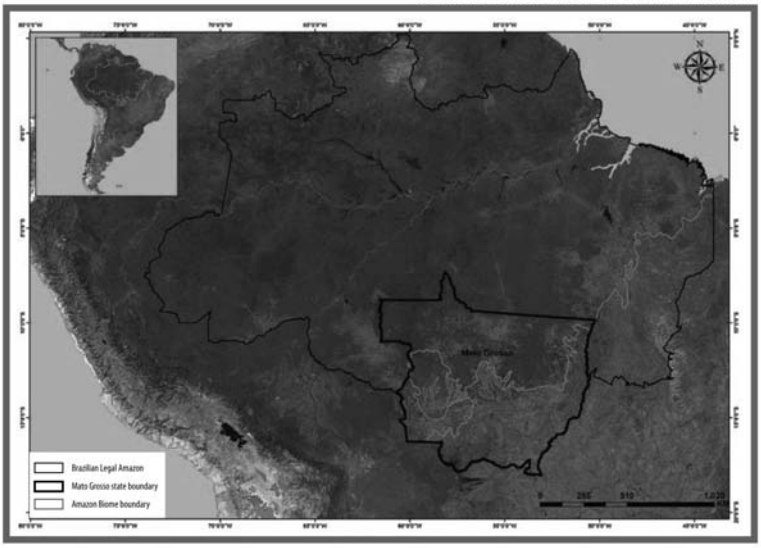
LOCATION OF MATO GROSSO IN THE AMAZON REGION



AREAS UNDER THREAT

The *Amazon Basin* covers an area of approximately 6.5 million km² across nine South American countries, five percent of the Earth's surface. It holds the largest river system on the planet, about one-fifth of the total volume of fresh water of the world. Some 60% of the Amazon basin (4.1 million km²) is inside Brazil's borders.[1]

Brazil's *Legal Amazon* is an administrative designation and includes the whole Amazon forest[2] in Brazil, plus some areas of savannah in the states of Mato Grosso and Tocantins. So far, 700 thousand km² of the original Amazon forest cover of Brazil has been destroyed - this is equivalent to an area more than twice the size of Poland[3].

INTRODUCTION

Between 2000 and 2007, the Brazilian Amazon was deforested at an average rate of 19,368 km² per year. Over this time, 154,312 km² of forest, an area larger than Greece[4], was destroyed.

Brazil is the world's the fourth biggest climate polluter[5]. Deforestation and land-use change make up 75% of all Brazilian greenhouse gas emissions. From this, 59% comes from loss of forest cover and burning in the Amazon region[6].

Cattle ranching which has been expanding continuously since the early 1970s, is responsible for the majority of Amazon deforestation. This is the result of more than 30 years of government policies that have encouraged investments in infrastructure (roads, dams), occupation of the territory (induced migration) and public funding of such activities.

Illegally occupied forest land is currently very cheap; making cattle ranching both profitable and expanding. In 2003, a study funded by the World Bank[7] showed the direct relationship between deforestation and cattle ranching, the report detailed how ranching is a strong driver for occupation, conversion and trade of illegally-used land.

Brazil has the largest commercial cattle herd in the world and has been the world's largest beef exporter since 2003. A Greenpeace survey based on Brazilian government data shows that in 2006 cattle occupied 79.5% of the land already in use in the Brazilian Legal Amazon (excluding the state of Maranhão)[8].

According to the data, in 2006 there were three head of cattle per inhabitant in the Legal Amazon[9, 10].

Around 40% of Brazil's cows are currently located inside the Amazon, and this is where most of growth of cattle ranching occurs. From 2002 to 2006, 14.5 million of the total 20.5 million head of cattle added to Brazil herd were located in the Amazon[11]. The expansion of cattle ranching in the Amazon Region has intensified in line with increasing international exports of Brazilian cattle and beef.

This study charts the location of pasture areas in the Brazilian Amazon, in the state of Mato Grosso. Using a new method, it analyses images released from the Moderate-resolution Imaging Spectroradiometer (Modis) satellite to identify which deforested areas are currently used for cattle ranching compared to those used for crops. Greenpeace studied the Amazon area in the state of Mato Grosso, which holds the largest bovine herd in the country, and has the largest average deforestation rates since 1988[12].

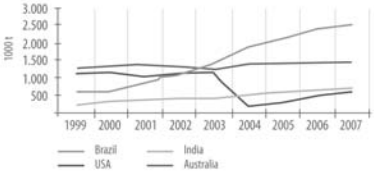
Mato Grosso extends over 903,358 km² and comprises the Amazon forest plus large areas of Cerrado (savannahs) and the Pantanal (flooded plains)[13]. In absolute terms, the state has the highest cumulative Amazon deforestation rates, so far some 185,587 km² has been destroyed, that's an area twice the area of Hungary[14].

The eight maps in this report show the land use, comparing it with data on infrastructure, recent deforestation and regional dynamics.

Brazil has a very important role to play in mitigating the effects of climate change. The country must see deforestation ended by 2015, a "zero-deforestation" target, this can be achieved through progressive deforestation reduction goals that combine development, sensible use of natural resources and biodiversity conservation.

Understanding land use change is a critical starting point for the Brazilian Government to make decisions about effective governance, control of cattle ranching and other agricultural sectors and how best to reduce and eliminate deforestation in the Amazon region.

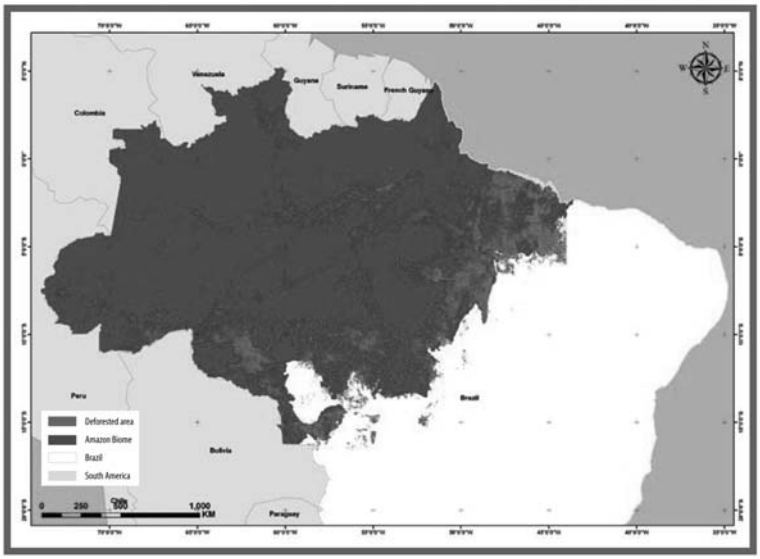
WORLD BEEF EXPORTS



SOURCE ABIEC (BRAZILIAN ASSOCIATION OF MEAT EXPORTERS), WITH DATA FROM MDIC (MINISTRY OF DEVELOPMENT, INDUSTRY AND TRADE) AND USDA (UNITED STATES DEPARTMENT OF AGRICULTURE)

HOW IS AMAZON DEFORESTATION MEASURED?

DEFORESTATION SHOWN BY PRODES



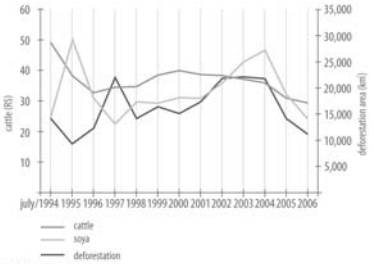
Since 1988, the Brazilian National Institute for Space Research (INPE) has released annual estimates of deforestation rates in the Legal Amazon. Since 2002, these estimates have been prepared through digital tracking of images, following the Amazon Deforestation Estimate Program (PRODES) methodology, and using images generated by the Landsat satellite.

In 2004, annual deforestation rates in the Amazon reached their second highest level ever, then dropped dramatically until 2007[15]. PRODES preliminary data show that 11,968 km² of Amazon forest were destroyed between August 2007 and July 2008 – a rise of 3,8% compared to the previous year[16].

Rates of deforestation in the Amazon are affected by international commodity price fluctuations, particularly of meat and soya[17]. When the price of both products drops, deforestation rates reduce significantly in the following year.

It remains to be seen what implications of the 2008 global financial crisis will have be the region.

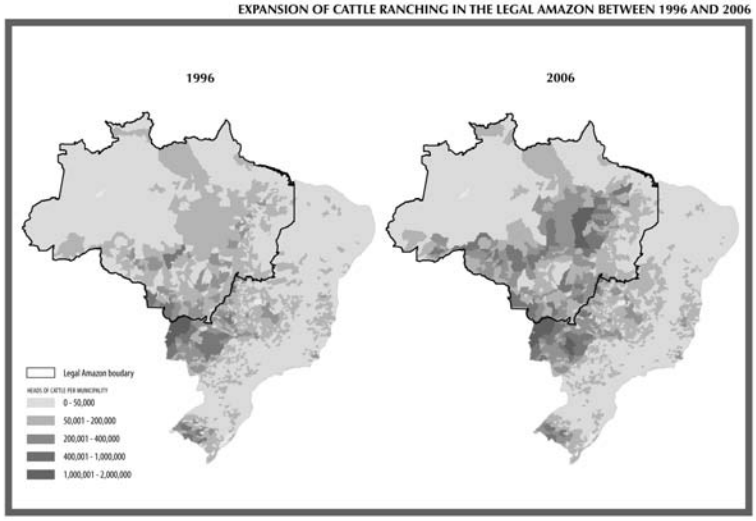
ANNUAL DEFORESTATION RATES COMPARED TO MEAT AND SOYA PRICES



SOURCE IMAZON

EXPANSION OF CATTLE RANCHING IN THE LEGAL AMAZON

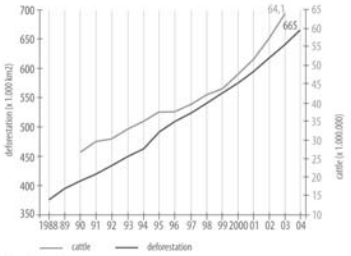
EXPANSION OF CATTLE RANCHING IN THE LEGAL AMAZON BETWEEN 1996 AND 2006



The number of cattle bred in the Legal Amazon is growing fast: between 1990 and 2003, the bovine herd more than doubled, from 26.6 million to 64 million head of cattle – 60% of the herd are in the states of Mato Grosso and Pará[18].

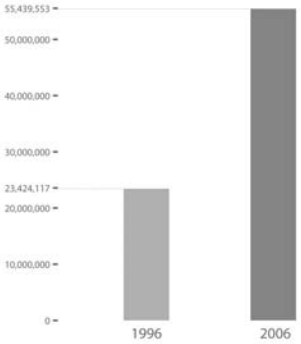
This growth intensifies Amazon forest destruction, as complex ecosystems are gradually being replaced by new pasture areas. According to Brazilian Institute of Geography and Statistics (IBGE), between 1996 and 2006 the area of pastures in the Amazon region grew by approximately 10 million hectares – an area about the size of Iceland.

TOTAL HERD AND TOTAL DEFORESTATION



SOURCE IMAZON

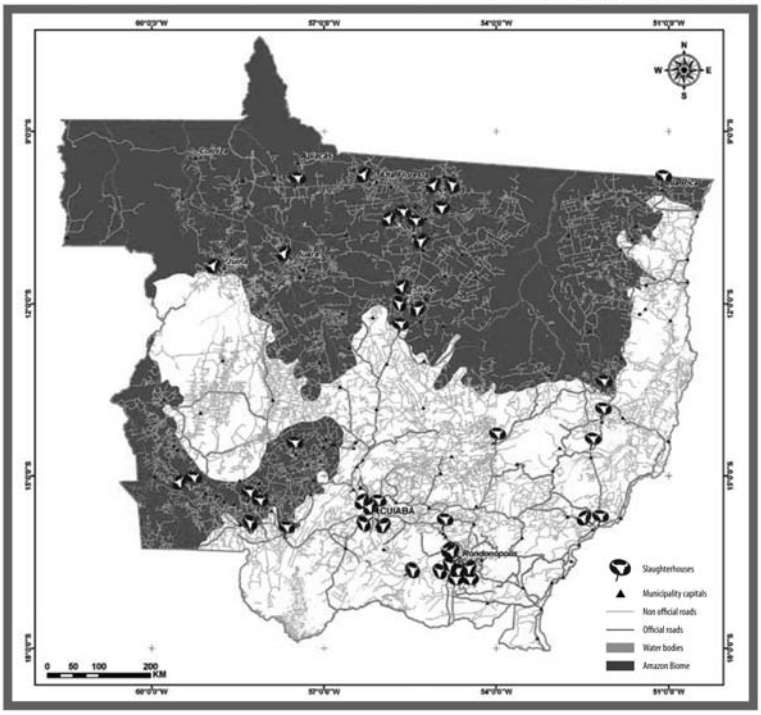
AREA OCCUPIED BY CATTLE RANCHING IN THE LEGAL AMAZON (HECTARES)



SOURCE IBGE: MARANHÃO EXCLUDED

DISTRIBUTION OF INFRASTRUCTURE

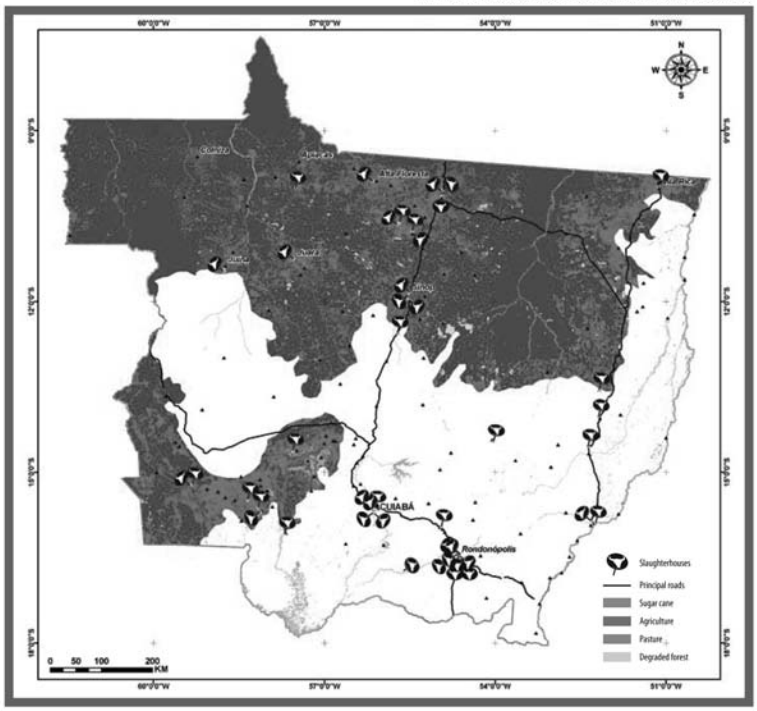
SLAUGHTERHOUSES AND ROADS IN MATO GROSSO



The building of new roads allows human occupation and further destruction of the Amazon rainforest. An INPE survey shows that up to 87% of deforestation in the region occurred less than 25 km from the first settled areas, where occupation started around 1978 as a result of roads opening up[19]. These roads, which link the Northern region to the rest of Brazil, were heavily funded by the federal government in the 1970s. Unofficial roads connect local sites and are not shown on the official charts prepared by the Brazilian government Infrastructure and Transportation Agency (DNIT) and by the IBGE[20]. The number of roads allows cattle ranching to occur even in remote areas - hundreds of kilometres away from slaughter facilities.

