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THE STATE OF THE BIOFUELS INDUSTRY

HEARING

BEFORE THE

COMMITTEE ON AGRICULTURE, NUTRITION, AND FORESTRY UNITED STATES SENATE

ONE HUNDRED NINTH CONGRESS

SECOND SESSION

APRIL 26, 2006

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THE STATE OF THE BIOFUELS INDUSTRY

WEDNESDAY, APRIL 26, 2006

UNITED STATES SENATE,
COMMITTEE ON AGRICULTURE, NUTRITION, AND FORESTRY,
Washington, D.C.

The committee met, pursuant to notice, at 10:05 a.m., in Room SD–106, Dirksen Senate Office Building, Hon. Saxby Chambliss, Chairman of the committee, presiding.

Present or submitting a statement: Senators Chambliss, Roberts, Talent, Thomas, Coleman, Crapo, Harkin, Conrad, Lincoln, Stabenow, Nelson, Dayton, and Salazar.

STATEMENT OF HON. SAXBY CHAMBLISS, A U.S. SENATOR FROM GEORGIA, CHAIRMAN, COMMITTEE ON AGRICULTURE, NUTRITION, AND FORESTRY

The CHAIRMAN. Well, good morning, and welcome to the Senate Agriculture Committee's hearing to examine the current state of the biofuels industry.

Interest in biofuels has exploded in this country, with good reason. Last week, oil futures prices reached nearly $75 per barrel on the New York Mercantile Exchange. Asian economies continue to boom, creating soaring demand. Several of the countries we import from, such as Nigeria, are experiencing political and social unrest. Venezuela is planning to nationalize oil production, and we have continued uncertainty in the Middle East—in Iraq, as democracy struggles to grow, and in Iran, as its regime preaches hatred and world domination. Even with all of this uncertainty and the regrettable impact on our wallets, the United States can meet these challenges and in the future succeed in making this country energy independent.

I believe we have a bright future and have already taken the right steps to get us there. Last year, Congress passed the comprehensive 2005 Energy Policy Act to lessen our dependence on foreign sources of oil and to ensure a healthy and prosperous future for all Americans. The energy bill balanced energy production at home with new conservation and efficiency efforts and increased investment in research and development.

Two of the most notable provisions in the energy bill as they relate to our topic today are the creation of a national renewable fuels standard and the extension of the biodiesel tax credit. Already we are seeing the results of the 2005 Energy Policy Act. The renewable fuels standard will require the production of 7.5 billion gallons of ethanol by 2012. The industry is well on its way to exceeding that requirement.

Biodiesel production in this country is growing at a fantastic rate. In 2004, the industry produced just 25 million gallons. In 2006, it is expected to produce a minimum of 150 million gallons.

This year, Congress will work to ensure the law is implemented and progress is made towards the goals it established. Congress also will conduct vigorous oversight to ensure everyone plays by the rules, especially as it relates to gasoline pricing.

This hearing is the first in a series the committee will hold to examine the various components of agriculture in America as we prepare for the next farm bill. Producers have had years of experience with biofuels, and they are uniquely situated to capture the benefits of future investment in them.

I am pleased to report to my colleagues that there are several opportunities in my home State of Georgia, which traditionally has not been a large producer of biofuels. For instance, there are two biodiesel plants using a variety of feedstocks currently operating in the northwest part of our State. In the southwest part of Georgia, the part of the State where I call home, there are plans to build a 100-million-gallon corn ethanol plant. It will be uniquely situated to tap into Southeastern fuel markets and will bring significant economic development to the area.

This hearing is not specifically on the farm bill, but I expect that this committee will expand the energy title in the farm bill that we expect to write next year. I am excited about the opportunities in the biofuels industry for producers and look forward to today's testimony to learn from the industry's experience and hear its expectations for the future.

I will now turn to my ranking member, my good friend, the Senator from Iowa, Senator Harkin, for any comments he wishes to make.

STATEMENT OF HON. TOM HARKIN, A U.S. SENATOR FROM IOWA, RANKING MEMBER, COMMITTEE ON AGRICULTURE, NUTRITION, AND FORESTRY

Senator HARKIN. Well, Mr. Chairman, thank you very much, and I want to thank you for having this very important hearing about the state of the biofuels industry. This committee has a long history of promoting and being involved in biofuels, and under your great leadership, I know we are going to do even more, because we have a new farm bill coming up soon. And I heard your statements, Mr. Chairman, about the importance of energy in the farm bill.

I want to thank all our witnesses for being here, especially Dr. Brown from my alma mater, Iowa State University.

Just a few years ago, many Americans saw ethanol as kind of a boutique industry. It was okay for the Dakotas and Iowa, and maybe Minnesota and Missouri. I don't know if it got to Idaho or not. But, anyway, that was sort of we were using it and nobody else, and it was not going to be good for the rest of the country.

Well, my, how times have changed. With the price of oil at record highs and escalating energy and gasoline prices, 3 bucks a gallon for gasoline, and all of a sudden, people are saying, you know, ethanol is not a bad deal after all. And when we look at what we have seen happen in Brazil, we think, My gosh, you know, they started in the 1970s and look where they are now.

Well, the truth is we desperately need biofuels. The President was correct yesterday when he said that we are addicted to oil and that biofuels are our best bet for weaning America from this dangerous addiction. And yet I will take a little bit of issue with the President because I think there was something in his statement yesterday indicating that maybe ethanol producers and supporters are part of the problem.

There has been this, for lack of a better word, I would say almost like propaganda or misinformation that somehow ethanol is responsible for the run-up in gasoline prices. Well, I beg to differ. When crude oil is $73 a barrel and going up, the fact is ethanol is helping to moderate gas prices, not boost gas prices.

I am referring to when the President said in his remarks that State and local officials in parts of the country are worried that the sudden changes from MTBE to ethanol will cause supply disruption in the short term, and that is causing the price of gasoline to go up some amount in their jurisdictions. That is just total misinformation. Whoever gave that to the President ought to be set straight because somebody was misinformed on that one.

Now, again, despite this, we have been making progress. Many of us on both side of the aisle chamoined the renewable fuels standard E85 installation tax credits will get more E85 pumps out there. These are big steps forward. The biomass provisions that Senator Lugar and I put in the recently passed energy bill I think are another big step forward. This is going to help with the research to get more ethanol out of a kernel of corn than we get today, and to do more research into the kind of and the variety of feedstocks that we can use, especially for cellulosic conversion into ethanol.

Again, the budget problem is that only half of the funding that we have put in there is being used right now. The President's budget only put in half of what we requested for the funding.

Thousands of additional E85 pumps must be deployed to gas stations across the country. If you are going to have E85 and flexible-fuel cars, that is fine. But if you do not have the pumps, what good does it do you? So both of those have to be addressed at the same time. And we need to continue to press the auto companies to produce more FFVs, and consumers ought to have that choice.

We know that biofuels are a solution to the great environmental challenge of our time—global warming. The more ethanol and biodiesel we produce, the less petroleum we would use. And, of course, as these crops grow, they take CO2 out of the air so there is not a net addition as there is when you burn petroleum products.

Of course, we will also need better fuel economy, the expansion of other vehicle technologies, such as hybrids, hybrid FFVs, and more research into hydrogen. On hydrogen, the President was right on the mark yesterday when he talked about that.

Lastly, the farm bill is coming up. In the 2002 farm bill, Senator Lugar and I worked together to put the first ever energy title in a farm bill to promote biofuels, wind power, other renewable energy resources. I think agriculture is the proper place to look to for that. And so, again, I am hopeful that we can continue to move this forward in the next farm bill and also that the budgets we pass here will reflect that.

The energy price crisis I think drives home the critical need for the President and Congress to get on the right track and make the necessary Federal investment in biofuels and bio-based products research and development. And I know Senator Conrad is here, and he has come up with a bill that I have looked at personally. I have not looked at the whole thing, but he is on the right track in terms of taking a long-term, comprehensive look at what do we do in everything. We cannot just do this and think we are solving a problem. Our response has to be very comprehensive.

But I am convinced, after 30 years on the Ag Committee, both in the House and the Senate, watching the ethanol industry and biodiesel—and, you know, I was just telling Dr. Brown, who is a mechanical engineer, that I had always been told that you need a differential in tax incentives because you get about 20 percent less power, less BTUs out of ethanol than you get out of gasoline. So you have got to have some differential there to make up for that 20 percent less. I just thought this was a physical fact of life and we just had to live with it.

Now I find out that Saab has built an automobile with a new engine and a turbo charger that actually gets as much and slightly more power out of ethanol than gasoline. So there you go. You turn it over to the mechanical engineers, they can do it every time, I guess. Right?

So what I am saying is that these are the things that we can start doing in our country. You know, we can make these automobiles, we can make these kind of engines. We need to do the tax incentives and the tax policies, plus the budget and other policies that move us in that direction.

So I think this committee and under your leadership, Mr. Chairman, I think we can do a lot to really move this country forward in this area, and I thank you for your leadership on this.

The CHAIRMAN. Thank you, Senator Harkin. You know, you are right about the automobile industry. They are making great strides towards producing flex engines that will allow up to E85 and even 100 percent ethanol utilized around the country. You folks in the Midwest have been doing it for years. We are now getting a taste of it in the Southeast, and I am excited about the opportunity. And I will report to you, too—you and I are going to talk more about this because I envision that we will get serious with our friends from Brazil.

I had a meeting yesterday with the Agriculture Minister of Brazil, and I hope that is the first meeting in a series of meetings that you and I can have with our Brazilian neighbors to develop somewhat of a partnership in this area. We are the two dominant producers of ethanol in the world, and I think we have got a great chance to export not just ethanol from our two countries around the world but export technology and create a whole new market there that will really be exciting for agriculture.

As staff, I know, advised every member, you will be recognized according to the way in which you showed up. Senator Conrad was first. He already has his charts out. I don't know why I am not surprised that he has charts this morning. But, Senator Conrad, we will turn to you for any opening statement you have this morning.

STATEMENT OF HON. KENT CONRAD, A U.S. SENATOR FROM NORTH DAKOTA

Senator CONRAD. Thank you, Mr. Chairman, and thank you, Senator Harkin, for your kind comments on the legislation I have introduced.

I introduced, just before we took the Easter break, legislation that I think is by far the most important legislation I have ever introduced in the Congress of the United States. I call it the BOLD Act, Breaking Our Long-term Dependence. And for about 7 months now, we have worked to meet with every entity in agriculture, in energy. We spent a lot of time with the people at the Hewlett–Packard Foundation, who financed a broad-based review of America's energy vulnerability. We have talked to everybody that we could find who had an idea for what might be done in a serious way to dramatically reduce our energy dependence.

I think the President got it right when he said in his State of the Union that we have a serious problem that we are addicted to oil, much of it coming from the most unstable parts of the world. The President has got that exactly right.

Let's go to the next one.

This shows the level of dependence we have now reached: 60 percent of our oil is being imported, much of it from Saudi Arabia, Kuwait, Abu Dhabi, and other places that are unstable.

Let's go to the next one.

The circumstance that we confront is that, increasingly, this is an incredible drain on the economy of the United States. We are now spending over $260 billion a year for our oil imports—$260 billion a year. That is over a third of our trade deficit.

When we look for ideas for what might be done, the chairman and ranking member have both mentioned Brazil. Let's go to the next slide. Brazil 30 years ago was 80 percent dependent on foreign energy—80 percent dependent on foreign energy. They have reduced that to less than 9 percent now, and they tell us they will declare their energy independence next year. At the same time they have been reducing their dependence, we have been dramatically increasing ours. We have gone from 35 percent dependent on foreign energy to 60 percent, and we are headed for 80 percent dependence if we fail to act.

You know, I was hopeful that others would move forward and introduce legislation that was really comprehensive and dramatic and would make a substantial difference. And, finally, I decided just to do it, and that is what the BOLD Act is all about. It would call for extending biodiesel and ethanol tax credits through 2013. It calls for increasing ethanol use from 4.7 billion gallons in 2007 to 30 billion gallons in 2025. It calls for all vehicles sold in the U.S. by 2017 to include alternative fuel technologies such as hybrid electric or flex-fuel systems.

Why? Because that is at the heart of what Brazil did so successfully. They aggressively promoted ethanol and biodiesel and flexible-fuel vehicles. So that has got to be the cornerstone of our strategy.

The BOLD Act also creates an alternative diesel standard starting at 250 million gallons in 2008 and increasing to 2 billion gal-

lons in 2015. These are the kinds of aggressive steps that are going to be necessary if we really are going to make substantial progress.

You know, the energy bill we passed last year was good. I supported it. But it is not going to make a meaningful difference in our energy dependence. This legislation, if passed, the experts tell us, would make a dramatic and meaningful difference. And to me it is time to step up.

Now, not only do we, instead of looking to the Middle East, turn toward the Midwest for our energy supplies, instead of looking to foreign oil fields, we start to look toward the farm fields of America to help grow our way out of this crisis. But we also do a whole series of other things, including clean coal technology; investments in hydrogen, the fuel of the future; domestic energy production incentives to use CO2 to repressure oil fields in this country so that we get more production out of our domestic oil fields; authorizing the opening up of offshore drilling for natural gas. All of these have to be part of a comprehensive solution.

I thank the Chair and thank my colleagues. I urge them to take a look at the BOLD Act. It is going to take this kind of aggressive action to make meaningful progress.

The CHAIRMAN. Thank you very much, Senator.

Senator Dayton?

STATEMENT OF HON. MARK DAYTON, A U.S. SENATOR FROM MINNESOTA

Senator DAYTON. Thank you, Mr. Chairman. Thank you for convening this very important hearing. I hope it will be the first and not the last, and from what you said I trust that it will because—

The CHAIRMAN. I think you need to hit your microphone.

Senator DAYTON. Sorry. I think it is better when I am not heard sometimes.

I want to thank you, Mr. Chairman, for convening this hearing. I hope it will be the first, not the last, because biofuels, specifically ethanol and biodiesel, are real and viable and here are now alternatives to the ever-increasing costs of gasoline and diesel fuels. It is an important component of Senator Conrad's BOLD initiative. I commend him for that. I am proud to be a cosponsor of it, and that is the kind of bold action that we need. It is going to be very, very important.