THE IMPACT OF THE INDUSTRY

LAND USE AND SLAUGHTERHOUSES IN MATO GROSSO



This map shows how there is a marked concentration of deforested areas and pastures in the areas around cattle slaughterhouses. These extend, via a network of roads, for hundreds of kilometres. Even those units located on the Cerrado Biome (savannahs) have an impact on large areas of the Amazon forest.

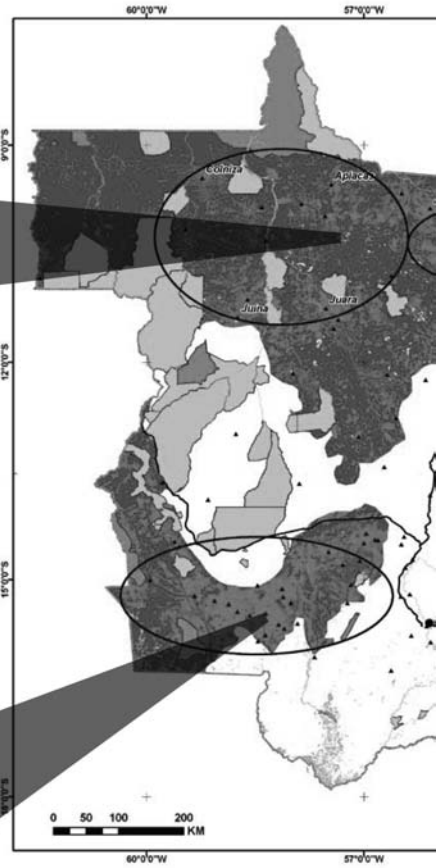
WHAT DOES SIF MEAN?

Slaughterhouses must be registered at the Federal Inspection Service (SIF) to gain permission to export their products to other states or abroad. SIF-registered facilities are just a fraction of all existing slaughterhouses, but they usually belong to the group of companies with the biggest production capacity. Of the 71 slaughter facilities registered at the SIF and located in the Amazon region, 45 are in Mato Grosso[21]. In addition, there are local and state facilities, plus an unknown number of clandestine cattle slaughterhouses supplying local markets.

CATTLE FOOTPRINT IN MATO GROSSO

This analysis of land use identifies four main areas of expansion and consolidation of cattle production in the Amazon forest of the state of Mato Grosso.

CATTLE RANCHING EXPANSION AREAS IN THE AMAZON BIOME, MATC



THE FAR NORTH (NORTÃO)

This area encircled by the municipalities of Juína, Juara, Apiacás and Colniza in the Northwest of Mato Grosso is one of the newest parts of the Amazon to be deforested for cattle ranching. The area is linked by road to the West, East and South where cattle ranching is already established. Over the past three years occupation of the far North has accelerated, mainly around Colniza, a town already linked to the Southern region of the Amazonas state. In these border regions the growth of cattle ranching is strongly connected to destructive logging.

AMAZON BIOME STRIP

This area extends towards the savannah and forms a strip in the Southernmost part of the biome. These areas were deforested before 2000 and have massive infrastructure, including roads and cattle slaughter and storage facilities.

There is no remaining intact rainforest in this area, instead it is characterised by extensive and continuous pastures with low density of cattle per hectare. It is hard to believe that this area was, not so long ago, rainforest.

THE ALTA FLORESTA – BR-163 ROAD INTERSECTION

The area along the BR-163 road is one of the best known sites for soya farming expansion in Mato Grosso. The areas close to the road, opened in 1970, are already completely occupied, and until you reach the municipality of Sinop to the North, soya plantations are the main cause of deforestation. At Sinop, and particularly at the intersection of the BR-163 with Alta Floresta, cattle ranching is dominant. Recent deforestation for cattle ranching expands to the North up to the Pará state border, and to the West.

THE SPRINGS OF THE XINGU RIVER

Most of the course of the Xingu River in Mato Grosso is protected by the Xingu Indigenous National Park, which covers 2,642,003 hectares[22]. Outside of the park, however, forest destruction threatens the springs of the river and therefore the course of water to it. This disrupts its delicate ecosystems needed to maintain biodiversity and support the almost 6,000 indigenous people from 14 different ethnic groups. In these areas it is possible to see recently deforested areas occupied by both cattle ranching and soya crops.

MODIS IMAGE AND LAND USE

LAND USE ON SATELLITE IMAGE

LAND USE IN LEGAL AMAZON IN 2006

LAND USE IN LEGAL AMAZON AND IN BRAZIL IN 2006

PASTURE

TOTAL OF PASTURE IN BRAZIL
172,333,073 HA

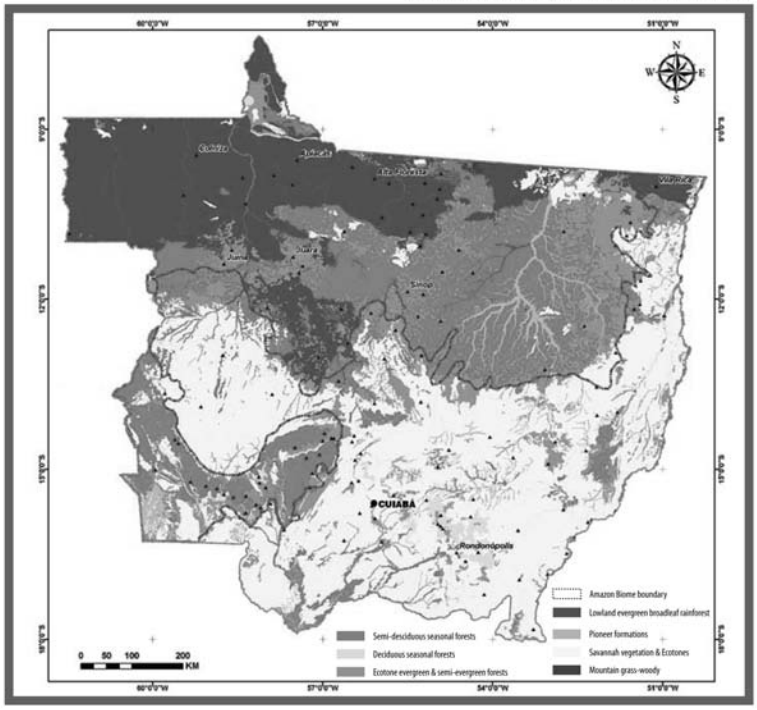
AGRICULTURE

TOTAL OF AGRICULTURE IN BRAZIL
76,697,324 HA

SOURCE IBGE

THREATENED HERITAGE

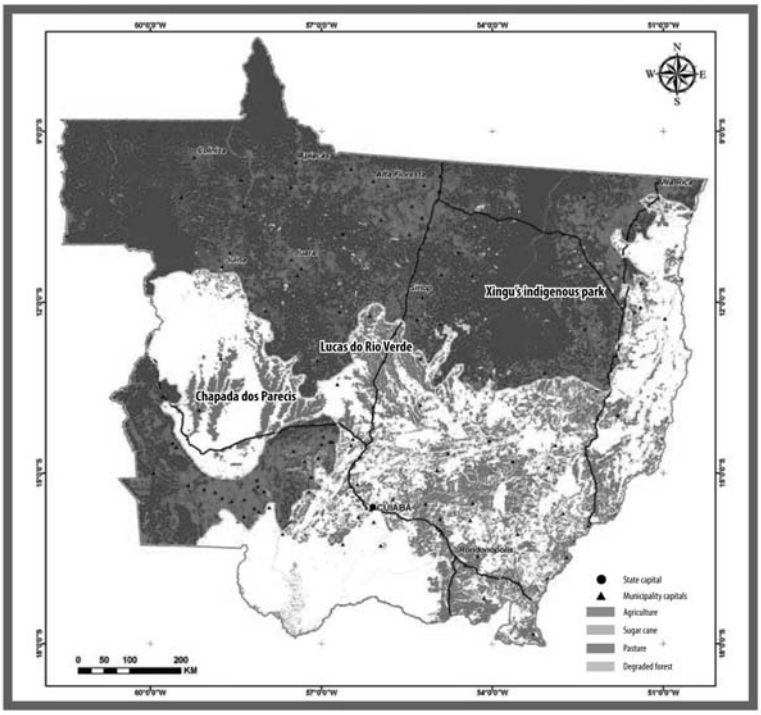
ORIGINAL VEGETATION IN THE STATE OF MATO GROSSO



The Amazon basin holds the largest tropical forest in the world and it is the most diverse ecosystem on Earth[23,24]. It plays a vital role in ensuring the region's water supplies, regulating rainfall, and it is crucial to keeping the world's climate in balance. Two of the main tributaries of the Amazon River have their origins in Mato Grosso: Xingu and Tapajós.

CURRENT LAND USE IN THE STATE OF MATO GROSSO

LAND USE IN THE STATE OF MATO GROSSO



Cattle ranching has been expanding and fuelling deforestation in the Amazon Biome of Mato Grosso state, but land use distribution in Mato Grosso also includes vast areas of savannah, where industrial farming of monocultures, particularly soya crops, impact four prominent areas.

- The Lucas do Rio Verde region is the biggest agriculture area in Mato Grosso and it extends beyond the savannah, occupying large areas of the Amazon forest.
- The Chapada dos Parecis region, between the land strip and the remaining Amazon Biome, has expanded along the Porto Velho – Santarém export axis, which follows the Amazon River.
- Soya crops (which require intensive use of agrochemicals), as well as cattle, also threaten the Xingu River springs and occupy mainly the neighbouring area on the Southeast of the indigenous park.
- Large areas of Cerrado (savannah) in Southeast of Mato Grosso given place to extensive soya plantations in the last 20 years.

LAND USE MAP METHODOLOGY

This study used images from the sensor Modis (Moderate Resolution Imaging Spectroradiometer) covering a whole year period, selected every 16 days (a total of 23 for each area, for the whole year). With this, it was possible to create an overview of vegetation in the whole state of Mato Grosso, over a whole year.

The identification of the land activity in each image was done using two methods. First, images were separated according to their EVI (Enhanced Vegetation Index), which compares different levels of photosynthetic activity and concentration of vegetation. This method identifies agricultural activity as well as regenerated forest in areas where deforestation has been previously detected (by PRODES).

To identify pastures, altered forest landscapes (victim of predatory logging) and degraded or secondary forest (capoeira) it was necessary to analyse each of the series of images visually. In the end, to evaluate the method, flights were carried out at the Eastern side of the Xingu Indigenous Park, in Sinop region around the BR-163, and North of Alta Floresta.

The Modis images are generated every day, so it is possible to follow changes to the vegetation throughout the year. However, the resolution of the images is very low - only accurate to 250m, or approximately an area of 6,25 ha. The constant presence of clouds in certain areas can make monitoring impossible in some regions.

REASONS TO STOP DESTRUCTION OF THE AMAZON RAINFOREST

- Forests are a crucial carbon stock: forest ecosystems globally store about one-and-a-half times as much carbon as is present in the atmosphere.[25] Deforestation of tropical forests is responsible for up to approximately 20% of the global emissions of greenhouse gas, more than the world's entire transport sector.[26]
- The Amazon is estimated to store between 80-120 billion tonnes of carbon.[27,28] If this is destroyed, roughly 50 times the annual greenhouse gas emissions from the US will be emitted[29].
- Cattle ranching in the Amazon has horrific social impacts, including the highest rates of slave labour in Brazil. 3005 rural workers, kept in slavery, were freed from cattle ranches in 2008. 99% of them had been held in the Legal Amazon[30].
- The region is home to more than 20 million people – including over 200,000 indigenous people, belonging to 180 different ethnic groups[31]. The rainforest is their home, providing them food and shelter to tools and medicines - it is also central to their spiritual life.
- Studies estimate that the Amazon supports 40,000 plant species; 427 mammals; 1,294 birds; 378 reptiles; 427 amphibians and 3,000 species of fish[32]. Many other species are still unknown.
- The Amazon produces 20% of river water in the world[33]. The forest influences the hydrologic cycle at local and regional scales, as humidity retained by the Amazon is carried by the wind to other parts of Brazil and South America. The reduction of the forest cover diminishes the amount of rainfall on the Southeast and Center of Brazil, affecting agriculture productivity[34].
- Belched methane from livestock constitutes one of the largest sources (roughly 30%) of greenhouse gas emissions from agriculture. Agriculture as a whole contributes between 10-12% of global greenhouse gas emissions[35].
- The greenhouse gas emissions from beef are13 kilograms CO_2-eq per kg[36]. This means eating a kilogram of beef represents roughly the same greenhouse emissions as flying 100 kilometers of a flight, per passenger. This is twice the carbon footprint of eating pigs or poultry[37].

WHAT MUST BE DONE

THE BRAZILIAN GOVERNMENT MUST

- Adopt ambitious deforestation reduction targets in order to achieve zero deforestation in the Brazilian Amazon by 2015. Adopt a five-year moratorium immediately on deforestation as an intermediate step towards zero deforestation.
- Support a strong climate protocol to be tabled in Copenhagen, December 2009, that includes an international fund to Reduce Emissions from Deforestation and Degradation (REDD) that adheres to key principles integral for a credible financial mechanism to protect forests (such as those detailed in Greenpeace's Forest for Climate proposal):
  - Provide sufficient annual funding to tackle tropical deforestation and make it available immediately;
  - Is accessible to all countries with tropical forests, including countries with low deforestation rates;
  - Protect biodiversity values and the rights and livelihoods of indigenous peoples;
  - Protect against 'leakage' via national-level accounting and reduction approaches in deforestation;
  - Does not directly include forest offset credits in carbon markets;
  - Does not support the replacement of natural forests with plantations and must not subsidise the expansion of industrial logging, agri-business and other destructive practices into forests.
- Enact and enforce the currently provisional act in the Forest Code, which stipulates that no more than 20% of any private land holding in the Amazon can be legally cleared. This would avoid additional legal deforestation permits.
- Redirect investments that drive deforestation into diversified economies including investing in people that support the sustainable use of forest products.
- Increase investments to strengthen the monitoring and control systems to fight forest crimes in the Amazon to ensure effective governance and law enforcement in the region.

INDUSTRIALISED COUNTRIES MUST

- Agree a strong climate protocol in Copenhagen that includes an international fund to stop deforestation governed by the key principles detailed above.
- Ensure that reducing emissions from deforestation and degradation is additional to industrialised nations' actions to reduce their own emissions.

INDUSTRY MUST

- Support the call for Zero Deforestation in the Brazilian Amazon.
- Stop the trade in products from deforestation and communicate to suppliers that they will no longer buy from companies engaged in deforestation.
- Provide reliable guarantees of the origin of cattle products such as meat and leather to customers.
- Reduce their own greenhouse gas emissions by adopting environmentally-friendly methods of production, absolute emissions reductions in line with the scale of global cuts needed and establish renewable energy targets.
- Publically call on governments and international community to support a strong climate protocol in 2009, including a credible REDD funding mechanism based on the principles outlined above.

BANK AND INVESTORS

- Stop financing companies involved in deforestation in the Amazon Biome.

CITIZENS CAN

- Join Greenpeace in the call for zero deforestation in the Amazon rainforest by 2015, by supporting appeals to the Brazilian government, their national government and international community to support this demand.
- Join Greenpeace's call to governments and companies take real action to halt deforestation and save the climate. In particular to pressure governments to agree a strong climate deal in Copenhagen in December 2009.
- Take individual action to reduce their carbon footprint. Some ways of doing so include reducing the quantity of meat consumed, and checking the origin of the meat or soya products they buy.

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The CHAIRMAN. Thank you, Mr. Dinneen. Your handout will be made part of the record, without objection.

Mr. Riva, thank you for being here. Welcome to the Committee.

STATEMENT OF CARLOS A. RIVA, PRESIDENT AND CEO, VERENIUM CORPORATION, CAMBRIDGE, MA

Mr. RIVA. Thank you very much, Mr. Chairman, Mr. Ranking Member, and Members of the Committee. I want to thank you for inviting me here today.

My name is Carlos Riva. I am President and Chief Executive Officer for Verenium Corporation. And I really appreciate this opportunity to be able to come and talk to you about our company's perspectives on how best to achieve reductions in carbon emissions in the fuel sector.

I can say that I support a number of the positions that have been expressed by my co-panelists. Particularly, it is important to support the corn ethanol industry, even though we are in the advanced ethanol industry, because, as has been said, corn ethanol is a bridge to the future, and we are the future. And I would also make the point that we are not a distant future, but we, as a company, and a number of my co-competitors, will be beginning construction of major-scale industrial commercial facilities within the next 12 months.

Verenium is a leading developer of cellulosic ethanol process technology and specialty enzymes. We are positioned to be among the first of the companies to bring commercial cellulosic ethanol to the market. We have been working in this space for the last 15 years. And only in the last 2 years, we have raised over $300 million of capital; over 90 percent of it has come from private sources. We also recently formed a technology joint venture and a project development joint venture with BP. And I can also say that, although I don't speak for BP, in forming this joint venture, they canvassed the industry globally and came to the conclusion that our technology and our approach to project development was the one which was the front runner and best in the industry.

We have used our capital to build a pilot plant in Jennings, Louisiana, which has tested a variety of different feedstocks, although we have focused on grassy feedstocks, sugarcane bagasse and energy cane, and the like. And we have also spent over $80 million in building a 1.4 million gallon per year demonstration-scale plant also in Jennings, Louisiana. And I would like to invite any of the Members or their staffs who would like to see the state-of-the-art of cellulosic ethanol to come and visit us in Jennings.

Also, together with BP, we plan to build and begin construction on a 36 million gallon per year commercial-scale facility in Florida. And in short, we have made a very serious commitment to advance biofuels and as great a commitment as any other player in this industry.

I am well aware of the concerns that have been triggered by EPA's proposed rules. And we have made our concerns noted in our written testimony as well as to the California regulators. And our concerns, again, center on imposing asymmetrical penalties on biofuels and speculative concerns about indirect land use change. I am also, frankly, aware of the issues and concerns around how

poor policy in the past has triggered undesirable effects such as deforestation in places like Indonesia.

But having said that, I believe that there are much better ways, less invasive ways and more effective ways to meet our goals of large-scale biofuels development without risking land use change, not through over-regulation, but by encouraging the right combinations of feedstock, of technology, of land use, and different processes. And our goal should be to optimize the production of food and biomass feedstocks for fuel, and doing so by using the land which is most appropriate to the feedstock.

This is not a zero-sum game, but rather a complex algorithm that has an optimal solution. I think, with the right technologies and feedstocks, we can actually reduce the pressures that drive the concerns about international land use change and generate outcomes that provide more food, more fuel, and lower carbon emissions.

Mr. Chairman, I urge EPA to forebear from regulating land use decisions for the first several hundred million gallons of advanced biofuels. Let's get this industry off the ground, attract the capital, and then we can see where the regulation needs to lead. Even by definition, the impacts from the first several hundred million gallons would not be significant, as required under the 2007 law. And, that this flexible approach is much more likely to help us find pathways to production that are truly scaleable and sustainable.

I would like to demonstrate what I am talking about by highlighting a little bit about our own strategy for development of our project in Florida. There, for example, we are going to use high-yield, nonfood, grassy biomass feedstocks. These are perennial crops that don't require annual replanting. They can be grown with fairly low inputs in the moist Gulf Coast region of the southeastern U.S. We are targeting previously cultivated lands that today are fallow or in pasture, degraded, or otherwise unsuited for food agriculture. Our facility will use energy cane, which is a high fiber relative to sugarcane. It can be produced. It yields between 18 and 20 dry tons per acre in that region. And ultimately this will yield between 1,800 and 2,000 gallons per acre of ethanol, about four to five times what is achievable using conventional crops in prime acreage in the grain belt.

We are also perfecting our technology which uses the whole plant, the five-carbon and the six-carbon sugars, and converts those to ethanol, while using the residue for energy to drive the entire process. We also have plans to replicate this strategy at various locations throughout the Gulf Coast, and then ultimately throughout the U.S.

It is a very complex challenge. There are no shortcuts. That is why we have had to take the steps of investing very heavily to prove out the technology at pilot and demonstration-scale levels. And, that this is where the role of government becomes very important to help the technology take the leap from demonstration to commercial-scale. And I would urge the government to continue to support the title IX farm bill, bioenergy programs that have been introduced in the 2008 Farm bill, the loan guarantee programs in the Department of Energy. Continue to support the renewable fuel

standard. And also, finally, dealing with what has been described as the "blend wall" and has been noted by some of my co-panelists.

Advanced biofuels offer tremendous potential to meet our nation's energy security and economic development needs, job creation and the like, and at the same time improving our environment. All three sets of these goals are critical, they all must be met. But I am confident that a flexible, technology-based approach, as I have suggested, can help our nation achieve these goals and the needs of more fuel, more food, and lower carbon emissions.

Thank you very much, Mr. Chairman. I look forward to your questions.

[The prepared statement of Mr. Riva follows:]

PREPARED STATEMENT OF CARLOS A. RIVA, PRESIDENT AND CEO, VERENIUM CORPORATION, CAMBRIDGE, MA

Introduction

Mr. Chairman, Mr. Ranking Member and Members of the Committee, thank you very much for inviting me here today. My name is Carlos Riva and I am President and CEO of Verenium Corporation. I am very honored to have this opportunity to speak with you about my company's vision for advanced biofuels, and the great promise they hold for reducing the carbon footprint of our automotive fuels sector. These new fuel technologies hold tremendous potential to enhance our nation's energy independence, promote economic renewal and spur job creation in rural areas, as well as to generate significant reductions in overall carbon emissions. But we are all aware of concerns that have been voiced about the fairness and workability of the EPA's new RFS2 proposed rule. This morning, I would like to offer my own thoughts on how Congress and the Administration can move forward, in a way that supports all of these goals including carbon emissions reduction, but with a regulatory approach that is more effective and less burdensome to this emerging industry at this critical stage.

Overview of Verenium

Let me begin with a brief description of Verenium. We are a leading developer of cellulosic ethanol process technology and specialty enzymes. We have positioned ourselves to be among the first major producers of cellulosic ethanol in the U.S. Building on a 15 year history, we have pursued a methodical approach to developing and scaling our technology, which is based on breakthrough early research at Florida State University and work at several National Laboratories. In the 2 years since the announcement of the merger that formed our company as the first pure-play public cellulosic ethanol company, we have raised and invested nearly $300 million to develop and advance our biofuels process technology. Roughly 90% of this funding has been raised from private sources, including more than $110 million through a landmark technology development alliance and commercial joint venture with BP. We have also won nearly $30 million of cost-shared support in several competitive DOE funding solicitations.

Last year, Verenium completed construction of one of the nation's first true demonstration-scale cellulosic ethanol production facilities in Jennings, Louisiana. This $80 million, 1.4 million gallon per year facility is now fully commissioned and undergoing process optimization. It serves as a centerpiece of our ongoing research and development efforts into new feedstocks and process innovations. Let me extend an invitation to any Members of the Committee who wish to visit it to see what I believe is the leading edge demonstration of cellulosic ethanol process technology at scale in the United States. More recently, in February, the BP/Verenium joint venture announced plans for a first commercial-scale facility to be constructed in Highlands County, Florida, with a targeted in-service date of 2012. A second commercial-scale project in the Gulf Coast is also in advanced development.

The RFS2 Proposed Rule: Initial Observations

Mr. Chairman, let me briefly address the new proposed rule that led to the convening of this hearing. Many have voiced concerns about the interpretation that EPA appears to have placed on Congress's direction in the Energy Independence and Security Act of 2007. The RFS2 rule aims to implement the mandate for production of 36 billion gallons of renewable fuel annually by 2022. We are all just becoming familiar with this 1,000 page rule. However, the initial industry reaction is

that it is unduly prescriptive, and overly focused on claims of indirect land use impacts of biofuels while overlooking the market-mediated impacts of other fuel pathways. Let me be clear that our company has long been on record in the California Low Carbon Fuel Standard proceeding, as opposing the selective enforcement of penalties on biofuels based on such claimed indirect effects, so this is a matter of great concern to me.

At the same time, I understand the genesis of concern about this issue. The world did in fact witness widespread clearing of land in Indonesian rain forests a few years ago to make way for palm plantations designed to meet the European biodiesel market. Clearly, we must take steps to ensure that similar strategies are not employed to meet the needs of the U.S. biofuels marketplace to meet the mandates of RFS2.

But I have every confidence that there are more effective, and much less invasive, ways to ensure that the legitimate goal of this provision in EISA can be met. The best way forward, I believe, is to encourage the advanced biofuels industry to innovate and evolve solutions using the right combinations of technologies, lands, feedstocks and processes. Rather than extending existing methods to new areas, we need to look at optimizing the production of food and biomass feedstocks from the lands that support each most effectively, wherever they are found. I have every confidence that, by following this path, we can actually reduce the pressures that drive concern about international land use change. This is an algebraic problem with several variables, not an arithmetical zero-sum game. If we approach it creatively, we can achieve the highly desired outcome of more food, more fuel and lower carbon emissions.

How should EPA's proposed rule be specifically modified? In my view, as of today, and for the immediate future, there are not, and will not be, *any* "significant" indirect impacts from advanced biofuels production—the literal test required by the terms of EISA. This conclusion is valid by definition, I would contend, because there is zero commercial-scale production of such fuels today, and there are only trivial quantities of advanced biofuels production in prospect in the immediate 3–5 year time horizon. We have the time to get this right, and we *must* get it right. Now is the time for policymakers to do everything possible to encourage the advanced biofuels industry to take root and grow, so that we may gain the experience necessary to assess its prospective impacts based on facts rather than speculation. It would be fully consistent with the test required by EISA, in my view, for EPA to defer adopting *any* calculation of land use impacts until a specific milestone is met, for example, the first 500 million gallons of advanced biofuels production capacity is actually in place. This approach of regulatory forbearance would give the first commercial producers of advanced biofuels the room needed to experiment, innovate and attract capital—which will be critical if this industry is to succeed.