As we all know, we are in this room now with a larger than usual capacity because in part we are in the midst of another price crisis for the gasoline, the diesel, and the oil upon which our cities and our industries, our lifestyles and our entire U.S. economy depend. Most Americans want their fuel prices to be lower, but they don't want to change their fuels in order to make them so. They say solve our energy problems right now, that is certainly understandable, but don't make us do anything different in order to accomplish that.

That is why I respectfully disagree with those who say that we do not have a national energy policy. We do. It is to maintain the status quo for as long as possible. And that is actually a rational policy because our existing energy sources, over 95 percent of which are and have been for over three decades oil-derived products, coal, natural gas, and nuclear, have been and in most cases

continue to be cheaper, more available, more convenient, and certainly more familiar than any of their alternatives. The sources of supplies, their production, transportation and distribution systems, and retail networks are all well established and well protected by everyone who profits from them.

Those industries and companies that control and profit from our country's enormous and almost exclusive dependence upon their sources of energy have enormous stakes in preserving their control and protecting their profits by destroying any real competition, competitive threats to their energy monopolies.

Nowhere are the stakes higher than in our Nation's transportation sector. Over 40 percent of total U.S. energy consumption is of oil and petroleum products, and over two-thirds of that oil is used for transportation. Our country now consumes almost 30 percent of all the oil that is produced in the entire world every year, which means that 20 percent or one out of every five barrels of oil produced in the entire world goes into an American car, truck, train, or airplane. And up until recently, oil was the only fuel that those cars, trucks, trains, and airplanes could run on. What a gigantic energy monopoly that is. It is the largest monopoly of any in the world. And like most monopolies, it is hugely profitable for the monopolists and hugely expensive for everyone else.

And like every other source of enormous profits and financial power, it is not going to be surrendered voluntarily by the profitable and the powerful. The huge oil and oil products monopoly is not going to willingly surrender sales or market share or profits to a competitor like the biofuels industry. Like other well-established energy monopolies, they may give lip service to energy alternatives, but they do not really mean it.

That was very clear when the Senate considered its energy bill last year. Full-page ads in The Hill and Roll Call by the American Petroleum Institute smeared biofuels with the same distortions and fears that they tried to use a decade ago to defeat a 10-percent ethanol mandate in the Minnesota Legislature. They claimed it would raise the price of every gallon, as the President repeated yesterday, that the supply would be impure and unreliable, and that people's gas tanks would explode or their carburetors would implode and their cars would be damaged or destroyed.

None of that occurred in Minnesota. Yet almost 10 years after the Minnesota Legislature required every gallon of gasoline sold in our State to contain at least 10 percent ethanol, we are still the only State in the Nation to have that requirement, and nationwide the use of ethanol is only about 2.5 percent of that gasoline.

That is starting to change, in large part because of these prices, and I commend the automobile industry for leading that initiative here in this country. If you see what has been passed out to my colleagues here, the current issue of U.S. News and World Report, the inside cover is a two-page advertisement by General Motors touting their flex-fuel engines.

Yesterday, Daimler Chrysler announced that 500,000 of its vehicles by the year 2008, one-fourth, would be also containing these flex-fuel engines.

In Brazil last year, over 80 percent of the automobiles sold in that country contain flex-fuel engines. I have had legislation for the

last 3 years that would require every vehicle sold in this country—automobile, SUV, small truck—that now consumes gasoline to contain a flex-fuel engine by model year 2006, 2008, 2010, take your pick, because it is technologically feasible, it costs about $100 to $300 per engine, I am told by the engineers in Detroit. And if the American consumer demands those vehicles as a requirement for buying or leasing new vehicles, it is going to spur this development, and then the consumer will have a choice. And that is the key. It is the price competition between ethanol E85 or E100 and gasoline—every time the consumer goes to the service station, it is that price competition that is going to help more than anything else we can do to reduce the price or reduce the increase in prices of our fuels.

Mr. Chairman, again, I thank you for holding this hearing. I hope that we will have the opportunity at some future date to ask the chief executives of the major automobile manufacturers to come here and see how we could work cooperatively with them to encourage this implementation of flex-fuel engines in our Nation's automobile and vehicle supply.

Thank you very much.

The CHAIRMAN. Thank you, and that is a great suggestion, and we will work on that.

I am not suggesting that everybody make an opening statement, but I want to make sure that anybody who has anything to say has the opportunity. Does any other Senator wish to make an opening statement? Senator Coleman?

STATEMENT OF HON. NORM COLEMAN, A U.S. SENATOR FROM MINNESOTA

Senator COLEMAN. Mr. Chairman, I will be, if I can, very, very brief.

First, I want to thank you for your leadership. This is critically important. There are so many crises we have in which the solutions are outside of our hands, we cannot control it. This is one that is right in our hands. It is in the hands of farmers in Iowa and Minnesota and the Dakotas. It is in the hands of American technology. So this is one that if we simply have leadership that says what John Kennedy said in the 1960s, when he said we are going to land a man on the Moon by the end of the decade, and we did not have the computer capacity to get to the Moon, nevertheless get back, what we simply need to say is that we are going to end the unhealthy dependence on Middle East oil and foreign oil, and we can do it.

I am not going to get into the detail here. The reality is we need to obviously do more with ethanol and biodiesel. We have also got to get the infrastructure out there. Half the E85 pumps in America are in Minnesota. Great for Minnesota, but this is not, as you said, as the ranking member said, it is not a Minnesota issue or an Iowa issue or a Midwest issue. It is an American issue.

And my last comment, Mr. Chairman, goes to your comment about China. I had a chance to visit with Hu Jintao last week. I talked about this issue. You know, we have an unhealthy dependence on Middle East oil. The Chinese are walking down the same path, and that has some terrible global, political, security implica-

tions. And so if we can figure out a way to forge a partnership on this issue, we can both help our own security and help our economy, and I think help the world.

So great things to do, great opportunity. Let's seize the opportunity and make it happen.

The CHAIRMAN. Senator Nelson?

STATEMENT OF HON. E. BENJAMIN NELSON, A U.S. SENATOR FROM NEBRASKA

Senator NELSON. Thank you, Mr. Chairman, and I, too, want to thank you for putting this issue on the agenda for today, and I appreciate the opportunity to hear from all of our colleagues and from the panelists as well.

I am also pleased that the President spoke of alternative fuels and ethanol in particular in his State of the Union address. What I think that did is it legitimized the whole discussion that we are having today in a way that could not have been accomplished in such a timely manner as we have seen it.

I am convinced that American agriculture is positioned to supply the Nation with an abundant source of clean, high-quality energy that will reduce our destructive reliance on foreign oil. That is what our purpose is all about.

I, too, have visited Brazil, met with them when I was Governor, learning of their dependence issues of the past and their independence rise in the present and the future. We have the same opportunity to do that.

As we look to the farm bill in 2007, I would hope that we would think in the following terms: If we like importing 60 percent of our fuel, we would love importing 60 percent of our food. So I am hopeful that, as we look at the importation requirements that we are experiencing today, we would focus on how to make the Food and Fuel Security Act of 2007 the highlight of what we are attempting to do, because it is a matter of security. Our food is a matter of our own security, to be able to produce enough so that we are not dependent on foreign sources for the predominance of our food any more than we want to be dependent on foreign sources for our fuel. So I hope that we can think as we move forward and look at 2007 and the farm bill, that our focus will then be on how we could—and for the sake of those in the South, we can add fiber, too. I know cotton is very important to some of our friends, if we are into Food, Fuel, and Fiber Security Act for 2007.

I appreciate it very much. Thank you.

The CHAIRMAN. You got my vote for President.

[Laughter.]

The CHAIRMAN. Senator Thomas?

STATEMENT OF HON. CRAIG THOMAS, A U.S. SENATOR FROM WYOMING

Senator THOMAS. Well, thank you, Mr. Chairman, and I am very interested in hearing from our members of the panel. I agree entirely with what has been said here. This is an opportunity for us to do some things. But I am very anxious to know what the prospects are for making this kind of an approach a little more efficient, a little more effective. I mean, if we go up to the 7 billion

area that we talked about, or 6.3 billion, that is 3 percent—that is 3 percent of our energy needs. So we need to be working here, but we need to find some ways to see how we can make it work a little better.

You talk like you are going to change the whole thing with ethanol. Well, that is not the case the way it is now. So we need to be really interested in how we can make this whole program be a little more efficient in terms of volume. That is really the key. So I am anxious to hear from you.

Thank you.

The CHAIRMAN. Senator Crapo?

STATEMENT OF HON. MIKE CRAPO, A U.S. SENATOR FROM IDAHO

Senator CRAPO. Thank you very much, Mr. Chairman.

First of all, I want to thank all of our witnesses for coming here today. I have a very eloquent and well-prepared statement, but most of the points I was going to make have already been made. I would simply submit my statement for the record and add that I had the opportunity recently to be in Brazil and to meet with the agricultural leaders and many of the other leaders of Brazil and actually go out and visit some of their ethanol facilities and observe some of the decisions that they are making in an effort to become energy independent.

And although I believe that the circumstances that the United States faces and the circumstances that Brazil faced are sufficiently different that we may have to design a little bit different approach to it.

But the fact is that the effort that Brazil has made shows that it can be done and that biofuels can be a key part of achieving energy independence, can be good for our agriculture community and good for our energy independence, and, frankly, as Senator Coleman has indicated, it can be very helpful to us in our international relations as energy issues become increasingly forefront issues in terms of the relations between nations.

So I think this is a very critical issue. I have got some questions for the panelists about how we will be as effective as possible, both technologically as well as in terms of the development of these fuels. But I am convinced that this is one of the key areas that needs to be a highlighted part of our national energy policy.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you.

Senator Salazar?

STATEMENT OF HON. KEN SALAZAR, A U.S. SENATOR FROM COLORADO

Senator SALAZAR. Thank you very much, Chairman Chambliss. Let me first thank you and Ranking Member Harkin for putting the spotlight on this issue because it is an issue that is very timely.

Two, I want to thank Bob Dinneen and Joe Jobe for their leadership and for the renewable fuels summit that you put together yesterday. I thought it was very, very well done, and I appreciated participating in that.

I have a statement for the record, and I will submit that for the record, but I want to make just a couple of quick points, and I will try to be very brief.

First of all, it seems to me that when you look at the national policy issues that we are dealing with here today, they are the most important national policy issues of our time for our country. And when you look at the national security issue of our over-dependence on foreign oil—the President's statement that this was an addiction that we had to foreign oil—it tells a story that we ought not to be putting the future of our country or our children in the hands of the sheiks and kings of the Middle East. And there is a tremendous national security imperative that I think brings conservatives, progressive Democrats, and Republicans together to try to address this issue.

Secondly, from a rural America point of view, I think that what happens with biofuels and bio-energy is going to create a whole new chapter of opportunity for what I often call the forgotten America, places that struggle so much, and I think it is a real opportunity for us to try to re-energize rural America.

The fourth point, quickly, Colorado I think is like the rest of the Nation, moving very fast forward in terms of embracing biofuels concepts. You know, 14 months ago, we had no ethanol plants in the State of Colorado. Today we have two that are up and functioning. There is ground-breaking scheduled for another five. There are biodiesel projects that are going on, probably in 20 locations around the State. This is really, really a very exciting movement and I am sure Colorado is an example of what is happening in the other States around the country.

I spent time with President Bush when he came out to Colorado and visited the National Renewable Energy Lab. I know he is excited, as is the Department of Energy, with respect to what we do with biofuels, including cellulosic ethanol and a whole host of other things. And I think, Mr. Chairman, it would be important for this committee to take the opportunity of the momentum that has built around the concept of renewable fuels and the technology that we now have around renewable fuels, to try to push forward with an energy package that might be very much what Senator Conrad has introduced—there are others who have ideas out there—but to try to do that this year as opposed to even waiting for the farm bill that I know we will be having hearings on in the year ahead and considering it for next year.

It seems to me that this is the issue of our time of this year, and we as an Agriculture Committee I think have a good sense of how it is that rural America can contribute to dealing with this national issue.

So my suggestion to you, Mr. Chairman, is that as we move forward with this issue of biofuels, we might want to speed up our conversation about legislation that might help us get to the energy independence that Senator Conrad spoke about so eloquently with respect to what has happened in Brazil.

The CHAIRMAN. Very good point.

[The prepared statement of Senator Salazar can be found on page 42 in the appendix.]

The CHAIRMAN. Senator Stabenow?

STATEMENT OF HON. DEBBIE STABENOW, A U.S. SENATOR FROM MICHIGAN

Senator STABENOW. Thank you, Mr. Chairman, and, first, welcome to our guests this morning, and thank you for your patience. I think the fact that all of us are here and have wanted to share thoughts means that this is something that we all care very much about, and it is, I think, wonderful to see that this is really an area where we can come together on a bipartisan basis. We have a real vision that is very exciting, I think, for where we can go as a country, both that relates to our national security, our foreign policy, our jobs, as well as supporting agriculture.

And, Mr. Chairman, I thank you and I also want to thank Senator Harkin. When I think about the farm bill in 2002, I think one of the most forward-thinking provisions in there was the energy title, and I am hoping with both of your leadership that we will really be able to build on that, because as Senator Conrad has said, this really is about being bold now. And it is exciting to see what all of us can do together.

Just a couple of points I would make. One is that our auto manufacturers are stepping up and are very excited and investing millions of dollars now in biofuels and alternative energy, and I appreciate Senator Dayton talking about the industry headquartered in Michigan. We are very proud of what is being done. Daimler Chrysler is the first automobile manufacturer to approve the use of B20 biodiesel. General Motors is advertising, as is Ford, for ethanol E85. Many of our vehicles right now can use that without any changes, and people are not aware of that. Flex fuels, hybrids, Ford has put out a bold plan for the future for their fleet.

There is a lot of excitement here, and in Michigan, where we will have five ethanol plants by the end of the year, and we already have biodiesel industries, announced that they are going to build a 3-million-gallon-per-year biodiesel production facility near Detroit. There is a lot happening. This is very exciting. And it is about jobs, and it about supporting agriculture, and it is about energy independence.