Once there is an actual base of experience, it will be possible to devise rules, if necessary, that are sensible, relevant and responsive to actual circumstances. From the outset, agencies like DOE and USDA, that are involved in supporting advanced biofuels commercial-scale deployments, should encourage project developers to use strategies aimed at optimizing land use and feedstock production. I would not be opposed to putting producers on notice that poor land use decisions in the first projects undertaken during this early period would likely increase the threat of direct regulation of future projects later on. But a more flexible approach of this nature would spur progress by putting the focus on innovation, rather than narrowing choices of available pathways to production. The approach I am recommending, I believe, is the way to figure out the pathways to advanced biofuels production that are truly scalable and sustainable.

Verenium's Strategy for Biofuels Production

Having offered this regulatory perspective as background, I would now like to offer a fuller discussion of Verenium's experience and thinking on feedstock issues, and to describe how these have led us to frame our own approach to building a sustainable, commercial cellulosic ethanol industry.

A few points about our commercialization program stand out. For example, we have chosen to focus on the use of high-biomass grassy feedstocks that do not compete with food. We have developed a preference for perennial crops that do not require annual tilling. These crops can be grown inexpensively and on a sustainable basis in many areas throughout the warm, moist Gulf Coast region in the Southeastern U.S. We are looking for opportunities to work with growers who can produce these crops on previously-cultivated land, including land that is fallow, in pasture, degraded and not suitable for food agriculture.

At our Highlands Ethanol facility in Florida, our plan is to grow energy cane. This is a high-fiber cultivar of cane, developed at Louisiana State University in the

1970s, that has been shown to produce up to 18–20 tons per acre. At projected conversion rates, this rate of growth could result in per-acre ethanol yields of up to 1,500–2,000 gallons. This level of production is several times higher, on a per-acre basis, than is possible with conventional crops on prime acreage in the nation's grain belt.

Verenium's technology is not limited to this or any other specific crop. In fact the Verenium process can use a wide variety of other feedstocks. In the Southeast, it could be applied on sugarcane bagasse, woody biomass or sorghum. In other regions, it could be adapted to biomass sources such as switchgrass or corn stover in other regions. We found it notable, though, that neither energy cane nor sugarcane bagasse was identified among the pathways identified by EPA or the CARB. In fact, the California Air Resources Board's draft rule projected that cellulosic ethanol would result in yields in the range of only 250 gallons per acre. The CARB estimate is only a small fraction of the per-acre yields that we believe are possible with the approach I have outlined.

Verenium's core process technology is based on a low-energy, enzymatic or biochemical pathway to biomass conversion. Compared to proven thermochemical approaches that have been in use for decades, the biochemical pathway is less mature, and is still being perfected. Yet, as a company with expertise in enzyme screening and expression, we believe this approach offers the best long-term promise in several critical dimensions, *e.g.,* overall energy efficiency, reduced carbon intensity, and the potential for achieving the lowest long-term cost of production. Finally, Verenium's basic technology platform is designed around the conversion of all available sugars—both five-carbon and six-carbon sugars found in cellulose and hemicellulose, further increasing yields and enhancing the energy and carbon balance of production.

Verenium's focus on commercialization has also led our company us to become highly focused on feedstock logistics. There are many technology pathways for converting biomass to biofuel in the laboratory. But in the long run, the difference between profit and loss will be one's ability to cultivate, harvest, transport, store and process feedstocks in large volume, economically.

We believe it is important not to underestimate the complexity of the challenge of commercializing advanced biofuels production. There are no shortcuts to commercial success. Rather, we have taken the time to verify our cellulosic ethanol technology at the bench and pilot scale, and are now doing so at the demonstration scale at our Jennings facility before embarking on a first commercial-scale facility through our commercial joint venture with BP. We believe this patient, methodical approach will enable us to be among the first companies to achieve full-scale, continuous production of cellulosic ethanol in the United States if not the world.

Advanced Biofuels Industry Requirements—Near-Term and Long-Term

In the remaining portion of my testimony, I would like to offer a few further thoughts about actions the government can take to enhance the prospects for success of the advanced biofuels industry, both in the near term and in the long term. The 36 billion gallon mandate in the new RFS includes 21 billion gallons to be produced from cellulosic and advanced biofuels. Given that there is no commercial cellulosic biofuel production in place at present, and a target of 1 billion gallons by 2013 (more than all current U.S. biodiesel production), it is natural to ask: what are the most effective remaining steps that must be taken to ensure that the first generation of commercial cellulosic biorefineries are in operation in the next 2–3 years? Likewise, what do we need to do to ensure that the industry fully develops so that it can supply 16 billion gallons of cellulosic biofuels by 2022?

Earlier this month, the Obama Administration took a critical step forward by establishing a new Interagency Working Group with the goal of clearly aligning the activities of USDA, DOE and EPA to support the objective of rapid commercialization of advanced biofuels. This clear alignment of purpose among these three agencies, I believe, will be of critical help in achieving the overall goals shared by Congress and the Administration.

Near-term needs. To ensure success, I believe that the Federal Government needs to be a full financial partner in these early commercialization efforts. Under the best of circumstances, commercial lenders are leery of financing pre-commercial energy technologies. The current economy makes it essentially impossible to obtain commercial financing for advanced biofuels projects; there is essentially no alternative to government financing for these first-of-a-kind plants. While USDA's loan guarantee program framework is a good start, the 80 percent Federal limitation has made it essentially unusable for most cellulosic ethanol projects. Companies like Verenium are going to struggle to find 20 percent private project financing.

We would also urge USDA to expedite its implementation of the Title IX Farm Bill bioenergy programs written into law in the 2008 Farm Bill. These are important and promising new programs that could provide critical help on the feedstock end, by spurring grower interest in shifting into bioenergy crops. It is especially important to get the Biomass Crop Assistance Program up and running, as it will help growers to overcome a natural degree of resistance to shifting into non-traditional energy crops that do not receive traditional crop protections.

In addition to these recommendations, we have voiced support for a recommendation put forth to the Ways and Means Committee under which cellulosic biorefineries would have the option to monetize their investment tax credit in the same fashion as was put into place for wind and solar energy producers in the recent stimulus bill. Such a mechanism would offer immediate value and would be more certain to stimulate biorefinery development than tax credit mechanisms that only generate value when they offset taxable income.

Long-term needs. It is impossible to overestimate the importance of stability and continuity in the RFS policy enacted into law in the Energy Independence and Security Act of 2007. This law serves as a foundation for the advanced biofuels industry. It must remain durable if the advanced biofuels industry is to attract the billions of dollars of investment capital required to prove out and scale up the opportunity.

Finally, it is essential to the long-term health of the biofuels industry that Congress formulate an approach for addressing the "blendwall" problem. While EISA is intended to drive our industry toward increased production capacity, the EPA 10% blending limitation acts effectively as a quota on ethanol use. I would note that, even the currently-pending waiver request for approval of blending to the level of E15 were granted in full, it would not begin to address the long-term problem of market uncertainty facing the advanced biofuels industry. Thus, I believe it is critical for Congress to focus on steps to develop the infrastructure required to expand the use of ethanol above and beyond the blend market. Specifically, I would urge Congress to move promptly to adopt the Open Fuel Standard, which requires flexible fuel capability for a rising fraction of new vehicles sold in the United States. In parallel, I would urge Congress to enact rules and funding mechanisms aimed at further accelerating the installation of E85 dispensing infrastructure, especially in areas of the country beyond the grain belt where most E85 infrastructure is currently concentrated.

Conclusion

In closing, Mr. Chairman, I would like to express my deep appreciation to you and to the other Members of this Committee for the opportunity to testify today. Recognizing the concern we share about the potential impact of new regulations on land use for biofuels production, I would reiterate my view that a more flexible approach is warranted for now to enable our industry to gain needed experience. All of us are concerned about passing along a healthy environment to our children. We are also concerned about achieving all of the other critical goals of advanced biofuels deployment—including energy security, economic renewal and jobs creation. All of these goals are important. None can be entirely subordinated to the others. I have every confidence that with a more flexible approach, we can work together to achieve a future with greater economic opportunity for our nation as well as more food, more fuel and lower carbon emissions.

This concludes my testimony. Thank you and I look forward to the opportunity to address your questions.

The CHAIRMAN. Thank you, Mr. Riva.

I thank all of the panel members for excellent testimony. We appreciate you being with us today and taking your time.

I recognize the gentleman from Pennsylvania for 5 minutes.

Mr. HOLDEN. Thank you, Mr. Chairman.

Mr. Jennings, can you elaborate on the attorney you mentioned that came up with this idea or this model? What is his background? What environmental groups was he associated with, and if you care to speculate on a possible agenda that he might have had?

Mr. JENNINGS. Thank you for the question, Mr. Holden. And I am happy to speculate on his agenda.

I think that Tim Searchinger has long held a grudge against American agriculture. And those of you on this Committee recog-

nize that there are far too many people in this nation that, because they don't have a relationship anymore to production agriculture, frankly don't understand it. And there are some people that don't like the way we farm. They think we are too intensive with chemicals. They think we are farming soil black. They haven't been to rural America to see what we are doing. And as a result, they want to dismantle some of the policies that have been in place to help sustain a very stable supply of food and feed, and now renewable fuel.

Mr. Tim Searchinger worked for an environmental group—I have it in my testimony here—Environmental Defense, during the most recent farm bill. And some of you may be well aware of him, some of the things that he tried to do to oppose some of these farm programs.

He then left, and he went to Princeton, where he is not a professor, but he is a visiting lecturer, and he invented this theory. And it has just taken enormous steam. *TIME* magazine wrote about it. And after that, it became very popular.

But the motive, I speculate, is to dismantle support for agricultural-based biofuels because some people don't want to see that succeed. They want to see other alternatives succeed.

Mr. HOLDEN. Thank you.

Mr. Dinneen, you mentioned an architect of this plan. Are you talking about the same individual?

Mr. DINNEEN. No. I was talking about someone else who had done modeling that created——

Mr. HOLDEN. Who were you talking about? And if you wouldn't mind elaborating on that. I think you used the words "not truth machines" in the statement.

Mr. DINNEEN. It was just someone who had consulted for the State of California that had worked on their models and was just expressing the limitations of their modeling. This is somebody who worked on one of the models, and I will get you specifically which model and the name of the individual, but not somebody necessarily with an agenda, but just someone working on modeling that recognizes himself that these models are being asked to do more than they were designed to do.

Mr. HOLDEN. Can you repeat the exact quote though? I found that interesting. It was something about truth machines, they are meant to be——

Mr. DINNEEN. The quote was, "Models should be seen as learning tools, not truth machines."

Mr. HOLDEN. Right. Thank you.

And this for the entire panel. How has the uncertainty surrounding the science for indirect lifecycle emissions stifled the investment in new biofuel technologies?

Mr. RIVA. I can begin to address that from the standpoint of advanced biofuels.

What it does is, it introduces additional uncertainty, not only in what the future regulation might be for the facility itself, but importantly, for the growers. Because ultimately our advanced biofuels industries are critically dependent on growers to produce large volumes of feedstock. And how this uncertainty may affect their decisions is problematic for the industry.

Mr. HOLDEN. Anyone else care to comment?

Mr. DINNEEN. Congressman, virtually every ethanol production facility has a cellulose-to-ethanol research program underway. And the uncertainty that is created by this modeling has clearly had an impact on trying to gain financing for those projects. Existing production is, indeed, grandfathered under this.

This is a debate largely about the future. It is about being able to demonstrate that the technologies that are going to be employed will indeed achieve the greenhouse gas benefits that we believe that they will. And if all those benefits are undermined because of this unrealistic, unsubstantiated penalty of international land use, then the finance community is not going to be able to support those projects, and the evolution of the industry will stop.

Mr. HOLDEN. Mr. Buis.

Mr. BUIS. Mr. Holden, I think you hit the nail on the head. If you want people to invest into an industry, you can't keep changing the policy that creates artificial hurdles. And I think this is an artificial hurdle. I think if I were looking to invest in a new technology, I would say, well, maybe I am only going to be this flavor of the month for a few years, and then they are going to switch gears again.

I think that, really, there are people out there that think some magic new energy source is going to fall from the sky. It is not. It is going to take time to develop it. Brazil did that. They took that first wake-up call that I talked about earlier in the early 1970s. They stuck with it, and they moved forward. And they are reaping the benefits today from it. We need to do the same thing.

Mr. HOLDEN. Thank you, Mr. Chairman.

The CHAIRMAN. I thank the gentleman.

The gentleman from Oklahoma, Mr. Lucas.

Mr. LUCAS. Thank you, Mr. Chairman.

While a lot of folks might think this is more of an academic discussion, anything that will be able to change the outcome of indirect land use issues, and all of this, matters. Clearly, we have examples already where the California Air Resources Board is potentially freezing out ethanol by including indirect land use change in their lifecycle analysis.

Tell me, gentlemen, you obviously have much experience in this area, how else can we meet our low carbon fuel standards if we do not incorporate renewable fuels? How can we meet this goal for the country? Anyone who wants to address it.

Mr. JENNINGS. Mr. Lucas, today we cannot. There is no viable alternative to petroleum that is ready to go, that works in the infrastructure and the vehicles we have today, that meets the standards for reducing carbon emissions other than biofuels. And today, the only biofuel, I am speaking ethanol, is corn-based ethanol. There are no other alternatives. I think this is designed to box corn ethanol out and give time to some other alternatives. And we don't oppose other alternatives, but there has got to be a recognition that there is no silver bullet here to reducing carbon emissions and to dealing with energy security. And this is very damaging.

Mr. BUIS. Mr. Lucas, the ethanol industry, number one, we are producing a low carbon fuel today, and it is getting lower all the time. We have a plant that just announced that they had tapped

into the Sioux Falls City landfill. They are capturing the methane from the landfill, piping it to an ethanol plant that produces 100 million gallons and, combined with a wood waste furnace, is going to provide 90 percent of the energy for that plant. Everyone is changing because they want to reduce their energy costs so the carbon footprint goes down.

It is also the same in farming. Farmers are employing new techniques, new technology, no-till, strip-till, minimum-till, which lowers the carbon footprint because you disturb less of the soil. But they also are using things like auto-steer, which is a more precise application of chemicals and fertilizers, and reducing the cost of fuel across the nation.

I think a lot of our critics like to look at the way we produced ethanol 30 years ago and the way we farmed 30 years ago, and there have been a lot of changes. And this Committee certainly understands that.

Mr. DINNEEN. Congressman, I would just add that I believe all alternatives are going to ultimately have a significant carbon benefit. Our frustration is that, right now, under the regulatory framework created by EPA, and that which California recently adopted, the penalty for indirect land use is only being applied to biofuels.

California, for example, did not assign any kind of an indirect land use effect—or an indirect effect associated with electricity. I think electric vehicles would be great, but if the increased use of electric vehicles is going to result in increased demand for coal-derived electricity, I am sorry, there is likely going to be some kind of indirect effect associated with that. But California said, no, we are not going to consider that; we are only going to consider the impact on biofuels.

And the same is true for petroleum. We kept trying to tell the State of California that, in the absence of biofuels, you are going to get a heck of a lot more of your energy supply from tar sands from Canada. And there is an absolute land use impact and environmental consequence of the increased production of petroleum from tar sands in Canada. So it is just the selective nature of this that makes no sense and puts an additional burden on our industry that nobody else is having to face.

Mr. RIVA. Mr. Lucas, if I could add a different dimension. I know that there are different technologies that are often put forward as being other solutions, things revolving around algae or synthetic petroleum and the like, but these are technologies that are very new. It will be a long time before they are scaled or developed into being able to make any kind of meaningful contribution. They will all have to go through the scaling process and disciplined scaling process that we have been through as a cellulosic ethanol industry. And I don't think that they are meaningful contributors in the near term.

Advanced cellulosic ethanol is something which is ready to go now. It is ready to begin construction. The facilities are going to start making a very near-term difference to the fuel mix, and hence the carbon content of fuels. I think it is the only near-term possibility.

Mr. LUCAS. Thank you, gentlemen.

Thank you, Mr. Chairman.

The CHAIRMAN. The gentlewoman from South Dakota, Ms. Herseth Sandlin.

Ms. HERSETH SANDLIN. Thank you, Mr. Chairman.

And I thank Mr. Boswell for allowing me to ask questions out of order here.

I thank all of our witnesses this morning for their helpful testimony: identifying which factors were not included in the EPA's analysis; the uncertainties of the various models that the EPA used that Mr. Dinneen focused on; as well as the future where we are headed that Mr. Riva has articulated with his company and, as he mentioned, his co-competitors; and why everyone on this Committee agrees that the science is with us, but the science—we can't back that up if we are not including all of the relevant factors, new information, advances in processes and technology, and using a combination of poorly designed models with various uncertainties that will then inhibit the development of advanced biofuels because of not including factors that are relevant in today's ethanol production, which has been commented upon as mostly corn ethanol.

My questions for the panel focus on one avenue, at least the avenue that the EPA has identified to review the science, the peer review process that they are establishing.

And both Mr. Jennings and Mr. Buis, you commented in your testimony on an issue that we all recognize as one of the faults in the proposed rule, in that it fails to recognize and account for the innovations of U.S. agricultural producers and biofuels processors who are pushing yields per acre up, and enhancing production processes all the time. You specifically mentioned the impact of dry distillers grains and improvements on farming methods and technology.

And then, Mr. Jennings, I believe your written testimony refers to a letter sent to the various agencies by five leading university scientists with regard to how the use of dry distillers grains by the livestock industry and the improved seed technology can mitigate the need to expand the global crop base.

So I guess for the two of you, would you recommend that these studies be incorporated into the questions asked during the peer review process, and should there be any other studies that are incorporated?

And for Mr. Dinneen and Mr. Riva, do you have any other concerns or recommendations to the EPA as they undertake their peer review process?

Mr. JENNINGS. Thank you for the question, Representative Herseth Sandlin. And we would absolutely recommend that the study and the letter that was sent by Professors Cassman and Klopfenstein of the University of Nebraska, and others, be submitted to EPA and the other agencies as part of this peer review.

We are convinced that either EPA doesn't understand or overlooked the role that distillers play. And there is this assumption that distillers grains may be replaced as corn on a pound-for-pound basis in a feed ration. And most experts in animal nutrition say that that is not the case, that distillers replaces corn far greater than a pound for pound. And so, taking that into account, along with the yield increases that you mentioned, very well could, and some studies indicate, mitigate the need to expand the global crop

base, mitigate the need for these induced international land use changes.

And so, to the extent that you can have some leadership to bear on the peer review process and get material to the peer review, we would encourage you to do that and highlight these issues specifically, absolutely.

Mr. BUIS. Well, I agree with everything that Brian just said, but I would add a note of caution here. I don't think we can count on us winning the day necessarily in the rulemaking process. I hope they listen to all of our scientists. I hope they take into account all these—one that I don't think has been mentioned here today from the University of Nebraska that points out what some people want to talk about on the equity issue, and that is the carbon footprint of imported oil coming from the Persian Gulf.

When you calculate that in there, that doubles gasoline's carbon footprint.

I think what happened, this thing should never have gotten to this level. I think you ought to pass legislation to strip out the international land use change, period.

Mr. DINNEEN. Congresswoman, first of all, thank you for all of your leadership over the years on this issue and helping to grow this industry to where we are today.

I would say that on the peer-review issue, I applaud EPA for doing it. I think it is EPA recognizing the limitations of the modeling that they have done. So, bravo, you are going to send it out to a peer review. But I do think that there is an issue of transparency here, because with those nine models, not all of those models are available to the public.

So for groups like ours that want to get ahold of the models and replicate what EPA has done, dig into them to determine what assumptions are really driving the result, and see if they can truly work together in the way that EPA has asked, it is going to be very important for the public to have access to the models and all of the inputs and assumptions that EPA has utilized. And I also think it is important for the peer-review committee, whatever it ultimately is, to have access to the comments, to the concerns of stakeholders like ours.

One of the real shortcomings of California's process, because they had sort of a peer review as well, they sent it out to four academics, two of which were on CARB's payroll and were consultants in the process, and another two which said that they really didn't know much about land use issues. Nonetheless, CARB had sent them their proposal, but they didn't send any of the comments from stakeholders. So the peer reviewers didn't have the benefit of the studies that the industry had done, that the Renewable Fuels Association had done, the hundreds and hundreds of pages that we had submitted to the CARB Board for review in this process. So they were spoon-fed by CARB, who were paying them to do the review, and it was no kind of an independent peer review at all.

I would hope that EPA envisions a different process where there is more transparency, there is more openness, and that the peer reviewers will have access to all of the data, not just that which EPA gives them.

Mr. RIVA. Thank you for the question, Congresswoman.

I guess my perspective is that, despite the peer review and the like, we are always dealing with a very high degree of uncertainty in the outcomes of these models. I think some of my co-panelists have expressed the range of possible outcomes.

So our position is that no model is going to be accurate in demonstrating these impacts. However, we do know that at least for the early stages of the evolution of the advanced biofuels industry, that the impacts are going to be *de minimis* because it is still just so small. So we have taken the position that we think EPA should just take a breather on this and let the industry get established. If they then want to come and examine what kind of impacts there might be, use the data derived during that period to calibrate those models. That is a more effective way to deal with this issue than putting stumbling blocks in front of the infant before it has learned to walk.

Ms. HERSETH SANDLIN. Thank you to our witnesses.

Thank you, Mr. Chairman.

The CHAIRMAN. We have three votes. We have a little bit of time, so I am going to recognize Mr. Moran. He says he can get it done in about 3 minutes, and then we are going to adjourn for three votes and then we will be back.

Mr. Pomeroy seems to disagree, which is like the kettle calling the pot black.

Mr. MORAN. Mr. Chairman, thank you very much. My question is just a broad one in the sense, and maybe—I don't know, maybe Mr. Buis is a good person to ask.

I really don't understand—I understand exactly what you are saying and I agree with the comments that are made about the science, about the—certainly the unfairness, the injustice of evaluating different forms of fuel by different standards. But what is confusing to me—and I pick on Mr. Buis because I know he has been in this process for a long time—what is the agenda that is being advanced here? I mean, Mr. Jennings talked about somebody who is anti-agriculture. Government agencies, do they just bring this tremendous bias to the process? Who is running the show?

I mean, we have an Administration that says they are pro-ethanol. We have a Secretary of Agriculture who is very interested in biofuels. Is the EPA operating in a vacuum? My broad question is: How do you explain what are clearly erroneous decisions based upon lack of science and, certainly, no sense of fairness?

Mr. BUIS. Well, thanks for that question. First of all, this has been in the process since 2007, and my understanding is EPA was supposed to get this rule out last year. I was wearing a different hat then, so excuse me for that. And they have been looking at this stuff for quite some time.

So I don't think it is necessarily fair to pin on the new President what happened when the ball was rolling earlier. The Administration did order this biofuels working group to demand that they have a peer review of that science before going forward.

I have no confidence in that peer review because, number one, Mr. Moran, I don't know—even if you give us a zero number, how do you calculate that? I mean, really, think about it. Where I live, here in Maryland, is on an old dairy farm. That probably forced some indirect land use. But if you have subdivisions that build up

or strip malls or highways or bridges or schools, all of the land use change is going to be attributed to renewable fuels. I don't know where you stop.

And I do think there is an agenda out there. I don't think it is an agenda by this Administration; I think it is an agenda by some people that probably best describe a western state governor—I won't mention his name—that thinks that we all ought to go naked, live in trees, and eat nuts.

The CHAIRMAN. Well, I would say that one thing that hasn't come out very much, but what they did in California is basically set this up to get rid of American ethanol and rely on Brazilian ethanol. I think that is where some people are heading. You know, the port business down south, they want this because it is business and so forth. But there are a lot of folks who have agendas here, and they are not all on the same page in my opinion.

Anyway, we will adjourn until the votes are over, and we will pick up after that. I appreciate your patience, to the witnesses.

[Recess.]

Mr. HOLDEN [presiding.] The Chairman will be delayed for a few minutes, so he asked me to get the proceedings started. And the chair recognizes the gentleman from Iowa, Mr. Boswell.

Mr. BOSWELL. Thank you, Mr. Holden. I appreciate that.

And I appreciate the panelists taking the time today to come and prepare and do what you are doing. And I want to reiterate, and we all can do this, that we don't really have an axe to bear against the oil producers within the United States. They simply can't do what we need. And, as I said earlier, if you went full out, we would still be importing, unless we get into the alternatives, and I have known this for a long, long time. I want to keep emphasizing this, because I don't—in fact, Leonard Boswell was on a standard rig one time, north of Monahans, Texas when, a rig brought a well in. It was an experience of a lifetime. But we won't tell that story now.

You know, we just hear from the press that E85 is not going to meet California's standard. Does anybody want to comment on that? Just briefly, because I have a couple of other things I want to use my 5 minutes for and I have people waiting on me. Anybody on that?

Mr. DINNEEN. It is true that the zero emission vehicle standards in California make it awfully difficult for auto makers to certify a vehicle to run on E85. Part of the issue there is the baseline gasoline that they are utilizing to compare against. And if they would use the proper baseline, ethanol would be able to qualify.

Mr. BOSWELL. If we are going to have this discussion, maybe you want to comment on it. I see it fits right in with my question when I asked. But if we are going to get into this indirect stuff, then I suppose it would be reasonable if we checked the indirect impact on all possibilities of energy.

And what comes to my mind immediately is the shipping and protection of the shipping coming out of the Gulf, coming out of OPEC. My gosh, is there anybody that has any data on that or just hip-pocket data? Because it has to be tremendous, and that has a part in what we are talking about here.

Mr. DINNEEN. Congressman, you are absolutely right. The fact of the matter is they have not yet considered any of those impacts,

and they need to. There is not a single thing that we do that isn't going to have an energy and carbon impact.

If I were to buy a bicycle—and evidence to the contrary notwithstanding, I like to ride a bike—and I were to ride that bike to work every single day—and there are days going down I–295 that I would probably get to work sooner—well, what is the consequence of that from a carbon standpoint?

If you look at what EPA has done, you would have to consider the fact that, well, now maybe I have a little more money in my pocket because I am not spending it on gasoline. And when I get to the office, because of the energy I have expended riding that bike to work, maybe I will want some bacon and eggs to recharge and have some protein. You know, does the carbon impact of that get applied to the bicycle? I mean, that is the absurdity of what EPA has done.

Mr. BOSWELL. Well, the whole point here I am trying to make—and you are affirming that—is more work needs to be done. And if we are going to really concentrate on this, then we have to get our arms around the whole thing and not just part of it.

And I really believe if we did a better job, Tim, and all of us—and you hear me say this once in a while, every person in this country has a vested interest in agriculture. A lot of them don't know it. And that is why I talk to my good friends—and I won't name names but I can—from inner cities, they have a vested interest. It is not just by chance that we have the most available, the least cost, and the safest food in the world. And if we didn't have that, you ought to hear—they would scream like a pig caught in a fence. They wouldn't like it. They have it because they have invested in it, in the programs that we do to sustain the production of agriculture and all that goes with it.

So I would hope that we are successful in this. I commend you for your efforts to put the information together. I commend the Chairman and the Ranking Member for your work, Frank, for bringing this to our attention. We have to prevail. And so—Tom.