The only thing I would add is something that is also very exciting, Mr. Chairman. We are seeing now that not only are we talking about ethanol out of corn byproducts and also being—the possibilities now are for sugar cane, sugar beets, which are very important in Michigan in terms of ethanol. There are, of course, soybean biodiesel, a variety of things. But we have been working in Michigan on other oil-based products. Plastics now can be made from corn byproducts. The President of Michigan State University just released a report on creating oil-less products in terms of plastics, and we are developing in Michigan now automobile parts. There is a development process going on for a dashboard that would be made with plastic from corn byproducts. And it has the added byproduct that if you get hungry and you are driving, you can...

But I throw out there because I think there is some real excitement and real possibilities for us that relate to not only fuels but relate to plastics and other options. And we can all come together around a vision that says we want our fuels and we want our plastics to come from middle America rather than the Middle East.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you. Indeed, there are a number of other products that we are experimenting with, and I had the privilege of joining my colleague Norm Coleman at the Farmfest in Minnesota last year. And knowing that I come from a big cotton-producing State, they presented me with a golf shift made from corn byproducts. They did tell me that it had not been perfected yet and that if I got hot and sweaty, it would fade.

Well, by the time I got in that night, it having been a very warm day, I had the most beautiful pair of pink underwear you have even seen.

[Laughter.]

The CHAIRMAN. But the shirt is very nice.

I hate to turn this over to Senator Roberts now, but, Senator Roberts?

STATEMENT OF HON. PAT ROBERTS, A U.S. SENATOR FROM KANSAS

Senator ROBERTS. Well, up to this point, pink underwear has been classified, but it now seems it is out.

[Laughter.]

Senator ROBERTS. Mr. Chairman, thank you, and thank you to Senator Harkin for really highlighting this issue, which is not a temporary challenge. It is a long-term challenge, maybe a permanent challenge.

I want to thank Senator Salazar for really stating what this is about, and that is, our national security in regard to our national economy. But it is our security as well.

We hold a lot of hearings in the Intelligence Committee that are classified, and I want every member here to know that this is a long-term, very serious challenge that we have, if you add up what the fuel consumption is going to be in terms of fossil fuels with India and more especially China and the turmoil in the Middle East, look at what happened with Iran. And Hugo Chavez is not behaving very well down in Venezuela. And then you take a long-term look at that in terms of increased population, and you look at what the price increase has done in regards to energy and farm country, and we have a very serious challenge. One would say it might even be a crisis, but I do not like to use that word.

I would like to know that we would continue to build this industry that we are talking about that everybody has mentioned with sound economic principles. I remember the 1970s when we went through the gasohol business and we had the National Alcohol Fuels Commission traveling all over the country with previous Senators and members. I think Senator Harkin was very much aware of that. And then it all folded like a tent in terms of the economic viability.

So I want to hope that we make sure that we educate and we equip our local communities to help make practical and financially sound investments in this fuel technology. We have seven ethanol plants, a biodiesel plant coming on board, and we are using that product. It seems like to me we have a real chicken and egg problem. Why would you buy a flex-fuel vehicle—and many more are going to be made, and that certainly isn't an answer if you can't buy biofuels at your local gas station. And if you are a station

owner, what incentive do you have to dedicate a pump for biofuels if your customers do not have the vehicles that can use it? Now, we can work that out, but that has to be according to a plan, and I don't think we can do it with mandates.

We have the higher blends of fuel in Kansas, the E85, B2, B10, B20, all of the fuel pumps popping across the State, and a lot of vehicles aligned to line them up, but we need more.

I am very pleased with the progress that we have made, but I have a word of caution. I said again that we must be sure that certainly our communities invest in the long-term viability of these biofuels, but these plants must be able to sustain price changes in our commodities and the prospect of future market fluctuations. We all certainly know about that. So we have to support incentives for, I think, the alternative fuel vehicles, and like the tax credit to producers that was included in the energy bill, and I agree with Tom Harkin, we need an energy section in the farm bill, and we need to consider that.

And we have to get these fuels from the countryside to the coasts and the urban areas as well. And I think we have to view our investments in regards to alternative fuels in the broader context of the next farm bill. What will the energy title look like? We need to keep in mind that any incentives or policy changes we make on the energy side cannot come at the expense of the food-based agriculture. And I think we need to think very carefully about the law of unintended consequences as we go through this, how our commodity programs and conservation and energy programs will work together, have to work together. Changing one title at the expense of another is just not the answer.

And that includes research. We have to continue to invest in the agricultural research that has increased our crop variety, production, and yield and disease resistance. Basically this is just not going to work without the proper research, and so research into these feedstocks will only help to ensure the viability of the biofuels industry.

I am pleased that the alarm bell has gone off. I am pleased that the American people are waking up to this issue. We have an obligation on our hands, and I think, Mr. Chairman, with you and Senator Harkin at the helm that we certainly will meet these challenges with some good answers.

The CHAIRMAN. Thank you, sir.

Senator Talent?

STATEMENT OF HON. JAMES M. TALENT, A U.S. SENATOR FROM MISSOURI

Senator TALENT. Thanks, Mr. Chairman. Three things, briefly.

E85 in Missouri is selling for 50 cents a gallon less than unleaded gasoline. It is already moderating the price of energy, and this at a time when supply is under stress and the distribution network is not as fleshed out as it needs to be and as it is going to be.

There is a town in mid–Missouri called Mexico, Missouri, and they broke ground on a biodiesel plant, and so a practical illustration of Senator Salazar's point, this is one time when it is a good thing that jobs are going to Mexico, in this case Mexico, Missouri.

And we are seeing this story repeated all over rural Missouri, and I believe we are going to see a renewal of many economies in rural America because we are now going to fuel with the same kind of substances that we have been using for food.

And, finally, Mr. Chairman, we are in the renewable era now. The energy bill last year I think did that. It ushered us into it. And all that bill really did was unblock the situation so the normal economic forces should work. And we should understand what was going on for years in the country. The oil companies are vertically integrated, and they just wouldn't buy ethanol, even though it did make economic sense, because they were in control of the oil market. And the renewable fuels standard, which many people in this committee worked hard to get, has made the difference because it was the watershed that said, no, we are going to buy ethanol, and it has allowed the economic forces that I think otherwise would have worked to work. And that's why I think everybody has come out of the gate, if you will, so fast because it was pent up anyway.

So we have taken a big step. I think we all wish that it had been taken earlier, but we have taken it. And then the question is now: What is the next step how to perfect this process? We do need continued investment, and we need continued investment in the infrastructure, in the distribution network as well. And I am going to be very interested to hear what the witnesses have to say about that, and I want to say a special welcome to Joe Jobe from Jefferson City, Missouri. It is good to have you here, Joe.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you.

Senator Lincoln?

STATEMENT OF HON. BLANCHE LINCOLN, A U.S. SENATOR FROM ARKANSAS

Senator LINCOLN. Well, thank you, Mr. Chairman, for putting together such an extremely timely hearing on the state of the biofuels industry. We want to welcome our panel, and I will try to be brief so we can get to you all because we want to hear from you.

But this is clearly a topic that is on most Americans' minds, and it is: What are we going to do to control the price of fuel? Whether you are a farmer, whether you are trucker, whether you are just trying to get to a job, it is a critical issue, and it is really hitting at your pocketbook and your ability to do your job.

But the question I get the most when I go to Arkansas and I travel across my State is: Why are we not doing more? They know the technology exists. They know that there are so many opportunities out there for us to do something about the issue of the price that they are paying for petroleum-based fuels. And they just cannot understand that we are not moving forward more quickly.

So we are looking to you for some help in answering those questions to constituents of how we can provide the kind of help that the industry needs in order to jump start it in a little faster fashion.

I have said for so many years that the biofuels can play an important role in bringing down the cost of fuel and certainly reducing our dependence on foreign oil, but they also do a tremendous amount for the environment. They are great as a secondary mar-

ketplace for our producers of crops and job creation. As Senator Talent mentioned, in Missouri, in Arkansas, places like that, this is going to be a real jump start in terms of the redevelopment of many of our rural areas. Being able to put up a lot of small plants in different places is going to mean an awful lot. And certainly through supply and demand we can figure that out.

We know that demand out there, the demand problem comes from the increasing industrialization of the Far East—that has been mentioned as well—namely, China and India and the demands that are being put on the supply that exists. Certainly the world market is more competitive than it has been, and it is not going to be slowing any time, and that is one of the other reasons you see a sense of urgency among our constituency when I was home for 2 weeks. They know it is not getting any better. They can see the future ahead of them, and they realize that over the course of this summer it is not going to get anything but probably worse.

So up to this point we have not been able to fundamentally address the supply problems that we face, and I think people are anxious and ready for us to do that now. We have tried diplomacy, urging oil-rich countries to open their spigots to meet increasing demand. We have tried greater investment, putting in place tax structures, other mechanisms that allow oil companies to seek investment in marginal sources they might not otherwise attempt. You know, to date, these efforts have just not achieved what we have got to do.

We have got to get serious about making an investment in alternative fuels, and I think that is why it is time for us to take ownership. I am pleased that the chairman and Senator Harkin are leading the way. We have to develop a domestic renewable fuels industry that can meet our Nation's energy demand, and we have got to do it now. You know, in our Nation's history we have faced unbelievable technological challenges that we have confronted and we have overcome. You know, we did not put a man on the Moon by talking about how important it was. We developed a plan and we committed the resources and we dedicated ourselves to achieving that plan. That is what we have to do in regard to renewable fuels. We have to embrace it. We have to set it as a priority, and we have to be willing to make the investment. Industry cannot do it by themselves. They have done a tremendous job in developing new technology and making biofuels a viable option. I attended a dedication; the very first new biofuels biodiesel plant in Arkansas opened last week. We were real proud of that. They did a great job not only in terms of making sure that they had the feedstock and the oils and the refinery in place, but they put together a financial plan and a whole business plan that also included the oil marketers and the distribution, making sure that what we are doing is not looking at just one component but all components, making sure that we are going to have these alternative fuels available. But they had to go to six different funding sources. They had to jump through hoops and blow whistles, and it was just unbelievable, the challenges. But they did it in less than a year to prove that it can be done. It does not take decades to do this. We can make it happen, and we can make it happen in a timely way that the American people expect us to do that.

So I am grateful that we are here today. I know, Mr. Chairman, in your State, First United Ethanol is getting ready to break ground. That is, I think, a wholly privately funded operation. They visited our office to talk to us about what they were up to. So we know that private industry has got the capacity and the capability to do it. We just have to be able to provide them the incentives and certainly the wherewithal to make sure that they are out there. There are great success stories. Hopefully we will hear about some more of them from you all. We have got our stories to tell. The most important thing are your suggestions of how we accelerate those stories and multiply them.

So thank you, Mr. Chairman. I am pleased to be here and certainly proud that the panel is willing to spend the time to work through this issue with us.

The CHAIRMAN. Thank you very much, Senator Lincoln, and now we will move to our panel. Gentlemen, thank you for your patience.

Our panel today consists of Mr. Bob Dinneen, President and CEO of the Renewable Fuels Association, headquartered here in Washington, D.C.; Mr. Joe Jobe, Chief Executive Officer, National Biodiesel Board, from Jefferson City, Missouri; Mr. Jay Debertin, Executive Vice President and Chief Operating Officer of Processing, CHS Inc., St. Paul, Minnesota; Dr. Robert C. Brown, Bergles Professor in Thermal Science. He is a mechanical engineering professor and chemical and biological engineering at Iowa State University in Ames.

Gentlemen, thank you very much for being here. We will start with you, Mr. Dinneen, and move down the row for any opening statement you wish to make.

STATEMENT OF BOB DINNEEN, PRESIDENT, RENEWABLE FUELS ASSOCIATION, WASHINGTON, DC

Mr. DINNEEN. Thank you, Mr. Chairman. Mr. Chairman, members of the committee, good morning. While my statement may not be as eloquent and well prepared as Senator Crapo's, I would ask that it be entered into the record, and then I will try to summarize real quick.

The CHAIRMAN. Without objection.

Mr. DINNEEN. First of all, Mr. Chairman, I want to thank you for holding this very timely and, indeed, very important hearing. I am pleased to be here. I want to tell you all about the growth in the domestic ethanol industry, the unprecedented growth that we are seeing today. Indeed, ethanol today is the single most important value-added market for farmers. Ethanol is the second largest consumer of grain this year, having passed exports in terms of demand. The growth that we are seeing in the industry today is simply phenomenal.

Today's ethanol industry consists of 97 biorefineries located in 19 different States. We are processing close to 2 billion bushels of grain today into more than 4.5 billion gallons of fuel ethanol. And we are going to continue to grow. But ethanol is totally blended in 40 percent of the Nation's fuel—40 percent. Virtually every single gallon of gasoline in California is blended with ethanol. Minnesota has led the way with a 10-percent requirement. Ten percent of the fuel sold in Minnesota is blended with ethanol, 85 percent of the

fuel in Iowa and throughout most of the Midwest, but it is no longer just a niche market in the Midwest. Ethanol is now sold virtually coast to coast and border to border, and we are going to see continued demand.

The 4 billion gallons of ethanol that were produced last year have provided tremendous economic benefits for the country. In using 1.5 billion bushels of grain, we increased gross output in this country by $32 billion. We added 153,000 jobs across all sectors of the economy last year. Household income was increased $5.7 billion as a result of the ethanol industry that exists today, and we are growing.

The ethanol industry added $1.9 billion in Federal tax revenues, $1.6 billion in State and local taxes, money that is used then to build infrastructure, build schools, and add to the quality of life in rural communities. Ethanol today is revitalizing rural America. When I go to grand openings and I see a thousand farmers that have invested their own money in an ethanol plant, they are so excited because jobs and economic opportunities are returning to rural America. That is what the ethanol industry is doing today.

In addition, as many of you have noted, ethanol is having a tremendous impact on energy. The 4 billion gallons of ethanol that were sold last year reduced our oil imports by 170 million barrels a day. That is reducing our trade deficit by $8.7 billion, and those benefits will continue to grow.

In terms of air quality, the 4 billion gallons of ethanol sold last year reduced greenhouse gas emissions by some 8 million tons. That is the equivalent of taking a million vehicles off the road.

Now, the reason for that tremendous growth is in large part because of the energy bill that was passed last year. As you, Mr. Chairman, noted, the renewable fuels standard that was passed as a part of that bill that so many on this committee worked hard to do was a clarion call to our industry to go ahead and grow. We have 35 plants under construction today; 24 of those have begun construction since August 8th when President Bush signed that bill into law.

The other reason for all the tremendous growth is that MTBE is hemorrhaging the marketplace. Now, importantly, there is nothing in the energy bill, nothing in the Clean Air Act, no Government requirement that says the oil companies have to remove that MTBE. It is probably a good thing because MTBE had been contaminating drinking water supplies all across the country. And some have questioned whether or not there is going to be sufficient ethanol to meet that tremendous increased demand, and absolutely there will be.

We are growing, as I have noted. There is going to be some migration from ethanol sold in conventional gasoline markets to those markets where it is needed more for MTBE replacement. And there will be some level of increased imports. We are working awfully hard today with our oil industry customers and the transportation infrastructure to make sure that ethanol is where it needs to be when it needs to be and the transition is moving forward as smoothly as we can expect.

In the future, we are going to continue to grow. The industry right now is changing. It is evolving. There are new feedstocks that

are coming into play, new technologies. Our industries are looking at corn extraction, gasification to reduce energy inputs. It is a very exciting time to be a part of this industry. I look forward to continuing to work with the leaders on this committee on bold energy initiatives and other measures to increase the production and use of renewable fuels because it is terribly important for our country, for our national security, as Senator Salazar has said, for economic opportunity, as Senator Harkin knows, seeing all the development in the State of Iowa, and for the environment in the future.

Thank you, Mr. Chairman.

[The prepared statement of Mr. Dinneen can be found on page 52 in the appendix.]

The CHAIRMAN. Thank you, Mr. Dinneen.

Mr. Jobe?

STATEMENT OF JOE JOBE, CHIEF EXECUTIVE OFFICER, NATIONAL BIODIESEL BOARD, JEFFERSON CITY, MISSOURI

Mr. JOBE. Good morning, Mr. Chairman, Ranking Member Harkin, members of the committee. I am the chief executive officer of the National Biodiesel Board. That is the trade association representing the biodiesel industry in America. And I am also pleased to report that the biofuels industry is in an era of tremendous growth. I will focus my comments this morning briefly on the factors that have contributed to that growth for biodiesel, why that growth is important to America, and what must be done to keep it on its current successful path.

As you mentioned, Mr. Chairman, the amount of growth has been substantial. We went from 25 million gallons in 2004 to approximately 75 million gallons of production and sales in 2005 and on track for 150 million gallons in 2006. In the last 2 years, the biodiesel industry has built approximately 45 biodiesel plants, which have come online—as many of the Senators have mentioned, in their own States—and another 40 more that are currently under construction.

The majority of diesel fuel in the United States is used in over-the-road trucks, and the trucking industry serves as a critical part of our economy, as you all know. Everything that is in this room—this microphone that I am speaking at, this table—all of the products that we use every day were brought to us by diesel-powered trucks and America's truckers. Average diesel prices have nearly doubled over the past 4 years, which represents a tremendous threat to the trucking industry.

The American Trucking Association has endorsed the use of B5 as a way to supplement our Nation's energy supply, and likewise, Sysco Corporation, which is the largest private truck fleet in the Nation, has begun using B5 in its trucks. Biodiesel contains oxygen, so it burns cleaner, it reduces smoke and smell, it increases cetane and improves lubricity. And as ultra-low sulfur diesel fuel is coming online beginning in June of this year, biodiesel is well positioned to replace lubricity that is lost in the refining process of ultra-low sulfur diesel fuel.

The high price of fuel is just one of the contributing factors to increased biodiesel use. But I am here today to highlight three Federal policy measures that have been extraordinarily effective in

stimulating biodiesel development. Because of these three measures, biodiesel is beginning to make a small but significant impact on our Nation's energy supply. All three of these measures are scheduled to expire soon, but must be continued in order to keep the growth of biodiesel going strong. Although we are showing significant signs of success, we are an industry that is still in its infancy and we are comparable to the ethanol industry in approximately 1982.

First, the biodiesel blenders tax credit, which, Mr. Chairman, you alluded to earlier this morning, was part of the restructured Volumetric Ethanol Excise Tax credit, or VEETC, went into effect in January of 2005. It functions similarly to the excise tax credit for ethanol and was the primary stimulant for the development of the biodiesel industry in 2005 and that showed a lot of increase in new plants and jobs in biodiesel production.

Senators Grassley and Baucus have introduced the Alternative Energy Extender Act, S. 2401, and this act includes the extension of the biodiesel tax credit through 2010, which would make it consistent with the ethanol provision. Additionally, as Senator Conrad mentioned, there is an extension through 2013 in his BOLD Act. Legislation is also currently pending in the House which would extend this credit.

The second policy measure is the Bioenergy Program. A 2005 OMB evaluation reported that that program has done much to stimulate biodiesel growth and could continue to be effective for the emerging biodiesel industry. The report stated, and I quote, "Increases in the production of biodiesel indicate a rise in the supply of domestically produced renewable fuels. It is also an indicator of the viability of the biodiesel industry and its expanded consumption of agricultural commodities."

High diesel fuel prices are also hurting farmers as they have entered the spring planting season. But while costs are going up, the projected value of their crop is going down. The USDA is estimating the highest number of planted soybean acres on record for 2006 and projecting that soybean prices will drop below $5 per bushel in 2006 and 2007, triggering significant payments to soybean farmers. If the extended 2007 Bioenergy Program increased soybean prices and reduced Government payments, increased the production by $40 million, it is expected it would reduce Government payments by $210 million, which would be a net plus for the United States Treasury. That program is scheduled to expire in July of this year, so it is critical that we work to do something to extend that program.

The third program I will mention briefly is the USDA's Biodiesel Fuel Education Program. It was part of the energy title of the 2002 farm bill. That has been extraordinarily important in addressing fuel quality measures, which is vital to the success of our industry, as well as educating the petroleum partners and the automotive industry. So, to summarize, the three Federal policy measures: the extension of the biodiesel tax credit, the extension of the Bioenergy Program for biodiesel, and the extension of the Biodiesel Fuel Education Program.

Mr. Chairman, we appreciate this opportunity, and I thank you very much for this committee.

[The prepared statement of Mr. Jobe can be found on page 59 in the appendix.]

The CHAIRMAN. Thank you.

Mr. Debertin?

STATEMENT OF JAY D. DEBERTIN, EXECUTIVE VICE PRESIDENT AND CHIEF OPERATING OFFICER, PROCESSING, CHS INC., ST. PAUL, MINNESOTA

Mr. DEBERTIN. Thank you, Mr. Chairman. My name is Jay Debertin. I am Executive Vice President and Chief Operating Officer for CHS Inc. We appreciate very much the opportunity to appear before you and would like to express our appreciation to the members of this committee for their strong support of efforts to promote a viable and competitive United States renewable fuels industry.

By way of introduction, CHS is an energy, agricultural supply, and grain-based foods company owned by about 1,100 local cooperatives and 350,000 farmers in over 30 States. This year we are marking our 75-year anniversary.

CHS is also one of the few farmer cooperatives that own petroleum refineries and fill key agricultural and rural market niches. Yes, I am one of those refiners. We own a refinery in Montana and have majority interest in a refinery in Kansas. In fact, we are the largest fuel supplier, including diesel, for on-farm use.

We are also one of the few refiners that have an equally strong commitment towards renewable fuels. For example, CHS has been extremely active in the renewable fuels business for a quarter of a century, marketed many times in States that you represent under the Cenex brand that you might see at facilities across your States.

In 2005, we marketed more than 500 million gallons of ethanol-blended fuels and sold approximately 100 million gallons of B2 diesel. We have been marketing these fuels since the late 1970s, went through those gasohol phases that we spoke of earlier, and we have been there.

While our focus has long been in the marketing of renewable fuels, last fall we took the major step of investing significantly in U.S. Bioenergy, a South Dakota company that manufactures and markets ethanol and which has a half dozen plants under construction or planned in the Midwest, as well as ownership in an established plant in Nebraska. They also have plants under development and under construction in many States that you might represent.

This represents a major commitment by our cooperative to our Nation's energy future and in helping our farmer owners better capitalize on new value-added opportunities as part of a growing renewable fuels industry. Being a cooperative also helps them to reduce the effective cost of fuel and other inputs as well as improve their income from the marketplace since our earnings are returned directly to our farmer members.

The renewable fuels industry is still a very young and growing industry. We see tremendous opportunities, but there are still some challenges. Two that we could talk about would include making sure that the Renewable Fuels Program is a true national program;

and, number two, to continue the development and enhancement of a distribution system.

The recently passed renewable fuels standard was an important achievement in helping drive industry growth. It is also important that EPA rulemaking help ensure that it is a national program, applying to both blending requirements and the use of tradable credits.

There is a geographic imbalance between where ethanol is produced and where the majority of the United States motor fuel is consumed. Ethanol production largely takes place in the Midwest today while the bulk of our population is in the coastal States. Therefore, we need to continue to ensure that we have an economical and efficient transportation and distribution system that facilitates this future growth.

In conclusion, what can Congress do to further encourage the production and availability of renewable fuels in a way that enriches rural America? We have a couple of thoughts:

First, to pursue an increase in the allowance for blending of ethanol with gasoline from the 10-percent level to an ultimate goal of 25 percent or more in addition to the current E85 option;

Second, to ensure that the current Renewable Fuels Program is a national program;

Third, continue to encourage the development and use of renewable fuels by maintaining current programs and tax incentives;

Fourth, to help meet current and future distribution requirements through continued infrastructure improvements;

Fifth, to work to ensure that future farm legislation builds on the success of the current farm bill to help promote the development and growth of renewable fuels;

And finally, sixth, to maintain and strengthen the ability for farmers to join together in cooperative efforts to capitalize on new value-added opportunities and improve their income from the marketplace.

Thank you, Mr. Chairman. We look forward to working with you and the members of this committee on these and other important issues.

[The prepared statement of Mr. Debertin can be found on page 48 in the appendix.]

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

Dr. Brown?

STATEMENT OF ROBERT C. BROWN, PH.D., BERGLES PROFESSOR IN THERMAL SCIENCE, PROFESSOR, MECHANICAL ENGINEERING, CHEMICAL AND BIOLOGICAL ENGINEERING, AGRICULTURAL AND BIOSYSTEMS, ENGINEERING DIRECTOR, CENTER FOR SUSTAINABLE ENVIRONMENTAL TECHNOLOGIES, IOWA STATE UNIVERSITY, AMES, IOWA

Mr. BROWN. Mr. Chairman, thank you for this opportunity to speak on the future of the renewable fuels industry. I would also like to thank Senator Harkin for his long-term support of biomass research at Iowa State University and his personal vision for a bioeconomy.

The Chicago Board of Trade recently reported that "the U.S. ethanol industry is experiencing exponential growth and this trend is

expected to continue." In other words, the sky is the limit. If this sounds like the heady days of the 1990s Internet boom, there are indeed parallels. The Washington Post notes that both the Internet and the renewable fuels industry started from relatively small bases, they are dependent upon technological innovation for growth, and both were underinvested relative to the size of the potential market. This parallel has not been lost on the original investors of the Internet who are among the largest investors in the renewable fuels industry today. With a growth rate averaging 22 percent in the last 4 years and a doubling expected in the next 5, it is hard not to be excited about this industry. However, we must realize that decisions made today will determine whether this industry meets expectations or whether it falls victim to irrational exuberance.

The Department of Energy calls for renewable fuels to meet 20 percent of U.S. transportation demand by 2030. Currently, ethanol represents only 3 percent of transportation fuels. but even the most optimistic scenarios do not predict grain ethanol to displace more than 6 to 8 percent of gasoline demand. Agriculture must think beyond corn and soybean production if it is to supply a significant fraction of U.S. transportation fuels.

At Iowa State University, I teach students about biorenewable resources in one of the only such graduate programs in the United States. As a class exercise, I ask my students, given the choice of growing an acre of corn, soybeans, or switchgrass, which would yield the most transportation fuel and which would produce the greatest quantity of dietary protein. Most students choose corn for fuel and soybeans for protein. They are surprised to learn that an acre of switchgrass could yield almost twice the biofuel as an acre of corn and almost the same amount of protein as an acre of soybeans. Much work remains to make this intriguing possibility a reality.

Success would allow renewable fuels to meet 30 percent or more of our Nation's transportation needs, according to a recent USDA study.

The emergence of the renewable fuels industry is only part of a bigger movement known as the bioeconomy. The Des Moines Register recently characterized this movement "a revolution"; indeed, proponents of a bioeconomy call for nothing less than the complete replacement of petroleum with plant-based chemicals and materials in the manufacture of not only transportation fuels but building materials, fabrics, lubricants, plastics, and other durable and consumable goods.

We must be careful in our delineation of goals for the bioeconomy. Often people confuse pathways with goals. For example, converting corn into ethanol is not a goal of the bioeconomy but, rather, a pathway, and possibly a transitory one at that, as new technologies present more efficient and high-yielding pathways. I suggest four goals for the bioeconomy.

The first goal is to reduce reliance on imported petroleum. If we discover after a decade of "exponential growth" in the renewable fuels industry that we still import more than 60 percent of our transportation fuels, then the bioeconomy is not fulfilling its promise.

The second goal is to improve environmental quality, especially reducing emissions of greenhouse gases into the atmosphere. In principle, the manufacture of biofuels yields no net emissions of greenhouse gases, while innovations in agriculture can substantially sequester carbon into soils. In practice, these advantages are diminished by overreliance on fossil fuels in the production of biofuels and failure to employ sustainable agricultural practices. We must be diligent about keeping the "renewable" in renewable fuels.

The third goal is to expand markets for U.S. agriculture products. Although these products might be traditional cash crops, they might also be new commodity crops that better meet the needs of a bioeconomy.

The fourth goal is to provide economic development opportunities for rural America. Outsourcing by U.S. corporations is often justified as "following the resource." In the bioeconomy, the resources are the rich agricultural lands of rural America. We can expect the manufacture of biofuels and biobased products to occur in communities close to this resource, which will boost our rural economies.