Mr. BUIS. Congressman, if I could. There is a study that came out recently and it was submitted to the CARB hearings. In fact, it came out of the University of Nebraska. And it measures the carbon footprint of imported gasoline from the Persian Gulf, and it takes into account the military presence there to keep the shipping lanes open. And the end result is the carbon footprint for imported gasoline is double what California was figuring for regular gasoline today.

Mr. BOSWELL. I am going to direct my staff, in fact—I am sure they are listening—get a copy of that. I want to see it.

Mr. BUIS. I will be glad to submit it to you.

Mr. BOSWELL. Well, we will get it. We will come to you. You don't need to chase us down.

Thank you, Mr. Chairman. I appreciate the opportunity, and we will just have to stay on target.

Mr. HOLDEN. The chair thanks the gentleman, and recognizes the gentleman from North Dakota, Mr. Pomeroy.

Mr. POMEROY. Thank you, Mr. Chairman. I think this panel has been absolutely excellent, straight-talking and on point.

And the question that I have from this hearing is, you have to consider things relative to other things. And when you have public policy coming out of an agency that does not look across the spectrum in building policy, Congress has got to intervene and make sure that things are considered in context to one another.

Specifically, this discussion on carbon footprint of ethanol relative to other fuels where they have made no effort to calculate the other fuels, this has been a problem and this has bugged me for years. So I am very pleased that you have some calculations and some examples. I think that puts it in context.

And then, Mr. Riva, I honestly applaud—I think your summary testimony, your last paragraph of the testimony as succinctly distills all of this as anything I have heard. I will read it back to you:

"All of us are concerned about passing along a healthy environment to our children. We are also concerned about achieving all of the other critical goals of advanced biofuels deployment—including energy security, economic renewal, and jobs creation. All of these goals are important. None can be entirely subordinated to the others."

That is just sound public policy. That is how you consider things. I think you have made some terrific contribution here.

Mr. Dinneen, I was really surprised when we had EPA explaining this new approach of theirs, and it looked to me like the productive capacity for biodiesel was just going to completely be mothballed. They were grandfathering ethanol; forget about new ethanol—corn-based ethanol, anyway—and biodiesel is just the top of the block—rotting steel on the prairie, I suppose.

What would be the impact, the fiscal hit, if we are to follow the EPA approach and just shut those facilities down and walk away?

Mr. DINNEEN. Well, you are right in that the existing ethanol industry is somewhat protected by the grandfather clause. And the biodiesel industry is only partially protected by that because they would be able to be sold as a renewable fuel, but not as an advanced biofuel, because the grandfather clause does not extend to advanced biofuels.

So while if you are just measuring the direct impacts of biodiesel and not taking into account these very speculative international indirect land use impacts, biodiesel would pass the 50 percent threshold as an advanced biofuels easily. But because of the way the EPA has done this international land use issue, it erodes a lot of the benefit, theoretically, and biodiesel plants would not be able to meet the 50 percent threshold for greenhouse gases established for advanced biofuels, and that would absolutely hurt them in the marketplace.

Mr. POMEROY. They had a great idea. You could make it work—blend in grease and some other things, used animal fats. Well, we have a terrific biodiesel facility up in Velva, North Dakota, the northwestern part of North Dakota close to the Canadian border. It is canola-based, I think it is. And you would have to haul grease from a long way away to blend into their—I can just see truckloads of french fry grease coming up from Atlanta or some darned thing.

Mr. DINNEEN. There are just not enough McDonald's in North Dakota, Congressman.

Mr. POMEROY. There are not enough McDonald's in North Dakota, let alone the carbon footprint on notions like that. It is really on its face absurd. And I appreciate very much the leadership of this Committee in giving us these kinds of *fora* to have us sit in the sun and dissect it a little bit. It is absolutely, patently absurd, and Congress has to put it right.

Mr. BUIS. If I could, Congressman. I don't think anybody has mentioned it today, but you also have to look at the cost back to American agriculture. And if you wipe out the biodiesel industry, then those canola farmers are going to have less demand, less price. The safety net is probably going to kick in. The cost to taxpayers goes up. It is the same for corn, it is the same for any of these commodities. That impact, economic impact in rural America, will be tremendous.

Mr. POMEROY. You are absolutely right. It all hangs together. Which is, Mr. Dinneen's very interesting example, I know full well I am not going to bike to work anymore and eat those bacon and eggs and kill the environment.

Thank you. I yield back.

Mr. HOLDEN. The chair thanks the gentleman, and recognizes the gentleman from North Carolina, Mr. Kissell.

Mr. KISSELL. Thank you, Mr. Chairman.

Mr. Riva, you had said earlier in having a more advanced approach to this process, a new kind of superplant that, at additional levels, it seemed like you were saying that you not only can use it for the energy process, but there are aspects of the plant that you can turn around and then use a fuel for the process itself.

It almost sounded like it was self-sufficient energy-wise; that it didn't take any additional energy from any other sources other than what came in with the plants. And I was wondering if you could elaborate on that for me a little bit.

Mr. RIVA. Yes. Thank you very much.

When you look at biomass, there are three principal components besides the water content. One is a six-carbon sugar, the other is a five-carbon sugar we refer to as hemicellulose, and then there is a protein component called lignin which is generally the higher BTU element of biomass.

What cellulosic processes do, ours does and others of our competitors do, we take those five- and six-carbon sugars and ferment those into ethanol. And then the residue, which is anywhere from 25 to 30 percent of the composition of the feedstock, then gets put into a biomass boiler. And that is used to generate steam or in some cases cogeneration electric power to drive the energy needs of the process itself. There is some electricity and the light needed from outside sources, but generally speaking that is very minimal in the cellulosic ethanol process. And, frankly, that is one of the reasons why that process has a very favorable carbon footprint, because all of that energy to actually drive the process itself is from renewable biomass.

Mr. KISSELL. Thank you. And someone said—and I apologize—I wrote this down, but apparently I put the notes somewhere when we were doing votes. Someone said that there is a reasonable chance, with the increased efficiency of agriculture, that we would be able to not only meet food demands, but we would also be able

to have this additional growth that we would use in this process that we are talking about without really having to increase the amount of land under cultivation.

If somebody wants to claim that one and kind of expound on that one, I would appreciate it.

Mr. RIVA. I would start again from the cellulosic side. Obviously, there is a lot of investment currently going into crop development. And, again, the grain and soybean industries have invested a lot in technology and we have seen miraculous increases in yield over the last several decades, the green revolution, if you will.

In contrast, very little investment so far has gone into specific energy crops to improve yields. And what the plant scientists tell us is that we can expect, as energy crops become part of the agricultural reality, that those investments in new strains, healthier strains, more drought-resistant strains, could yield very significant increases in the per-acre yields for biomass energy crops to support cellulosic ethanol.

So in our case we are looking at, on the order of, 20 dry tons per acre of feedstock. If that were to, say, double in 10 years because of technology development, then we would be able to expand our cellulosic facilities and get even more ethanol production from a given parcel of land that was dedicated to this feedstock production.

Mr. BUIS. Congressman, you are correct. If you look at the future productivity of American agriculture, our ability to produce more on less acreage, or the same acreage, will far exceed the amount that we need to meet the 15 billion gallons RFS mandate on corn ethanol.

If you look at the past, we have doubled yields in the last 20 or so years. We are producing on the same amount of land. And the advancements in those yields have been tremendous. If you would just look, the corn belt used to be the "I" states and a couple others, but it has expanded. In Congressman Pomeroy's district, they are growing corn now in areas that 10 years ago wouldn't have happened because of new types of hybrids that have been developed.

That continues to happen around the country. Drought-resistant seeds, new technology, new seeds with vigor, that can withstand cooler soils to warm up quicker to extend that growing season. So all that is happening. And, the only downside is if you don't have that market on the farm, that transformation is not going to take place. And if you reduce the demand for corn ethanol or soybeans or sunflowers or canola, whatever, people won't invest in that technology. And that is part of the problem.

Mr. KISSELL. Thank you, gentlemen. Thank you, Mr. Chairman.

Mr. HOLDEN. A few weeks ago we had a similar hearing in the Subcommittee that I chair, and we spent a considerable amount of time talking about the definitions in H.R. 6 and how restrictive it was for second-generation ethanol for regions of the country to participate.

What is really troubling to me is I represent the anthracite coal fields of Pennsylvania, and Pennsylvania's Department of Environmental Protection commissioned a study last year that showed the abundance of which switchgrass would grow on abandoned mines.

They are nothing more than an eyesore and an environmental hazard and make it impossible to attract any industry. I just wonder if anyone would like to elaborate again on the record, even though we have it from a few weeks ago, about the restrictive significance of the language in H.R. 6 and how, regionally, second-generation ethanol is not going to be realistically achieved if we don't change it.

Mr. RIVA. Just to kick that off. I think that, without specifically commenting on H.R. 6, there is a lot of land that, today, is not used to benefit that could be used to grow high yielding energy crops, particularly the grasses. You mentioned, Congressman, switchgrass on anthracite piles. We have similar situations in the Gulf Coast which are old phosphate lands that could be turned into sources of land dedicated to energy crops. And, that this is an important consideration that needs to be taken into account when we consider, in fact, the land resources that we have to support a very large investment in advanced biofuels, and we shouldn't overlook any of these sites.

Mr. HOLDEN. Anyone else care to comment?

Mr. BUIS. I would just follow up by saying that there is a great opportunity to produce energy from a variety of crops in America and a variety of processes. But you have to have the marketplace. And right now, the marketplace is capped out at ten percent. And so unless there is a signal that they are going to have a market out there, it is going to be tough to bring in these new processes.

Mr. HOLDEN. While we are waiting for the Chairman, there is one question I believe he was going to ask, so I will ask it for him. There was a recent op-ed story that pondered over EPA's decision to keep the cellulosic ethanol target for 2010 in their proposed rulemaking. Do any of you believe that there will be 100 million gallons of cellulosic ethanol production in 2010?

Mr. RIVA. The mandate has always been a challenge that has been sort of slapped down in front of the industry to meet. And while we may not produce 100 million gallons of cellulosic ethanol in 2010, the industry is going to be well on its way to building 100 million gallons worth of capacity in 2010. Whether that is manifest in 2011 or even a little later isn't important. The important thing is that the industry gets rolling and start building that capacity, because once it starts and once we demonstrate the commercial model for effectively building these units, then I believe that the industry will start to replicate very, very quickly. And so I believe that the mandate, as structured, should not be changed in any way.

Mr. DINNEEN. Mr. Holden, I would just add to that, because Mr. Riva is absolutely right, that you have to have the RFS remain in place to keep that market signal there so that the investment community will continue to invest in these new technologies. But I am not willing, at this point, to say that it cannot happen, because I have been surprised before. And there are some technologies that could be rapidly utilized, processing the fiber that is already in the plants, and does represent a cellulosic feedstock. And as some of those fiber technologies are commercialized, it is still possible that we could meet that 100 million gallon mandate.

But clearly, if you look at the landscape today in terms of greenfield cellulosic ethanol production technologies, whether it is from woody biomass or municipal solid waste, that is going to be a challenge by 2010.

Mr. JENNINGS. Mr. Holden, if I could add to what the two previous speakers have said. The inconsistency, the uncertainty that is introduced to this equation on top of the complexities already in place with the financial markets, because of international land use change—and to reinforce something Tom said—the fact that the market for ethanol is effectively capped to ten percent right now only make it much more complicated for companies like Verenium to get it done.

And I want to be optimistic about this, too. But those two uncertainties, the capped marketplace at just ten percent and the introduction of this international land use change component, make it much more difficult to get that done.

Mr. HOLDEN. The chair thanks the gentleman.

The gentleman from Ohio, Mr. Boccieri.

Mr. BOCCIERI. Thank you, Mr. Chairman.

And to the panel, thank you for sharing testimony today. Can you speak to me about the vision you have for ethanol production at some point, either surpassing where it is today or perhaps gaining a larger market share?

Mr. JENNINGS. Thank you for the question. I would take that first, if I could. And, the tremendous thing about ethanol today is that its better days are yet to come. And when you compare the future of biofuels to the future of oil, it becomes even more meaningful for this country, because future supplies of biofuel, whether from corn or from cellulosic products, are only going to be more efficient, more sustainable, cleaner for the environment, and ultimately help reduce prices for consumers.

At the very same time, future sources of oil are going to be less sustainable, more expensive to extract, and more carbon-intensive; and so today, most reputable models would indicate corn ethanol. An average corn ethanol plant reduces greenhouse emissions by about 60 percent compared to gasoline based on the technologies that are available. Well, companies are developing new technologies as we speak, and so the future is only going to get better; meaning, we will produce more from grain than anyone ever thought. It will be more efficient. And we will—it is not a matter of if, it is when. We will be making cellulose all around the country from various biomass feedstocks.

Mr. BOCCIERI. Tell me what kind of pressure this puts on other sectors of the economy. I know like 70 percent of our food supply in this country is based on some form of corn base. Now, only because I have four children I know about this, high fructose corn syrup, corn starch, and the like. But what type of pressures is this putting on other sectors of the economy?

Mr. JENNINGS. I don't want to diminish pressures, but the fact that—and we talked about this a little bit earlier. The fact that farmers have increased corn yields 400 percent since World War II ensures that these pressures are not as significant as some would like to suggest. That means we are raising more bushels on the

same or less acres, doing so using fewer chemicals, less water, and we are able to supply some of their needs.

Now, the RFS contemplates that there is a limit on how much corn we are going to use to make ethanol, and right now that is at that 15 billion gallon level. And so that will meet its course at some point in time. But I don't foresee that the pressures are overwhelming given the technology that can be brought to bear on this.