The way to a bioeconomy is not clear even with the well-defined set of goals. It is too early to pick winners and losers among the technologies that can transform biomass into biofuels and biobased products. I think you would be surprised and astonished at the wide array of technologies that are being explored as pathways to the bioeconomy. Much of the recent public discussion has been about the development of advanced enzymes to produce cellulosic ethanol, but other possibilities include Fisher–Tropsch liquids or alcohols from syngas, co-refining bio-oils and petroleum crude, and hydrogen generation from algae, to name a few. Expanded research both applied and fundamental in nature is the best way for Government to help industry distinguished the winners for commercialization.

Thank you for this time this morning.

[The prepared statement of Mr. Brown can be found on page 44 in the appendix.]

The CHAIRMAN. Dr. Brown, you certainly make the point that Senator Roberts emphasized, and that is that we must continue agricultural research in this area and the funding thereof.

Mr. Dinneen, the Federal excise tax credit and the recently enacted renewable fuels standard are both designed to sustain domestic ethanol production and encourage future growth. According to a study completed by USDA last year, if the Federal tax credit of 51 cents per gallon is eliminated, ethanol production would fall sharply to about 1.5 billion gallons per year. With petroleum prices reaching record highs and gasoline at $3 per gallon, ethanol producers are receiving a higher return for a gallon of gasohol than at any time in the past.

Do high gasoline prices lessen the need for the tax credit? If so, how much longer would the credit be necessary in order to meet the minimum production schedule called for by the RFS? And at what point will the domestic ethanol industry mature where the tax credit and the import tariff are no longer necessary?

Mr. DINNEEN. Mr. Chairman, I can tell you that the ethanol industry is doing everything it possibly can to reduce production

costs. We are indeed evolving as an industry with new technologies all the time, and it is exciting to see.

Clearly, we want to look to a time when such Government supports are not necessary, but I will tell you that the oil industry today is making their investment decisions based on a conclusion that there is still going to be $25-a-barrel oil. And, clearly, what the oil price is going to be is going to determine whether or not additional incentives, continued incentives for ethanol production are necessary.

I would hope that in the future they would not be, and we are certainly working toward a place where they should not be.

In terms of the tariff, I think it is important to understand, to put the tariff in some kind of structure. There are two tariffs for imported ethanol. There is the ad valorem duty which is imposed at 2.5 percent for undenatured ethanol, 1.9 percent for denatured ethanol. That compares to a tariff of 25 percent in Brazil, 65 percent in Europe, about 135 percent in Japan. The lowest ad valorem duties anywhere on the globe. There is a secondary tariff that is imposed that is often talked about that merely offsets the benefit of the tax incentive that refiners get no matter the source of the ethanol. So we are, in effect, asking an importer to pay for the benefit of the tax incentive. The reason for that is we do not need to be asking U.S. taxpayers to subsidize already subsidized Brazilian ethanol.

Brazil over the past 30 years has built a heck of a program. I give them great credit for the industry that they have created, and Senator Conrad's chart shows the results of that investment. But they have had decades of tax incentives, production incentives, mandates, export enhancements, building the infrastructure, forgiving the debt. So they have done everything that they possibly can to build their industry. They do not need our incentives as well.

And if you remove the tariff and you have not changed the structure of the tax incentive, that is, in effect, what you would be doing.

I think the focus of both of us ought to be, as it seems your discussion with them yesterday was, how do we build worldwide markets for ethanol so that both Brazil and the United States and others can export product, because there is a growing demand for renewable fuels all across the globe. That is an agenda that makes a great deal of sense.

But I think nations that are trying to build a biofuels industry, as Brazil did, as we are doing, ought to be able to build incentives into their programs and encourage domestic production of renewable fuels from indigenous feedstocks without having to subsidize Brazil or without having to subsidize us. We would not go to Europe and say, you know, give us your incentives. I think that is the responsibility for our Nation, and we are doing it.

The CHAIRMAN. Senator Harkin?

Senator HARKIN. Thank you very much, Mr. Chairman.

Let me ask a question, and I am going to start with Dr. Brown, but I would like you all to kind of respond to it. We heard from Mr. Jobe here about biodiesel, and then you, Dr. Brown, you talked about the whole bioeconomy, about looking at different items that

we can build from this bioeconomy. Other than just ethanol and biodiesel, but there is a whole host of other things that an be produced.

I guess my question is sort of are we—and, Bob, I would ask you to think about this, too. We have been so focused on fuel because that is the Big Kahuna out there. That is what is costing us all this money because we are importing oil. But are we shortchanging ourselves by not thinking about how we combine the fuel production with feed—now, we do that already with ethanol, with distiller's dried grain, but what about the other types of things that we can get out of agricultural production that you mentioned. In other words, what about a refinery that would not only make your ethanol or biodiesel but would also make a whole host of other things?

Has anyone really looked at that? Do we know about the economics of that? Or are we building a whole industry now that will have to be revamped at some point down the pike? Will that cost us more than if we were to right now begin integrating with those fuel plants, the ethanol plants, the biodiesel plants, the necessary components for a biobased production facility that would make other things? Are we shortchanging ourselves? Should we be thinking about it in a broader scope, for example, in terms of tax benefits, tax write-offs, provisions, things like that, rather than only ethanol or biodiesel?

Mr. BROWN. Senator Harkin, if our goal is to reduce petroleum imports, we have to remember that we also use petroleum for an awful lot of products that—if you look around the room, the carpet I am just certain is a petroleum-based product, and paints and any number of things are based on petroleum. So if we are going to make that substitution for fuels, we also need to address the issue of how we transform biomass into the other products that we use?

Now, those are not necessarily going to be identical products, but examples like polylactic acid, PLA, as a polymer for the use in fabrics and utensils, plastic utensils and such, is a good one.

The idea is to build a biorefinery that models what a petroleum refinery does, which is a notion we can get both fuels and important products out of it.

I believe that the economics of a biorefinery will be very dependent on its ability to capture value clear through the processing, that it will not be enough to produce fuels. We need to do—in fact, they refer to it as an integrated biorefinery, the notion to make them pay, you need to be able to squeeze every BTU, if you will, out of the biomass that goes into it, and use it in production of fuels and different products.

I think one of the difficulties, though, is we do not have a good handle on what are the attributes, the physical and chemical attributes, of biobased materials that make them superior consumer products? You know, a lot of years have been put into looking at petroleum-based polymers and solvents, et cetera, to make good adhesives or cleaners or whatever. And I think the industry would be helped, the biobased industry would be helped tremendously if there was more information on what makes for a superior product using these biobased materials, and that is coming to an understanding of the physical and chemical properties of those materials that are being produced.

Senator HARKIN. Mr. Debertin?

Mr. DEBERTIN. Senator, it is a very insightful question, and as an investor in these plants and in these businesses, it is something that we are exactly thinking about at the same time, because clearly there are opportunities. And when we talk about on the ethanol side—and Bob could probably speak to this better than I, but there are thoughts around ethanol and corn degerming and taking the oil off the corn, and that may be going into corn oil or into the pharmaceuticals industry, which has opportunities in the future.

The issue that we really face is that the industry is moving very fast. Those types of opportunities are not yet, it seems, ready for the market. And I wish that they were because I would rather invest in an operation that was capturing all that. And I know at the end of the day we are going to have to go back and plow some ground again.

The offset to that is wait until all that is proven out, and I am afraid that this industry is—and some companies perhaps are taking that route. We have decided to enter into this industry knowing that there is probably going to be some ground that is going to have to be replowed, whether it be due to using pharmaceuticals as an option for some bioproducts of an ethanol plant or using switchgrass as a feedstock, which, again, may take some existing plants and have to do rework to those plants when that technology is marketable and ready for market.

Senator HARKIN. Mr. Jobe, how do you respond to that? Keep in mind that what I am thinking about is if we are shortchanging ourselves by just looking at fuel and maybe some feed, such as animal feed. Should we be thinking about biorefineries that are capable and even right now responding to a growing demand for biobased products out there, such as starches and other things?

Mr. JOBE. Senator Harkin, excellent question, and as it pertains to biodiesel specifically, the primary bioproduct of biodiesel production is glycerine, and there is already starting to be some response in the development of that product as an industrial chemical, as a more profitable industrial chemical, as a part of a biorefinery concept. In fact, there was an announcement of a glycerine plant that will be refined into a replacement of propylene glycol, which is a chemical that is used for a number of industrial uses, but primarily one of the major ones is as a de-icer at airports. And it is a valuable industrial chemical; however, as crude oil increases and as more biodiesel production comes on line, we can begin to utilize our glycerine-refining capacity, which is in surplus, and develop these industrial chemicals that compete with conventional petroleum-based petrochemicals. So that is beginning to become a driver.

I believe that the best way to do that on the biodiesel side is to do more of what we are doing, which is making the economics of biodiesel work. And what we are seeing in our industry, which is rather exciting, is as the economics begin to drive this, then the profitable biorefinery concepts and the bioproducts and the other emerging industries that are supporting it are beginning to—the creative processes are flowing and beginning to thrive.

Senator HARKIN. Mr. Dinneen?

Mr. DINNEEN. Senator, indeed, there is nothing that is currently produced at an oil refinery that could not theoretically be produced

from an ethanol refinery, a biorefinery. And, indeed, I have had to begin to change my own vernacular and stop talking about ethanol plants and start talking about ethanol biorefineries, because that is what they are today and that is what they are likely to be in the future. There are already many of my member companies that are highly engaged in bioproducts—pharmaceuticals and other products. But it is not just the large agri-processors that are doing this. Some of the smaller, farmer-owned ethanol plants also have very aggressive research programs underway right now because they recognize that to be competitive in the future, they have to have diversified products and they have to be looking at these technologies.

The incentives that the Congress has put in place for fuel obviously have been terrific and have allowed this industry to grow and develop, and I do think it probably makes some—a great deal of sense to think about how to create additional incentives to encourage bioproducts as well as biofuels.

Senator HARKIN. I appreciate your response to that. And, Mr. Chairman, I just think that is something we did not really incorporate fully into the energy title of the farm bill last time, but I think it is something we ought to be really thinking about down the pike for next year.

I would just add two other things. I had a picture here. I guess my staff gave it to Senator Stabenow's staff and they left. Just to show you there is nothing new under the sun as they say, it was a photocopy of a picture I have—and I have it in my office. It was a picture of Henry Ford with an axe handle hitting the trunk of a 1939 Ford. The picture was taken in 1939, the year I was born, and Ford was hitting the trunk of a car. The picture shows him hitting it with an axe handle to demonstrate that a trunk made from soybeans would not crack or dent when hit with an axe handle. And he predicted in 1939, as Senator Stabenow said, that much of the automobile of the future would be made from soybeans. That was 1939 so he was way ahead of his time.

I will say one other thing. In regards to a lot of the biobased products, again, it is the chicken and egg. Why don't more people or companies buy them or use them? Well, because they are a little bit more expensive than petroleum-based products. Well, why are they more expensive? Well, they are more expensive because no one buys them. And no one buys them because they are more expensive. You see, someone has got to crack this thing.

And so my idea was to at least put a demand pull. There is a small section that we slipped in the farm bill the last time that not too many people know about, Section 9002. It is a mandate. It says that every Federal department and agency—every one, not just the Department of Agriculture but Defense, Commerce etc. Every Federal department and agency shall give a preference to biobased products in their purchasing as long as they are equivalent in price, performance, and availability. This was signed into law by President Bush.

Well, the Department of Agriculture dragged its feet. We kept hammering it to come out with the rules on this so departments would know what to do. It was not until—and I say this, quite frankly, until Secretary Johanns came down and I met with him

about. He got it because there is a biobased plant north of Omaha owned, I think, by Cargill Dow that uses starches, and they make a lot of plastics and things like that. And he has now gotten the initial rules out on it. I think by the end of this year, he predicted they would have several hundred items on the list, Mr. Chairman, that now the Federal Government will have to buy, as long as they are reasonably equivalent in price, performance, and availability.

I mean, just think if all the hydraulic fluid that the Department of Defense uses every year for its equipment and such was, made from soybeans. We know that. All the grease that is used could be made from soybeans. Starches. McDonald's buys some of their plastic from the plant that is in Nebraska.

I asked President Bush one time on this, I said, How many plastic knives, forks, spoons, and plates do you think the military uses every year? Hundreds of millions of dollars worth. Well, now they are supposed to be buying those based upon biobased products.

Oh, here is my picture. They got it back. Henry Ford hitting his 1939 Ford car.

So that is why I asked the question, because if we are going to start really purchasing these, then we have got to make sure we have the refineries to make them. And I am concerned that we are not doing that, that we are only looking at fuels. As I said, that is important because it is the 900-pound gorilla on the block. That is what we have got to take care of. But we use our imported petroleum for other things, too, I say to my friend from North Dakota, and hopefully we can think about this in terms of biorefineries.

I have taken too much time, but I just wanted to make that point and get your response on it. Thank you, Mr. Chairman.

The CHAIRMAN. It is interesting you make that point, Senator Harkin, because when I was called recently by the White House and asked what can we do about fuel prices, I said, Well, you know, it occurs to me that the Department of Defense has one heck of a gas bill every month, and one problem we have got relative to ethanol consumption is the availability of pumps in places like the Southeast. We just do not have them. But at military bases, it is pretty easy to install them. We can control that because we control the retail outlets. And I suggested to him they might think about mandating that all military installations move to at least a 10-percent blend of ethanol. So hopefully they will start thinking about those things.

Senator HARKIN. Put me on that, will you?

The CHAIRMAN. Okay.

Senator Conrad?

Senator CONRAD. Thank you, Mr. Chairman, and thank you, Senator Harkin. I think the question you asked actually is very, very important because it helps change the economics in a very favorable way when you extend the product mix that comes from these biorefineries. So I think that was a very important question.

Mr. Dinneen, the BOLD Act that I have introduced calls for ethanol production to be increased from 4.7 billion gallons in 2007 to 30 billion gallons in 2025. Can the industry meet that ambitious timetable?

Mr. DINNEEN. Senator, we can. Obviously, it would not all come from grain. National Corn Growers have done a very comprehen-

sive study of where they think the upper bounds of ethanol production from grain would be, and their analysis suggests that we can get 15, 16 billion gallons of ethanol from grain.

The industry is moving today to look to new feedstocks, to look to cellulose-ethanol production, and we are very, very close. Senator Crapo has been leading an effort to help a plant that is beginning to produce ethanol from wheat straw in Idaho. One of my member companies recently announced the construction of a plant in Spain that will be producing ethanol from both grain and cellulose, and they intend to bring that technology to the United States.