Mr. DINNEEN. In addition to that, Congressman, just quickly, it is important to remember that when we are processing grain into ethanol we are just using the starch. I am sort of the poster child for the fact that we have too much starch in our diet. What is left behind is a very high protein, high vitamin and mineral content feed that then goes to cattle and poultry markets. And so you are not just taking grain away from these other markets, you are actually enhancing its value as a feed product.

Mr. BUIS. And, Congressman, if I could: That 70 percent of the food that you are talking about, 81 percent of that price is set after it leaves the farm. The farmer gets less than 20 percent of that food dollar. And I was saying earlier in here that that was the most disingenuous campaign I have ever heard, to blame farmers and high commodity prices and corn ethanol on the increased food prices.

We all know it didn't happen. Everyone looked at it and tried to point that finger. But every economic analysis has said, look, it was energy, it was excessive speculation in the futures markets, and it was exports. Because at the end of the day, last year when we were supposedly running out of corn we still put 1 billion bushels back in to the carryover for next year.

Mr. BOCCIERI. My time is expiring here, but just answer this question. Can you mix ethanol with, like, with Brazil—with the corn or the sugar beets or the sugar cane that they use? Can you mix those two products together?

Mr. DINNEEN. Ethanol is ethanol. Yes. It doesn't matter what the feedstock is.

Mr. BOCCIERI. Okay. Thank you. Thank you, Mr. Chairman.

Mr. HOLDEN. The chair thanks the gentleman, and recognizes the gentleman from California, Mr. Costa.

Mr. COSTA. Thank you very much, Mr. Chairman, for holding this hearing, and the importance of the subject matter.

I want to follow up on—first of all, let me say, as maybe the only Californian that has participated in this hearing this afternoon, I am not here to defend the California Air Resources Board. Let's make that clear. I have had my differences with them over the years, and on occasions I have agreed with them on issues. But I want to talk about the methodology, because we have discussed that a lot today, and the robust and scientific efforts, as Mr. Boswell and others talked about, to identify direct and indirect emissions, and the international land change uses we have spoken of.

In my area, it is a nonattainment area, so the air quality is a big issue and we have done a lot—agriculture has done a great deal to reduce from PM_{10} levels to $PM_{2.5}$ and so forth. But can you highlight some of the impacts of what it would take into account to determining direct and indirect impacts, quickly?

Mr. DINNEEN. Congressman, we have done a lot of work in California. Throughout the rulemaking process, we have participated in every CARB workshop and we have filed hundreds of pages of comments.

Mr. COSTA. What examples does it take, quickly?

Mr. DINNEEN. I am sorry?

Mr. COSTA. What examples does it take to determine direct and indirect impacts?

Mr. DINNEEN. Well, California utilized a GTAP model that was developed by Purdue, which as we ran models and tried to replicate what they did, we learned how significantly they had undervalued the feed copilot credit and yields. They virtually gave no credit for increased yields, which we have talked a lot about today. And their modeling, while I will give them credit for being more transparent than EPA's process, the model they relied upon had some——

Mr. COSTA. So the models are flawed. Do you have other models that you would recommend to the Committee that ought to be considered?

Mr. DINNEEN. Well, the GTAP model, like many of these other models, were not developed to determine the carbon footprint of an industry. They were economic equilibrium models, and they may tell you something about commodity markets, but they can't tell you anything about carbon. And they are being forced to do something that they were not designed to do.

Mr. COSTA. Well, apparently 125 scientists agree with you. As you know, they submitted a letter to the California Air Resources Board talking of the frustration they had with regards to the methodology and the models that were used. Do you think it is possible to establish an appropriate measure of indirect land use across the globe?

Mr. DINNEEN. I think it is absolutely impossible to determine international land use impacts. And it also ignores all of the other factors involved, because there is more to indirect effects than——

Mr. COSTA. And I don't know if the others, if you want to opine. But it is virtually impossible to construct an unbiased formula when you talk about the complexities of global marketplaces, when you talk about in some instances, since we are in the Agriculture Committee, comparing apples and oranges—I think that is a good analogy—when we are talking about the myriad of different types of fuels and what it takes to produce those fuels around the world.

Mr. BUIS. Congressman, I think you stated it accurately, because I don't know how you would ever be able to determine a land use change in some other country based on commodity production in the United States that can go for a variety of reasons.

Mr. COSTA. Let's be clear about it. I think you can determine it, but I don't think you can determine it with any accuracy.

Mr. BUIS. Right. They have already determined it in California and at EPA, but there are so many factors that go into agriculture production, local food needs, exports, monetary.

Mr. COSTA. Do you think this holds true? I mean, we have been focused on the corn stuff. And, we don't grow a lot of corn in California, some for dairy feed. But how about the other biofuels?

Mr. BUIS. Absolutely, but, it goes beyond that. I think once they go down this road, you are going to see it for all of agriculture.

Mr. COSTA. So the next generation of biofuels you think will be thus impacted?

Mr. BUIS. Less impacted?

Mr. COSTA. No. The next generation of biofuels, we get beyond corn, because we are talking about it in California as well as elsewhere.

Mr. BUIS. Absolutely. If you change land and they figure out some model that they are going to use, land is land and it is going to change hands.

Mr. COSTA. Before my time expires, are there any things in the Air Resources Board that you think they did better than the Environmental Protection Agency with regards to the renewable fuel standard rule, or *vice versa?*

Mr. DINNEEN. The only thing, like I indicated earlier, they have been more transparent than has EPA in terms of the models used and the ability to get those models and replicate what they have done. But other than that, I mean, all of this stuff is based on the assumptions. And CARB's assumptions are every bit as flawed as EPA's has been.

Mr. COSTA. My time has expired. But, Mr. Chairman, if you would allow me one last line, because a number of us have been having conversations as we try to deal with an energy package that the Congress, both the House and the Senate, are working on, and the Administration. And, we can create a robust energy package without, for example, having to deal with cap and trade. I think if we focus on caps like the CAFE standards and other kinds of things and then be clear—you noted, some of you, in your testimony, about the importance of having clear rules and keeping the rules in place.

What is the biggest criticism that any of you would like to opine with the current energy package that we are producing now as it relates to agriculture's role to date? And how would you urge Members who represent strong agricultural areas to consider what to look out for, based upon the measure that is being formulated in the House?

Mr. BUIS. Well, kind of speaking wearing my old hat as a farm leader, I think the offset issues are very troubling. They count all international agriculture offsets equal to U.S. agriculture offsets. I know that is a big problem. Who regulates the marketplace is a big issue, as well as some of these other issues that we have talked about here today.

Mr. COSTA. So you are saying that others—if you are representing an agriculture area, that you would think twice unless there are significant improvements for voting for the package, some 2,000 pages now, that is being formulated on the House side?

Mr. BUIS. What I am saying is that they left agriculture out of the current legislation. Hopefully, they will allow you guys to have your input into it.

Mr. COSTA. Do the other three of you feel the same?

Mr. RIVA. I don't know if I would comment on whether it has been left out or not. But I would make the point that for any kind of biofuels industry, advanced biofuels industry in particular, agriculture needs to have an important consideration in whatever legis-

lation is taking place, because we are clearly seeing a convergence of agriculture and energy in the current energy mix.

Mr. COSTA. And in the Waxman-Markey bill, you don't see it?

Mr. RIVA. I haven't seen the latest, so I couldn't comment on that.

Mr. DINNEEN. I think there is very little in there for biofuels generally. There is no requirement any longer for flexible fuel vehicles. They have not done anything to address some of the concerns that have been raised about the RFS. I think that there certainly are some issues that they have yet to address.

Mr. JENNINGS. I would share the view that Bob just shared with you. There is very little in there for biofuels. So for the narrow interest that I am representing here today relative to ethanol, it is—far be it from me to opine on that large legislation.

Mr. COSTA. You have been very generous with my time, Mr. Chairman. Thank you very much.

The CHAIRMAN [presiding.] I thank the gentleman. The gentleman from Maryland, Mr. Kratovil.

Mr. KRATOVIL. Thank you, Mr. Chairman. If this has already been answered, forgive me coming back into this. But a number of you obviously suggest an absurdity in connecting the increased biofuel production here with deforestation elsewhere. But then you say we need to make sure we get the science right before making decisions.

My question is, do you believe that the science isn't there yet and we just don't know whether or not there is a connection? Or is your opinion that there is no connection? In other words, do you foresee a time when those indirect consequences would be considered?

Mr. JENNINGS. I will take a first stab at that. Thank you for the question.

As was noted by Bob Dinneen, there are indirect effects domestically that can be verified with relative scientific consensus. But the fact that the real-world measurements and the predictions surrounding international land use change are not cohesive, that they don't match up, that presents a serious problem.

So with respect to that part of it, the international and indirect effects, yes, more scientific rigor is needed. Will they ever get to accuracy, as Mr. Costa asked? No, I don't think you will ever get to 100 percent accuracy.

There is nothing wrong with trying to make sure that every fuel source is as low carbon as it can be in the world that we are dealing with, though. And so we support continued research on this; it is not as if we want to shy away from being under the microscope when it comes to our greenhouse gas impact. We are proud of the greenhouse gas impact we have, and we welcome this. But it needs to be more scientifically rigorous.

Mr. KRATOVIL. Okay. And Mr. Jennings, you indicate in your statement, you are suggesting that we undertake a complete evaluation of the lifecycle assessment of the indirect emissions associated with petroleum. Specifically, what are some of those examples that you think we should be considering?

Mr. JENNINGS. Sure. And we talked a little bit about that earlier. But some examples of indirect effects from petroleum could be the amount of fossil fuels used to protect the shipping lanes that bring

Middle East oil from there to the United States. You know, the fuel used to support our military presence in part in the Middle East comes for those supplies of oil.

When it comes to where we will get future supplies of oil, increasingly that will come from Canada and the Tar Sands, and there are enormous indirect impacts from the energy that is used to extract those sorts of oils, to remove the oil from the sand. Some of the land use changes that take place in Alberta with respect to what they do with the wastewater, none of those are captured in the analysis that EPA and CARB are undertaking right now.

Mr. KRATOVIL. And, again, in your report on page four, you have the chart that demonstrates the lack of connection, arguably, between the ethanol production and the deforestation in Brazil. Are you aware of any studies that demonstrate something else elsewhere in the world?

Mr. JENNINGS. With respect to?

Mr. KRATOVIL. Deforestation. In other words, any arguments other than that, the report that you referred to, indicating that there is some connection.

Mr. DINNEEN. If I could, because I had asked for it to be submitted for the record, but here is a report from Greenpeace suggesting that virtually all of the deforestation happening in Brazil is attributable to the growing cattle industry. And, people would point to cattle, they would point to lumber. It is a real stretch to suggest that there is deforestation as a result of biofuels.

Mr. KRATOVIL. Thank you.

The CHAIRMAN. I thank the gentleman. The gentlelady from Pennsylvania.

Ms. DAHLKEMPER. I apologize for not being here earlier. I actually just came from my Small Business Committee hearing. I am Chairwoman of the Subcommittee on Regulation and Health Care. We actually had a hearing going on regarding the same issues and just the really dire situation that this industry is in currently. And not knowing really where the questioning has gone, at this point I yield back.

The CHAIRMAN. I thank the gentlelady. You guys were all out and testified at the CARB hearing. Right?

Mr. DINNEEN. The RFA was.

The CHAIRMAN. When they made this decision, one of my ethanol plants had put in a digester and so they are using the corn cobs and wood in place of natural gas. Did any of that stuff get counted in whatever they did out there?

Mr. DINNEEN. Not yet. And actually that is a very good point, because one of the attributes of the California program that is better than what EPA has done is that they at least allowed for the possibility for a plant that can demonstrate it has a technology, whether it is a biomass gasification unit, as in Chippewa Valley, or something else that would reduce its carbon footprint. At least the California program allows that company to go in and make a case that its process should have a lower carbon number than the default would suggest.

EPA, although the statute certainly does not prohibit it and industry has certainly encouraged it, has to this point not proposed a similar opportunity. And we hope in the comment period and

throughout this process that EPA may as yet adopt that kind of mechanism. We do think it would allow companies that have these technologies to demonstrate a lower carbon footprint.

The CHAIRMAN. So under the California thing, an individual plant can get treated differently? In other words, the fuel from one plant might have a better number than a fuel from another plant?

Mr. DINNEEN. That is correct.

Mr. BUIS. That is the theory, Congressman. I don't think, in practicality, it would ever work.

The CHAIRMAN. That doesn't sound very reasonable.

The other thing, can any of you speculate about when the President came up with these new CAFE standards? You know, that is going to cost I don't know how much, $1,000–$1,500 a car or whatever, to do this new deal, why do you suppose they didn't require that the car companies produce flex fuel vehicles like they do in Brazil? I mean, General Motors and Ford are making those vehicles. I have been down there. They tell me they can probably do them for no extra cost, or maybe $50 a car. Why wouldn't they have put that into the mix at this point? That way, we can get to a place where we could build a marketplace, and we won't have to be so reliant on the government and the RFS and all this stuff.

Mr. DINNEEN. They absolutely should have.

I mean, at least to the point where Ford, General Motors and Chrysler have each already committed that, voluntarily, 50 percent of their vehicles will be flexible-fuelled by 2012. And I believe that they are going to stick to that commitment. But the foreign auto manufacturers have made no commitment whatsoever to E85 vehicles, to biofuels; they are sort of ignoring that opportunity. I think that a requirement, at the very least to that which the domestic manufacturers have already committed, would make a great deal of sense. And whether it happens by Executive Order or it happens in this legislation, similar to the Open Fuel Standard Act, it is going to be a very necessary public policy.

Mr. JENNINGS. If I could, Mr. Chairman, to add to that, not only do we need the vehicles in place, but we need the infrastructure in place. As you know very well, that you have a lot of blender pumps in your Congressional district that mix E85 with unleaded to give consumers a meaningful choice at the pump. Today, it is approved for FFVs only, but we still should have those in the context of this Biofuels Working Group that created this market development program. So to the degree that the Committee can bring some leadership to bear on this, ensuring that some policies are put in place to support the installation of blender pumps, it would be enormously helpful.