There are many other efforts. Dupont is working awfully hard. There is not, frankly, a single ethanol producer that I represent that does not have a very aggressive cellulose-to-ethanol research program underway today, because they all have cellulose already coming into the plant, and if they can convert that into higher-value ethanol, they are going to be more competitive.

I believe that we are going to see a time well before 2025 when there is meaningful production of ethanol from cellulosic material, and that will allow the types of numbers that you are talking about be realized.

Senator CONRAD. Let me just say BOLD Act also calls for a benchmark of producing 100 million gallons of cellulosic biomass by 2010, increasing to 250 million gallons by 2013, to help that effort.

We also have an alternative diesel fuel standard, and I want to ask Mr. Jobe about this. Starting at 250 million gallons in 2008, increasing to 2 billion gallons by 2015, is that an achievable standard?

Mr. JOBE. I think it is, Senator, and our industry is supportive in principle of that measure. We are certainly very interested in working with you and your office on some of the mechanics of that. Obviously not all of that volume is in reference to biodiesel. There are a number of alternative diesels, coal—

Senator CONRAD. It also involved coal-to-liquids, because that has got to be an important part of this. We have anticipated that this new diesel fuel standard would not only reach out to biodiesel but also to coal-to-liquid fuels as a source.

Mr. JOBE. Absolutely. And we agree that that would be a very important way to support domestic—increase domestic production of a very viable alternative diesel technology and one that is compatible with biodiesel, frankly, because coal-to-liquid technology is a very arid fuel. And biodiesel is complementary with that fuel on the lubricity side.

Senator CONRAD. One of the things we have also done in the BOLD Act is to extend the existing income and excise tax credits through 2013. You know, we see as one of the big problems here that we have got all these short-term time horizons, and for the industry to plan appropriately—if we are really going to make a big push, if we are going to do anything close to what Brazil accomplished, we have got to get serious about this. Brazil did this over a 30-year period. They went from 80 percent dependence on foreign energy, and they say they are going to declare their energy independence next year. An aggressive promotion of ethanol and biodiesel and flex-fuel vehicles was right at the heart of their strategy.

Now, some have said we have got a more complex economy than they do. Absolutely we do. That is why in the BOLD Act we do not just have the renewables. We also have coal-to-liquid fuels. We have hydrogen. We have extension of the wind energy credit, the solar credit. We also have provisions on domestic energy, repressuring existing oil fields with CO2 and additional incentive for the oil industry to do that.

We also open up offshore natural gas reserves because that has got to be part of an overall comprehensive strategy, and that is what is desperately needed.

Let me just say the chief criticism of my bill has been it invests $40 billion over the next 5 years. That is $8 billion a year. I have said to those who raise that criticism we are going to spend $1.3 trillion over that period buying oil from unstable parts of the world. So the BOLD Act is 3 percent—is less than 3 percent of what we are buying from abroad. That is the cost of it. And the transformation, I would say to the chairman and say to my colleagues from Minnesota and Arkansas, Colorado, is that money—instead of spending $260 billion to ship our money to Saudi Arabia and Kuwait and Abu Dhabi and all the rest, invest that money here. Just a fraction of it, how that would transform rural America, how that would reduce the vulnerability of our country.

My time has expired, Mr. Chairman. I just think this is the time, and I urge my colleagues to look at the BOLD initiative. I would welcome original cosponsors.

The CHAIRMAN. Senator Dayton?

Senator DAYTON. Thank you, Mr. Chairman.

I certainly agree with my esteemed colleague, Senator Conrad, about the importance for action now, and I think what Senator Salazar suggested earlier about the Senate passing another energy bill this year, if we are really serious and are going to take bold action and take action itself rather than just continue to wring our hands over these problems, I think we have to act, and I hope that the Ag Committee, Mr. Chairman, under your leadership could be part of that, along with the Senate Energy Committee.

I just want to offer one more editorial comment, Mr. Dinneen. When you talk about ethanol as a substitute for MTBE—and I recognize that it is, and I recognize that the practical, short-term focus, concern of some parts of the country is the impact of that on price and the like, and supply. I think in terms of this body, and the House as well, the mentality, the East Coast mentality toward biofuels, that the misconception that ethanol is a substitute for MTBE rather than a substitute for gasoline is one of the biggest conceptual barriers we have got to get over here.

I hear that again and again from my colleagues. You know, what is the additional cost that ethanol is going to add to a gallon of gasoline? It is grossly exaggerated. But I go to a very highly respected source, Congressional Quarterly Weekly, this current week about ethanol, and it says the Energy Information Administration estimates that expanded use of ethanol will add up to 4 cents per gallon in some places to the price of regular unleaded gasoline this year.

Well, first of all, I think that is an exaggeration because if you are talking about 3 percent MTBE replaced by ethanol, a 4-cent-

a-gallon increase, that would be a $1.33-a-gallon, if it were 100 percent ethanol, increase. That is contradicted by what I see the price of E85 is in Minnesota.

So I don't think it is correct, first of all, but secondly, it reinforces this notion here that that is really the limit of ethanol's capability. So why go through all the trouble. It is one of the same problems we have with, I think, 2-percent biodiesel. I mean, it is a start, but why ask truckers to go through all the fears they have and the possible disruptions and everything else for a 2-percent variable and the price difference you get from that? Whereas, if ethanol is 85 percent of the fuels, then whatever transitional changes have to be made are really going to be worth it. They are really going to pay off for the consumer. The same thing for the truckers with biodiesel. So I offer that.

That segues into my—I guess my question is: I was driving around Minnesota quite a bit last week. I have an SUV that can go on E85 so I can, you know, price shop as I go into every station. The price of E85 last August–September in Minnesota was $1.70 a gallon. Last week, it was typically about $2.39 a gallon. The price of regular unleaded was about $2.79 a gallon. So it was about 40 cents less than regular unleaded. But that is based on—from a year ago, that is an increase of 69 cents a gallon in ethanol, in E85. That is a 41-percent price increase. And what I have heard anecdotally from some station managers is that they—or at least somewhere along the line somebody is just pegging the price of E85 to about 40 cents below the price of regular unleaded. It is not based on the cost. You know, frankly, it is as much profiteering somewhere along the line as I fear is happening with gasoline. And I think it is going to be the destruction of the industry and this opportunity now because if it is not kept the price well enough below the—as you know, with the difference in fuel density and, therefore, miles per gallon, it has got to be priced about 80 percent, or it depends on the vehicle, less than regular unleaded in order to be price competitive. And I think they assume people do not know that so they can get away with it. But if you are going to—whoever is along the line here is going to take advantage of this current situation, I think it is going to undermine the short-term cost competitives.

I see you nodding your head, Mr. Debertin, and I appreciate what Cenex has done around Minnesota to make available and encourage the use of this fuel. I would be interested in your comments, and anybody else's.

Mr. DEBERTIN. I would agree with the comments that you made, Mr. Dayton. The pricing formulas that are hitting energy products, whether they be straight gasoline or gasoline blended with unleaded, are fundamentally different than they were just a year ago when we saw ethanol prices roughly half what we have right now, and it has translated into the pump price, too.

If commodities act in such a way that they start losing public support, such as E85, if they act in such a way, it will do the industry long-term harm. And, therefore, what we think is going forward is that this will become more and more of a commodity business, more production is coming online, more production will come online, and that is going to do what price does, and it is going to

bring those prices down for an ethanol-blended fuel across the marketplace. But your comments I would agree with.

Senator DAYTON. Well, who is making these pricing decisions?

Mr. DEBERTIN. On the ethanol side, most of the times the pricing decisions are made by the ethanol manufacturer that sells the product. That isn't the case in all places because other companies will buy the ethanol off these plants, bring it into a terminal, and then market that ethanol to be blended with gasoline across the terminal. So you kind of could have two sets of pricers, so to speak—an ethanol plant that sells it directly off his plant to a retailer that you may have stopped to buy gas at, or they may have sold it to a company like us or other companies that bring it into a terminal and blend it with gasoline. So there are kind of those two.

Mr. DINNEEN. Senator, if I may just real quick, ultimately it is the marketplace that is going to set the price, and the demand for ethanol has indeed been very strong this year because refiners made the decision to remove MTBE. That has driven demand much higher than the demand that was created by the renewable fuels standard, about a billion gallons more demand than Congress had suggested was going to be necessary. So, I mean, that is what is driving the price right now.

I might add that refiners having made the decision to remove MTBE, were it not for ethanol, were it not for the fact that our industry has been expanding and we are there in order to supply the 11-percent MTBE volume coming out of gasoline, prices would be significantly higher. It is true that that has absolutely had an impact on the E85 market, but virtually all the ethanol sold in this country is sold as a blend component with gasoline, and very little of it today is sold as E85. When there are more vehicles, when there is more infrastructure, quite frankly, when there is more ethanol, then you will see a pricing structure for E85 developed that is independent from the blend marketplace.

Senator DAYTON. Thank you, Mr. Chairman.

The CHAIRMAN. As I turn to my colleague, Senator Coleman, I am going to also turn control of the microphone over to him as I am meeting with the Majority Leader right now. But, gentlemen, thank you very much for being here. I appreciate your participation today, and we look forward to continuing to use all of you as a resource as we move through this very critical issue.

Senator Coleman?

Senator COLEMAN. [Presiding.] Thank you, Mr. Chairman. I am going to ask one question because I think we have a series of stacked votes at noon, and I want to give my colleague, Senator Salazar, an opportunity to ask some questions.

A very simple question, Mr. Debertin. You talked about geographical imbalance. I think, as I said before, perhaps half the E85 pumps in America are in Minnesota. What do we have to do to—what can be done—and I would open it up to anybody—to extend the infrastructure? I think, by the way, we should mandate it in military bases. We should simply say—we do 10-percent ethanol blend in Minnesota. We could do it with the military. It works well. But I would like some ideas on what can we do to expand infrastructure. I am the author of a bill that has two choices—one to

increase the ethanol tax credit from 30 percent to 50 percent; another piece would use some of the CAFE penalties to fund fueling infrastructure grant program, Department of Energy. There has been some talk about requiring the oil companies to step up to the plate. I would be interested in your perspective, how to extend infrastructure.

Mr. DEBERTIN. Senator, I think the examples that you give are exactly the types of things that I would offer to you. Minnesota, as you said, has the vast majority of E85 pumps. In Minnesota, we have the vast majority that are under our brand. But we are in rural America. Unfortunately, rural America does not have the population, does not have the large consumption that you see other places.

So I think incentives, to incentivize other parts of the country, other retailers to put in more E85 pumps is a big role. I think increasing ethanol as a blend stock in more parts of the country is also a role, because E85 is one good route. It is one good route, but it is not the only route. Increasing ethanol as a blend stock in gasoline goes a long way toward addressing the energy problems for the country.

I think also then the credit trading system that the EPA is developing and how that gets developed is going to be—I think it is something that is a little bit under the radar screen to a lot of people, but it is a very important development. If that credit trading system gets developed in a certain way, it almost could inhibit the movement of ethanol around the country. If it gets developed in another way, it could make ethanol become more of a fuel type of product, which it becomes fungible and transportable and dependable. And those are the components that I think you have to have for ethanol really to move up to be a part of the fuel chain of the country, beyond just, you know, kind of an isolated product.

Mr. DINNEEN. Senator Coleman, there are lots of things that have to happen before E85 is a much more meaningful component of our motor fuel infrastructure. You have to have more vehicles. We have got 5 million flexible-fuel vehicles on the road today. That represents less than 3 percent of our total vehicle fleet and, quite frankly, only a fraction of those know that they even have the cars. I give great credit to what General Motors and Ford have done to promote FFVs of late, and I think the yellow gas cap campaign will help to inform consumers.

But given the fact that there are so few vehicles on the road today, it is awfully difficult to go to a gasoline marketer and say, hey, turn over one of your pumps to E85 to satisfy a fraction of the marketplace. And so incentives to help them do that make sense, and they should be done, and it is all good. But we need to have incentives for infrastructure coinciding with efforts to have more vehicles that are capable of running on the fuel.

Senator Harkin has legislation in place requiring automakers to produce more FFVs. This country this year will produce some 17 million vehicles. Roughly a half a million of them will be flexible-fueled. Yesterday Chrysler made an announcement at our conference talking about they are going to have a quarter of their vehicles FFVs next year. That is great. That is terrific. We need to do more, however, but it needs to be on the vehicle side, on the infra-

structure side, and maybe just one more brief comment. If we are incentivizing the production of FFVs, let's make sure that we are incentivizing the most efficient use of the fuel as well. General Motors had a vehicle at our conference yesterday, a turbo-charged engine that, as Senator Harkin talked about, realizes no mileage penalty whatsoever when ethanol is used. Unfortunately, while they had that vehicle out front of the hotel, you cannot buy it here in the United States. General Motors has plans to introduce that vehicle here, but I think we need to encourage that kind of technology, that kind of leadership, because ultimately that is what is going to create the marketplace environment to allow E85 to be used more widely.

Senator COLEMAN. Mr. Jobe?

Mr. JOBE. Senator, it is an excellent question. One of the primary things for biodiesel is blends up to B20 can be used in any conventional diesel engine seamlessly. So for us it is not a matter of having a special vehicle, but it is a matter of having availability of blends of B20. And it also is a matter of getting better, more fervent support by the engine manufacturers specifically stating that they support the use of B20 in their vehicles. Most state now verbally that B20 will not void their warranty. Some of them in their written statements say they do not recommend blends over B5. But one of the key elements that is helpful in getting more support from engine manufacturers is the Biodiesel Fuel Education Program that I mentioned earlier, and working with our automotive industry partners and our petroleum industry partners.

I will also mention that that applies also with OEM's dealing with rail and water transportation, our barges and rail industries. Biodiesel can be used in those aspects as well, and so rail and water transportation issues, critically important on the diesel side.

One last point as to the infrastructure and availability of B20. Infrastructure credits and the infrastructure credit that offers tax credits for retail pumps of E85 and B20 can be very effective. However, one of the things that is very critical when putting in infrastructure credits is making sure that the mechanisms actually work within the Tax Code and can be taken advantage of. We know historically the income tax credit that was available for E85 did not really work for E85 until it was restructured into the VEETC tax credit. And as we are looking at the rulemaking process for the infrastructure tax credit, it could be limited in how effective it could be unless we perfect it in some way.

Senator COLEMAN. Your response has been very helpful. Before I turn to Senator Salazar, I would note that my colleague from Iowa was talking about Henry Ford. I believe that Henry Ford's first automobiles actually ran on ethanol fuel. But it was the availability of cheap Pennsylvania crude that really turned him to using a petroleum base. Had he gone in another direction, we would have had different hearings, I think, today.

So with that, Senator Salazar?

Senator SALAZAR. Thank you, Senator Coleman.

I have four questions, and I would appreciate it if you would keep your responses to 30 seconds because we have a vote coming up shortly.

Senator COLEMAN. I believe, by the way, the vote is at 12:15, so you have a little time, Senator Salazar.

Senator SALAZAR. Okay. Thank you, Senator Coleman.

First, Jay, if you can respond to this question, what, in terms of technical and financial assistance, are we doing enough for all of these communities that want to do something regarding a biodiesel or ethanol plant or a biorefinery program so that they know what to do instead of having their exuberance somehow wasted out there? Is there something more than the United States of America should be able to do?

Number two—I am going to ask all my questions so you can all then respond to them in 20 second. Number two, for Joe, if you can tell me what the level of technology is with respect to some of the jelling that has occurred with biodiesel in some places around the country, with some people saying that it makes a not very effective fuel in some of our colder States. Joe, also for you, and for Bob, the question about small-scale projects that are actually on-farm projects that can produce fuel, how feasible is that? How far along is the technology on that?

And then, Bob, for you on the question of cellulosic ethanol, we are spending—investing tremendous amounts of money, $50, $100 million into each one of these ethanol plants now where we are using corn as a feedstock. How difficult is it going to be to convert those plants over to a new feedstock, whether it is corn stocks or switchgrasses, et cetera, when we get to the 2012 time frame and we have the technological capacity to do it?

So why don't we just go down the line, give me a 30-second response to each of those questions. Go ahead.

Mr. JOBE. I can start. First of all, the community production, are we doing enough to stimulate investment in plants and community production, I believe the answer to that is the Bioenergy Program, which I mentioned in my comments, is set to expire in July. That program has been extremely effective in developing domestic biodiesel production capacity as we look at—biodiesel does not have an offsetting import tariff like the ethanol industry does, and in terms of how we address that, the Bioenergy Program is going to be important because it has been a cornerstone in the development of a domestic biodiesel industry, and we believe that perhaps is the best, strongest way to compete against imports.

In terms of jelling, the Biodiesel Fuel Education Program is very important because some of the fuel quality problems that we have had have been not having the proper information and education with the petroleum industry on proper handling and blending. Also, that program helps support fuel quality programs in the industry.

And, finally, on-farm small-scale production, that has not been a focus of the industry. We have kind of let the market take care of that. But we are—the average biodiesel plant is considerably smaller than the average ethanol plant. Many of the plants that are going up right now—in fact, the average scale is about 3-million-gallon plants—they are farmer-owned and community-based.

Senator SALAZAR. Thank you, Joe.

Bob Dinneen?

Mr. DINNEEN. In terms of on-farm small-scale production, most of that today I believe is going into beverage, not necessarily fuel. It is really not an economic model. Most ethanol production facilities today that are going in are 50 or 100 million gallons. The economies of scale are important. I would say, however, that the single largest ethanol producer taken as a whole today is the farmer-owned ethanol plant. So farmers are investing. They have got a strong place in this industry, and they always will, but it is going to be coming together, not necessarily putting it in on-farm production.

In terms of cellulose-ethanol production, I do not see that replacing existing facilities. I think you are going to have cellulosic ethanol production alongside an existing grain-based ethanol facility. The two technologies are going to continue to evolve, but evolve together over time.

Senator COLEMAN. Jay?

Mr. DEBERTIN. Mr. Chairman, just the issue of what you are doing for local communities and getting investment, I can't say there is nothing around the edges that might be helpful or might be necessary, but I can say you are doing it 90 percent right. Investment in ethanol manufacturing within rural communities is going well. The money issue is not a problem today. Local communities are welcoming this both from jobs and a property tax point of view. They are welcome employers and in light manufacturing in those towns. So I think it is on a good track as we speak.

Senator SALAZAR. Thank you very much for your exciting and very, very informative testimony.

Senator COLEMAN. Senator Harkin, is there anything else that you want to raise?

Senator HARKIN. No. I see a vote is on right now?

Senator COLEMAN. The vote is to go on at 12:15, so we are right on schedule.

Senator HARKIN. Could I just ask one thing?

Senator COLEMAN. Absolutely.

Senator HARKIN. I appreciate that very much. Thank you.

You have all touched on ethanol production in one way or the other, and, Bob, you have been involved in this for many years. But one of the constant kind of things I hear are fears that, oh, my gosh, if we are just going to use all our corn for ethanol, then we are going to be going fence row to fence row? Are we going to be plowing up all this conservation land we have, and are we going to have all the environmental problems that come with that? It is going to maybe even impinge upon the use of that grain for other things.

And so what has appealed to me is this whole idea of cellulosic conversion, Senator Lugar and I have talked about this, and he has kind of been the leader in that for a long time. And I know Canada has at least one demonstration plant. I think we have maybe one here in the near future. I do not know. I am not as familiar with it in the States a I'ld like to be.

How aggressive should we be—now, we got the renewable fuels standard. We got that in, and we will probably exceed that, by the way.

Mr. DINNEEN. Far exceed it, yes.

Senator HARKIN. But how aggressive should we be in the research and the development of cellulosic conversion now, anticipating this big growth? Again, I am thinking about the next farm bill. I am thinking about the WTO and what we have to do in terms of cutting back on our price supports and things like that. The world is changing on us, and if we are going to be in that WTO negotiation, which I believe we should be and part of it, then we are going to have to cut back on a lot of the old traditional types of supports that we have had for agriculture. Well, then, maybe we ought to think about how we shift it into some other areas, and I am thinking about cellulosic conversion. Can we see that it actually will be—Dr. Brown, will that be a viable part of our fuel supply? Will it be economically feasible at some point? And how do you see it, Bob? What do you see for ethanol production down the pike? How aggressive should we be on this cellulosic conversion?

Mr. DINNEEN. Senator, I think we have to be as aggressive as we possibly can. We are 60 percent or more dependent on imports. You look at the world oil situation. You see what China and India and others are doing to worldwide oil supply by creating tremendously increased demand. And, Senator, quite frankly, Americans are dying today because of our dependence on oil from that part of the world.

We have to be doing everything that we possibly can to assure greater production of ethanol and other biofuels from domestic feedstocks. That is not just corn. Corn growers are incredibly productive and efficient, and the Corn Growers, as I mentioned earlier, have an analysis out there that they anticipate being able to get 15 billion gallons of ethanol. Actually, 15 billion bushels of grain, by the way, in the future. We are coming off of back-to-back 11-billion-bushel corn crops. They are doing a tremendous job. But even they will tell you that if ethanol is to become a much more meaningful component of our motor fuel supply, that you have to be producing ethanol from other feedstocks. And there is no question.

But as I indicated earlier, there is not an ethanol producer I represent that does not have a very aggressive ethanol cellulosic program. I have been in this industry now for 19 years. When I first started with the association, Department of Energy would say that the cellulosic ethanol production is 5 years away. And it has been 5 years away every year since then. But, Senator, we are closer today than we have ever been. There is production of ethanol from cellulose today. Iyagen has a facility in Canada, but they are looking to build a much more—a commercial size facility here in the United States. Abengoa Bioenergy is today building a commercial size cellulose and grain ethanol production facility in Spain, but Abengoa operates four plants here in the United States, and they intend to bring that technology here.

There are others out there—Dupont, many other companies—that are excruciatingly close to cracking the code to be able to produce ethanol from cellulose economically. This is not a time to be taking the foot of the gas. This is the time to be going forward.

Senator HARKIN. Well, I am open for any kind of suggestions any of you have, whether it is in the Tax Code or whether it is pilot

projects or whatever else we might do. If you have got any suggestions, let me know.

Dr. Brown, do you have any comment?

Mr. BROWN. I would echo both remarks. At the growth rate of the ethanol industry right now, we will have no choice but to be producing cellulosic ethanol in 7 years. We need to make sure we are ready to do that, and I am not convinced we are. I think we are going to need to be doing both research and pilot scale—

Senator HARKIN. We need to put more money in research in that area?

Mr. BROWN. I believe so, and I believe there are many options for doing this, and we have not explored all of those. And I think we need to open that up and look at those possibilities.

As I mentioned in my testimony, enzymatic hydrolysis is just one possibility. There was mention of coal to diesel. It is also possible to go to biomass to a green diesel using a Fisher–Tropsch type process. So there's a lot of possibilities, but it takes time to do that, and the next 7 years is really pushing it as a schedule.

Senator HARKIN. Well, because, you know, we have gotten—what do we have now? Norm, how many acres do we have got in the CRP? About 40 million acres? Thirty-six million acres in CRP now, and, you know, farmers have to plant a conserving crop on that, such as switchgrass or alfalfa. It would seem to me if you could keep that CRP thing going but give farmers another incentive to grow something that would be harvested for fuel without disrupting the conserving nature of it, that would give the farmers an income stream to offset a decrease in commodity prices because of WTO. That is why I am interested in this approach and how close we are to cellulosic conversion.

Senator COLEMAN. I would note the vote was posted at 12:03, so I just—

Senator HARKIN. I appreciate that. Thank you very much. I am sorry I had to leave for a phone call, but I was listening to you out there. Thank you.

Senator COLEMAN. Gentlemen, this has been an extraordinarily helpful panel, and we are very, very appreciative. And as the chairman said, this is the start of a much longer discussion so I want to thank you for your participation and thank the ranking member for his leadership on this issue.

With that, this hearing is now adjourned.

[Whereupon, at 12:11 p.m., the committee was adjourned.]

APPENDIX

April 26, 2006

Appendix

Senator Ken Salazar
Agriculture Committee Hearing: The State of the Biofuels Industry
April 26, 2006
Statement

Chairman Chambliss and Ranking Member Harkin, thank you for holding this hearing on the state of the biofuels industry. With gasoline prices topping $3.00 a gallon in many parts of America today, and projections for more of the same over the coming summer, this hearing is extremely important and timely.

While this is an extremely tough time for American consumers at the pump, it is a very exciting and dynamic time for biofuels in both Colorado and the rest of the country, and I thank the panel of witnesses for your work in this field and for joining us today to share your expertise. I look forward to working with all of you on this important issue.

I am extremely excited about what the continued advancement of this technology will be able to do, not only for our rural communities, but for our entire country. As a member of both the Agriculture and the Energy Committees, I have been fortunate to see this issue from two complementary perspectives. The future of our energy independence is inexorably linked to our commitment to novel, renewable sources of energy like ethanol.

Home-grown ethanol remains one of the most promising fuels for rural America and the nation as a whole. Over the past several years we have been able to see ethanol grow into a cost effective, clean burning, and competitive octane enhancer. In these weeks of astonishingly high crude oil prices, the appeal of renewable energy technologies, like ethanol, is all the more apparent.

Those of us here in Congress should remain steadfast in our long term support of ethanol and other renewable opportunities – not just to ease the burden on American consumers, but to protect our national security. Every gallon of domestically produced fuel lessens our ballooning trade deficit. In addition, each barrel of oil that we don't need to import from politically unstable regions improves our national security.

We must be generous with our investment in research, development and infrastructure expansion of these exciting technologies. As I have said many times during my tenure here in the Senate Mr. Chairman, what better way to wean America off her addiction to foreign oil than by using the hard work, innovation, and industriousness of our heartland?

I am proud that Colorado, which is the home of the National Renewable Energy Laboratory – or NREL, has become one of the nation's major players in the biofuels industry. This facility and its scientists are on the cutting edge of biomass technologies, and I am proud they call Colorado home. Their work with cellulosic ethanol will help make that fuel one of the most efficient and cheapest alternatives to petroleum.

In addition, NREL considers Colorado to be the ideal location for cutting-edge "closed loop" biorefineries. Indeed, my state is the 5th largest in ethanol capacity and the 11th largest in ethanol production. I am so proud of the continued technological advancements that Coloradans are making everyday in this area.

Mr. Chairman, the benefits of the biofuels industry are profoundly linked with the future of rural America. Our producers need relief from the staggering increases in fuel and fertilizer costs. We, especially those of us on this committee, have the responsibility to ensure that our producers will be able to stay in the business of agriculture - so that our rural communities will remain viable and our food supply secure. I believe that biofuels will play an important role on the viability and sustainability of our rural way of life.

The Energy Title in the Farm Bill provided us with a means to apply some of this science directly to our farmers. I would like to commend those who worked on the Farm Bill and who had the foresight to include programs to help rural communities invest in biofuels. I look forward to working with all of you not only to expand and increase investment in existing programs, but also to develop new, creative programs that will continue to demonstrate our commitment to this emerging industry.

Rural America is spoken of as the heartland of America not only for its geographic location, but also because it is where our bedrock values have been developed and deeply tested. Biofuels may offer a new dimension to this old metaphor; a heartland that provides clean reliable energy, the lifeblood of our modern economy.

Mr. Chairman and Ranking Member Harkin thank you again for holding this hearing. I hope that this hearing signals our ongoing commitment to this promising technology.

Testimony
Robert C. Brown
Iowa State University
for
Senate Committee on Agriculture, Nutrition, and Forestry
April 26, 2006

Mr. Chairman, thank you for this opportunity to testify on the future of the renewable fuels industry. I would also like to thank Senator Harkin for his long-term support of biomass research at Iowa State University and his personal vision for a bioeconomy.

The Chicago Board of Trade recently reported that "the U.S. ethanol industry is experiencing exponential growth and this trend is expected to continue."[1] In other words, the sky's the limit. If this sounds like the heady days of the 1990's Internet boom, there are indeed parallels. The Washington Post notes that both the Internet and the renewable fuels industry started from relatively small bases, they are dependent upon technological innovation for growth, and both were underinvested relative to the size of the potential market.[2] This parallel has not been lost on the original investors of the Internet who are among the largest investors in the renewable fuels industry today. With a growth rate averaging 22% in the last four years and a doubling expected in the next five years, it is hard not to be excited. However, we must realize that decisions made today will determine whether this industry meets expectations or whether it falls victim to irrational exuberance.