The CHAIRMAN. Well, we all need to get focused on this because there was a story today that was forwarded to me, you may have seen it, from *The Guardian* in London. Apparently, they are very anti-ethanol and anti-agriculture. But they are basically using E85 as a reason why ethanol should be eliminated.

And E85 served a purpose, but it is just the infrastructure that it takes to get that whole thing going, and the fact that, apparently, even under this new edict, the car companies are going to be able to get some kind of extra credit if they make E85 vehicles,

I guess, that hasn't been changed. And we are kind of missing the point here.

I think we need to re-examine this because of the mileage decrease. We have a study up in North Dakota that was done that says, what the Brazilians figured out, that the right blend is 25–30 percent. At that level, you don't really get any mileage reduction; you get better greenhouse gas results and so forth.

So, we all need to take a look at this. And if we can build a marketplace, we are a heck of a lot better off than relying on the government and going through these fights all the time. I think we would all agree with that.

Thank you all very much. You have been very generous with your time. Your testimony has been great, as well as the answers to the questions.

We will continue to focus on this. And our Committee will do what we can to try to straighten this deal out. So thank you very much.

Under the rules of the Committee, the record of today's hearing will remain open for 10 days to receive additional material, supplementary written responses from the witnesses to any questions posed by a Member to the panel.

This hearing of the Committee on Agriculture is adjourned.

[Whereupon, at 1:25 p.m., the Committee was adjourned.]

[Material submitted for inclusion in the record follows:]

SUBMITTED STATEMENT OF MANNING FERACI, VICE PRESIDENT OF FEDERAL AFFAIRS, NATIONAL BIODIESEL BOARD

Chairman Peterson, Ranking Member Lucas and Members of the Committee, the National Biodiesel Board (NBB) appreciates your steadfast leadership on efforts to promote the use of biofuels and we thank you for giving our industry a voice when addressing rainforest deforestation and assumptions pertaining to indirect land use change (ILUC). Our goal is to work with you and the California Air Resources Board (CARB) to create a workable solution that will measure biofuels through appropriate scientific methodologies.

There are significant economic, energy security and environmental public policy benefits associated with the domestic production and use of biodiesel. Though the U.S. biodiesel industry has experienced growth since 2004, biodiesel producers find themselves in the midst of a severe economic crisis that threatens the nation's ability to domestically produce low carbon, renewable diesel replacement fuel. In 2009, we anticipate production of biodiesel will be less than half of 2008 production, and nationwide production compared to capacity will be about 15%.

It is important to note that the biodiesel industry does not support the degradation of sensitive rainforest ecosystems. However, the science associated with ILUC is incomplete and inexact. The science pertaining to direct emissions is well established. The USDA/DoE lifecycle study was initially published in 1998, and has been continually refined and updated since this time. According to this model, biodiesel reduces greenhouse gas (GHG) emissions by 78%.

Many studies rely on uncertain and inexact assumptions when applying ILUC to biodiesel's GHG emission profile. There are many factors unrelated to U.S. biodiesel production that impact land use decisions abroad. For example, in Brazil, forestry, cattle-ranching and subsistence farming drive land use decisions, not the production of soybeans for biodiesel. In fact, acreage in Brazil dedicated to soybean cultivation actually decreased from 2004 through 2008, by more than 1.5 million hectares—a time period during which U.S. biodiesel production increased from 25 million gallons to 690 million gallons. If U.S. biodiesel output drove Brazilian land use decisions then the opposite would be true.

In April, the California Air Resources Board (CARB) approved a Low Carbon Fuel Standard (LCFS), which includes a number of issues that are flawed from both a scientific and logic standpoint. Below are the NBB's comments and observations on how the program can be improved.

More importantly, the issues relating to the indirect impacts associated with GHG lifecycle analysis that were included in the draft regulation but were not approved by CARB are considerable. On March 5, 2009, the NBB commented on these issues, and today we will reiterate those points.

We appreciate the willingness of CARB's staff to work cooperatively in a professional manner with our NBB stakeholders throughout this process. It certainly has been spirited process. While we continue to believe the implementation schedule for diesel is unnecessarily back loaded and we continue to have one significant difference of opinion on the lifecycle assessment for soy-based biodiesel, when taken as a whole, we feel that CARB is doing a commendable job, particularly in light of the immensely challenging time constraints the agency has been given. So it is on this basis, and with the understanding that CARB staff will continue to work collaboratively on potentially difficult issues like indirect lifecycle GHG impacts, that we provide the following comments:

1. We respectfully urge the CARB to take its time with regard to work on ILUC modeling. While we support investigating this issue fully, and wish to participate in and contribute to the effort in any way possible, we are keenly aware that the data and models needed to properly assess this issue are not yet available. Since the LCFS is not, in a real sense, implemented until 2011, and more biodiesel will not be required until 2014 than is currently sold in the state, we see no reason to rush to judgment on this issue. Rather than prematurely publishing a questionable result, we recommend investigating ILUC until January of 2011 when the LCFS is actually implemented but could still be met quite easily with California-produced ultra low carbon biodiesel from recycled cooking oil. This approach would be much more in keeping with generally accepted scientific principles. It is also interesting to note that the European Commission is employing just such a strategy by moving forward with implementation of its renewable fuels mandate, but not including a factor for ILUC until 2017. While we are not advocating for CARB to wait until 2017 to address ILUC, we do feel strongly that a 1 year deferral would inform thought on this issue significantly by providing more time for data gathering and model improvement and development.

2. At a basic level, it is our understanding that CARB is considering a methodology that attributes deforestation in the Brazilian Amazon to the production of U.S. biodiesel from vegetable oils. Statistically, we know that from 2004 through 2008, U.S. biodiesel production increased from 25 million gallons in 2004 to 690 million gallons in 2008. If most of the analysis under consideration by CARB is accurate, then one would assume that Brazilian soybean acreage would have shown a corresponding increase from 2004 through 2008. However, the attached chart, (*Attachment I*) establishes that U.S. biodiesel production *increased* from 2004 to 2008, while at the same time land dedicated to Brazilian soybean cultivation actually *decreased* by 1.52 million hectares. This real-life example contradicts the ILUC modeling under consideration in California.

3. The fact that CARB has indicated it will not perform an assessment of indirect GHG impacts associated with petroleum-based diesel represents a flaw in the agency's analysis. While CARB staff is on record indicating this information is difficult to find and would likely result in only minor modifications to petroleum's GHG reduction assessment, the same statements could also be made about soy-based biodiesel as it relates to global land use changes and the causes of those changes. In the latter case, rather than using a factor of zero as the CARB has for petroleum-based diesel, the agency has, in truth, simply ventured a guess to derive a "temporary" number—a number which, by the way, is quite large. Ultimately, this is clearly an instance in which petroleum diesel and biodiesel are treated very differently, resulting in a less accurate analysis, in general, and a less favorable analysis for biodiesel, in particular.

4. CARB does not include historical yield trends in its modeling. With all due respect, this is a catastrophic error that could distort the modeling results by a factor of 80 percent or more. At the most recent CARB public workshop, John Sheehan from the University of Minnesota presented data from a model he developed with the Natural Resources Defense Council which showed that once a historical yield trend is included in the analysis, the ILUC factor becomes zero because the higher productivity of agricultural land means there is more than enough crops available to address both energy and food needs. The NBB, as strongly as possible, encourages CARB to reconsider its position on this issue. Although CARB's current approach is simpler and easier, it distorts the final results immensely, perhaps to the point of needlessly cancelling the only compliance pathway capable of meeting the ten percent diesel reduction target.

5. As a follow-on to point number four above, CARB should recognize the GTAP model's major weakness—that it assumes supply and demand are always in equilibrium. CARB should address this shortcoming by adding a component to the model that can account for increasing yields, which would allow the model to show greater supply than demand over the long-term. Since substantial data exists showing supply and demand in the agriculture industry are never in balance, it is difficult to understand why CARB would use this model for long-term forecasting. (Notably, one of the CARB's own peer reviewers made this same point in his recent response to the draft regulation by stating that GTAP should not be used for forecasting periods longer than 15 years). This limitation of the GTAP model is precisely why CARB was unable to verify its ILUC model against 2001–2007 corn data. Of course, this is not entirely unexpected since the GTAP model was never intended for the purpose for which it is being used by CARB.

6. Page X–4 of the proposed regulation states that "The lowest cost way for many farmers to take advantage of these higher commodity prices is to bring non-agricultural lands into production." This assumption causes the ILUC model to predict that a significant amount of new land will be brought into agricultural production, artificially increasing the ILUC factor and thus decreasing biodiesel's GHG benefits. We would be interested in seeing any data CARB has that shows clearing land for additional plantings is less expensive than improving agricultural practices such as purchasing higher quality seed varieties. Based on our calculations, the math does not come close to supporting this assumption, meaning CARB believes farmers will consistently—and on a long-term, worldwide basis—make decisions counter to their economic interest.

7. With respect to GHG modeling, CARB mentions the words "full transparency" in the draft regulation on multiple occasions. We are pleased to state that this has been the case with regard to the direct emissions model, CA–GREET. To date, however, this has not been the case with respect to ILUC/GTAP modeling. CARB staff have indicated at public meetings that the GTAP model is publicly available. Unfortunately, this is only technically true because to gain access to the model one has to pay Purdue University a sum of approxi-

mately $9,000. And even if one musters the financial resources to access the GTAP model data, he or she still would not know what assumptions had been changed by CARB staff and contractors because that information has not been made available to the public. Given the extreme importance of the ILUC modeling effort to the biodiesel industry and the fact that CARB appears to be moving forward on this issue at a very rapid pace, we would hope all data related to this work would be made publicly available in the very near term so that organizations such as ours could participate meaningfully in the effort. As it stands currently, we have contracted with a noted expert in the field to analyze CARB's work who is unable to do so because no significant information has been released.

8. While we have a high level of confidence in the intellectual integrity of CARB, we cannot help but note that most governments and organizations which employ a peer review process mismanage it by hand picking a few like-minded junior professors from a small set of geographically diverse institutions. Typically, these exercises have the effect of rubber stamping the agency's views rather than informing the process. As such, we urge CARB to be exceptionally thoughtful with regard to how it manages the peer review process. Specifically, we suggest a fully transparent and unbiased process that focuses on soliciting opinion from the premier North American experts in this area. Already, we understand an "Expert Panel" will be created. Please keep in mind that a panel of experts is a panel of all experts, not just those that agree with CARB's current line of thinking. The biofuels sector has any number of readily available "experts" who should be tapped to serve on any expert panel where indirect land use is the issue.

Furthermore, on the issues approved CARB, we provide the following insights:

1. We continue to be puzzled by CARB's resistance to accelerating the diesel implementation schedule, particularly in light of a study we forwarded to staff which conclusively shows price and supply should not be concerns. It is important to note that, under the current schedule, the LCFS will not begin requiring more biodiesel to be sold in the state than is currently sold until at least the fourth year of the program. And California biodiesel plants' current production capacity will likely not be exceeded until the fifth year of the program. Ultimately, this overly cautious implementation schedule will only serve to delay development of a California-based industry that has significant potential for improving the environment and creating green jobs.

2. With respect to the CA–GREET model for soy-based biodiesel, CARB should have, in our view, used a consistent co-product allocation method. Employing the displacement method for corn-based ethanol and the energy allocation method for soy-based biodiesel defies logic given their inherent and rather obvious similarities. No other government does it this way. This decision is particularly harmful because the chosen methods result in the worst possible assessment for each fuel. And in the case of soy-based biodiesel, the error is compounded because CARB adds GHG emissions associated with the inefficiency inherent in livestock feed uptake to the oil/biodiesel side of the equation. This is illogical since the amount of energy that animals metabolize has nothing to do with the oil/biodiesel side of the GHG assessment; those GHG emissions should be counted on the meal side since they are related 100 percent to livestock feeding within the animal production industry. Further, it is important to understand that soybean oil has historically been viewed by the soybean industry as a by-product rather than a co-product. Even with the development of biodiesel, the majority of the value of a soybean continues to reside in the meal. As such, it is common knowledge that farmers grow soybeans for the meal and not the oil. This makes it doubly inaccurate to add GHG emissions associated with meal/livestock feed to oil/biodiesel.

3. With respect to the lifecycle analysis for direct emissions related to petroleum-based diesel production, it is difficult to understand why CARB would only assess the fuels that are produced in-state, since these fuels merely comprise ⅓ of the fuels sold in California. It has been said that this data is difficult to obtain, so one is left to conclude that the default value in GREET is simply being used by CARB for the sake of convenience. Given that many view GREET's assessment of petroleum to be favorable to that industry, we urge CARB to reconsider its decision to not conduct a full lifecycle assessment of petroleum-based diesel fuels produced outside California.

4. We wish to point out that the "system boundaries" of the direct emissions models for petroleum-based diesel and soy-based biodiesel are inconsistent in so

> far as GHG emissions related to oil exploration and oil well drilling are not included in CARB's assessment while GHG emissions associated with soybean planting are included in CARB's emissions figure. Clearly, a direct parallel exists between oil well drilling and soybean planting. Unfortunately, this goes unrecognized in CARB's model, compromising its accuracy. As such, we respectfully request that this difference in system boundaries be remedied by adding GHG emissions associated with oil exploration and drilling to the petroleum-based diesel total.

Chairman Peterson, Ranking Member Lucas and Members of the Committee, the NBB again thanks you for the opportunity to share our thoughts and observations on the LCFS that is being formulated by CARB. We remain ready to work constructively with you to ensure that sound science and realistic assumptions are applied to Federal and state policies that are meant to achieve the worthwhile goal of displacing petroleum with low carbon renewable fuels.

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