The Department of Energy calls for renewable fuels to meet 20% of U.S. transportation demand by 2030. Currently, ethanol represents only 3% of transportation fuels but even the most optimistic scenarios do not predict grain ethanol to displace more than 6-8% of gasoline demand. Agriculture must think beyond corn and soybean production if it is to supply a significant fraction of U.S. transportation fuels.

The U.S. Department of Agriculture recently performed an assessment of biomass resources for the United States.[3] This study concludes that over 1.2 billion tons of dry biomass could be produced in a sustainable manner from a variety of resources including animal wastes, milling residues, crop residues, and dedicated energy crops such as switchgrass. Equivalent to 21 billion GJ of energy, this biomass supply could be used to fulfill one-third or more of U.S. demand for transportation fuel. Agriculture will have to reinvent itself to achieve this potential.

At Iowa State University I teach students about biorenewable resources in one of the only such graduate programs in the United States. As a class exercise I ask my students, given the choice of growing an acre of corn, soybeans, or switchgrass, which would yield the most transportation

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[1] Anon, CBOT Ethanol Futures Hedge Examples, Chicago Board of Trade, May 17, 2005, http://www.cbot.com/cbot/ pub/ cont_detail/0,3206,1172+28201,00.html.

[2] Shin, A., Internet Visionaries Betting On Green Technology Boom, Washington Post, Page D01, April 18, 2006, http://www.washingtonpost.com/wp-dyn/content/article/2006/04/17/AR2006041701563.html.

[3] Perlack, R. D., Wright, L. L., Turhollow, A. F., Graham, R. L., Stokes, B. J., and Erbach, D. C. (2005) Biomass as Feedstock for a Bioenergy and Bioproducts Industry: The Technical Feasibility of a Billion-Ton Annual Supply, Department of Energy Technical Report GO-102995-2135, April.

fuel and which would produce the greatest quantity of dietary protein. Most students choose corn for fuel and soybeans for protein. They are surprised to learn that an acre of switchgrass could yield almost twice the biofuel as an acre of corn and almost the same amount of protein as an acre of soybeans. Much work remains to make this intriguing possibility a reality.

The emergence of the renewable fuels industry is only part of a bigger movement known as the bioeconomy. The Des Moines Register recently characterized this movement "a revolution;" indeed, proponents of a bioeconomy call for nothing less than the complete replacement of petroleum with plant-based chemicals and materials in the manufacture of not only transportation fuels but a variety of biobased products. Already commercially available biobased products include adhesives, cleaning compounds, detergents, dielectric fluids, dyes, hydraulic fluids, inks, lubricants, packaging materials, paints and coatings, paper and box board, plastic fillers, polymers, solvents, and sorbents.

We must be careful in our delineation of goals for the bioeconomy. Often people confuse pathways with goals. For example, converting corn into ethanol is not a goal of the bioeconomy but rather a pathway, and possibly a transitory one at that, as new technologies present more efficient and high yielding pathways. I suggest four goals for the bioeconomy.

The first goal is to reduce reliance on imported petroleum. If we discover after a decade of "exponential growth" in the renewable fuels industry that we still import more than 60% of our transportation fuels, then the bioeconomy is not fulfilling its promise.

The second goal is to improve environmental quality, especially reducing emissions of greenhouse gases into the atmosphere. In principle, the manufacture of biofuels yields no net emissions of greenhouse gases, while innovations in agriculture can substantially sequester carbon into soils. In practice, these advantages are diminished by over reliance on fossil fuels in the production of biofuels and failure to employ sustainable agricultural practices. We must be diligent about keeping the "renewable" in renewable fuels.

The third goal is to expand markets for U.S. agriculture products. Although these products might be traditional cash crops, they might also be new commodity crops that better meet the needs of a bioeconomy.

The fourth goal is to provide economic development opportunities for rural America. Outsourcing by U.S. corporations is often justified as "following the resource." In the bioeconomy, the resources are the rich agricultural lands of rural America. We can expect the manufacture of biofuels and biobased products to occur in communities close to this resource, which will boost our rural economies.

To meet these goals we will have to develop and deploy biorefineries, which efficiently separates biomass into individual plant components and converts them into diverse marketplace products. Three distinct kinds of biorefineries are visualized for the United States: corn-based biorefineries, lignocellulosic biorefineries, and oleochemical biorefineries.

Modern wet corn milling plants can rightly claim to be a form of corn-based biorefinery, producing starch, ethanol, high fructose corn syrup, and animal feed. However, advanced corn-based biorefineries will process fibrous byproducts into higher valued products than animal feed. This will be accomplished through the development of new enzymes that release sugars from cellulose fibers.

Lignocellulosic biorefineries will convert fibrous biomass such as switchgrass and cornstover into sugars and lignin.[4] The sugars will be fermented into "cellulosic" ethanol although the same carbohydrate derivatives contemplated for corn-based biorefineries are also possible secondary products for a fiber-based biorefinery. Lignin, a phenylpropane-based polymer, is not fermentable but has potential as a urea-formaldehyde substitute or even the starting point for the production of hydrocarbon fuels.[5] First generation biorefineries, however, are expected to simply use lignin as boiler fuel.

A fundamentally different approach to lignocellulosic biorefineries thermally gasifies plant material into a mixture of carbon monoxide and hydrogen known as syngas. This simple gas mixture can be catalytically upgraded to a wide variety of compounds, including alcohols, carboxylic acids, and hydrocarbons.[6] It is the process proposed for the production of "green" diesel in Europe.[7]

The oleochemical biorefinery is based on plant oils or animal fats. For a biorefinery based on oilseed crops such as soybeans the primary products are oil (triglyceride) and meal, the later of which contains significant quantities of protein and fiber and some residual oil. The oil can be either hydrolyzed to fatty acids and glycerol or converted into methyl (or ethyl) esters and glycerol.[8] The fatty acids and esters are potential platform chemicals for the production of a vast array of derivative chemicals used in high value products. Much of the focus on methyl esters today has been on their use as biodiesel but there has also been limited diversification into ester-based solvents and lubricants. The industry has shown only limited interest in upgrading the glycerol byproduct although technologies are rapidly emerging for its conversion to 1, 3-propanediol,[9] a precursor to the production of plastics. Similarly, although the protein in the meal as potential to replace urea-formaldehyde in adhesives, commercialization has been slow to emerge.

The question of whether renewable fuels return more energy than is consumed as fossil fuels in their production is a seemingly interminable debate. [10, 11] Research into this question yields

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[4] Lynd, L. R. (1996) Overview and Evaluation of Fuel Ethanol from Celllulosic Bomass: Technology,Economics, the Environment, and Policy, Ann. Rev. Energy Environ. 21, 403-465.

[5] Meister, J. J. (2002). "Modification of lignin." Journal of Macromolecular Science - Polymer Reviews 42(2): 235-289.

[6] Spath, P. L. and Dayton, D. C. (2003) Preliminary Screening —Technical and Economic Assessment of Synthesis Gas to Fuels and Chemicals with Emphasis on the Potential for Biomass-Derived Syngas, National Renewable Energy Laboratory Report NREL/TP-510-34929.

[7] Boerrigter, H., den Uil, H., Calis, H. P. (2002) Green Diesel from Biomass via Fischer-Tropsch Synthesis, Pyrolysis and Gasification of Biomass and Waste, Expert Meeting, Strasbourg, France, Sept. 30 – Oct. 1.

[8] Van Gerpen, J., Biodiesel Processing and Production, Fuel Processing Technology 86 (2005) 1097-1107.

[9] Arbige, M. V. (2004). "Bioprocess converts glycerol to propanediol." Industrial Bioprocessing 26(11): 3.

[10] Pimentell, D. and Patzek, T. W. (2005) Ethanol Production Using Corn, Switchgrass, and Wood; Biodiesel Production Using Soybean and Sunflower, Natural Resources Research 14, 65-76.

answers ranging from a 60% deficit to a 110% gain in energy, depending upon who is performing the analysis.

There are several reasons for the wide range of reported values for this energy return in the production of ethanol. First, different study groups make different assumptions about the production yield of corn grain. For example, one study group averages corn yields over all fifty states with the intention that this best represents a national average for corn yield while another averages yields over the top ten corn producing states, arguing that these are where grain ethanol plants are clustered. Second, there are major disagreements about the amount of energy needed to produce anhydrous ammonia fertilizer. Third, there is no consensus on the amount of ethanol that can be produced from a bushel of grain, probably because this number depends on the age and size of the fermentation facility. Finally, there are questions as to the amount of fossil energy consumed within the production facility. Clearly, a large amount of natural gas is consumed in drying DDGS and distilling ethanol, but it is difficult to accurately assess energy consumption in an industry that is rapidly growing and changing. Ultimately, the disagreements among researchers likely reflect the difficulty of assigning average values for these parameters to the whole industry. Very likely there are older and smaller corn ethanol plants that are operating with energy ratios less than unity while larger, more modern facilities are operating above unity.

At any rate, there is substantial room for improvement in the grain ethanol industry. Averaging the results of 14 distinct studies suggests that grain ethanol currently provides a 30% energy gain over the fossil energy used in its manufacture (in comparison, and there is little disagreement on this point, the production of gasoline from petroleum results in a 20% energy deficit). There is no theoretical reason why the manufacture of renewable fuels should not have energy gains of 500% or higher. Several things could be done to reduce the use of fossil fuels in ethanol production: tractors could run on pure biodiesel; cornstover could be the energy source for fertilizer production; byproducts could be used as sources of energy for drying and distillation.

The way to a bioeconomy is not clear even with a well defined set of goals. It is too early to pick winners and losers among the technologies that can transform biomass into biofuels and biobased products. Much of the recent public discussion has been about the development of advanced enzymes to produce cellulosic ethanol, but other possibilities include Fisher-Tropsch liquids or alcohols from syngas, co-refining bio-oils and petroleum crude, and hydrogen generation from algae, to name a few. Expanded research both applied and fundamental in nature, is the best way for government to help industry distinguish the winners for commercialization.

Thank you for your time this morning. I would be happy to answer any questions you have for me.

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[11] Shapouri, H., Duffield, J. A., and Wang M. (2003) The Energy Balance of Corn Ethanol Revisited, Transactions of the American Society of Agricultural Engineers 46(4): 959-968.

Testimony of Jay D. Debertin,
Executive Vice President and Chief Operating Officer, Processing,
CHS Inc.
Before the Senate Committee on Agriculture, Nutrition, and Forestry
Hearing on Renewable Fuels
April 26, 2006

Thank you, Mr. Chairman. My name is Jay D. Debertin, Executive Vice President and Chief Operating Officer of processing, for CHS Inc. Among my major responsibilities is the company's renewable fuels direction. We appreciate very much the opportunity to appear before you and to share our views on the renewable fuels industry.

We also want to take the opportunity to express our appreciation to the members of this Committee who have been strongly supportive of efforts to promote a viable and competitive U.S. renewable fuels industry. This includes passage of the 2002 Farm Bill with the first ever Energy Title; Congressional passage of comprehensive energy legislation with its 7.5 billion gallon Renewable Fuels Program and related tax incentives; and enactment of the American Jobs Creation Act, which also included provisions to help encourage and promote the development of renewable fuels. These provisions continue to be important to help meet the current and future energy needs of agriculture and our nation.

CHS is an energy, agricultural supply and grain-based food company owned by more than 1,100 cooperatives and 350,000 farmers in over 30 states. Our origins reach back nearly eight decades to farmers who needed both a source of supplies – like petroleum products and fertilizer – for raising their crops, as well as markets in which to sell them. This year, we are marking 75 years of service to the nation's producers and are the largest cooperative of any kind in the United States.

Among the several major components of our supply business, energy is our most critical. Today, CHS is one of a few farmer cooperatives that own petroleum refineries and fills key agricultural and rural market niches. CHS is the sole owner of a refinery in Montana and holds 75 percent of another in Kansas with two other co-ops. We are one of the few refiners, if not the only, that has as strong a commitment towards renewable fuels. In addition, we have an extensive fuel distribution system that includes crude oil and product pipelines, trucking fleets and terminals through which we sold three billion gallons of fuel last year. We are also the largest fuel supplier when it comes to on farm use.

While our focus has been on traditional petroleum-based fuels, CHS has also been extremely active in the renewable fuels business for a quarter of a century. In 2005, we marketed more than 500 million gallons of ethanol-blended fuels; the vast majority of it unleaded gasoline

with 10 percent ethanol. In addition we blended both E85 (85 percent ethanol) and RFG, which is a 7.8 percent blend.

We have also entered the soy-based diesel fuels business. Last year, we sold – largely through our member co-ops – the equivalent of two million gallons of soy ester. Typically, this is blended at 2 percent, so that quantity would result in 100 million gallons of B2 biodiesel.

While our focus has long been in the marketing of renewable fuels, last fall we took the major step of investing in a manufacturing firm. CHS purchased ownership in US BioEnergy, a South Dakota company that manufactures and markets ethanol. This company currently has half-dozen plants under construction or planned in the Midwest, as well as ownership in an established Nebraska plant.

Recently we extended our relationship with US BioEnergy to form a joint venture in the marketing and distribution sector now called US BioEnergy Fuels, LLC.

These steps represent a major commitment by our farmer-owned cooperative system to both our nation's energy future and the ability of our producers to add value to the crops they raise. It allows us to combine our broad petroleum fuel distribution and marketing systems, capability and experience with our equally strong skills in grain procurement and oilseed processing. This synergy provides important benefits for our farmers and consumers alike in terms of meeting their energy needs and other demands.

For our farmer owners, it also helps them better capitalize on new value-added opportunities associated with a growing renewable fuels industry, and improve their income from the marketplace. This is because as a farmer cooperative, our earnings go back to our farmer members.

The renewable fuels industry is still a very young and growing industry. While public policy, along with current market conditions, is helping promote its growth, there are still some potential challenges ahead. I would like to focus on what we see as two major challenges in terms of future growth: (1) Making sure the Renewable Fuels Program is a true national program and (2) Continued development and enhancement of the distribution system for renewable fuels.

The recently passed 7.5 billion gallons Renewable Fuels Standard was an important achievement and is helping drive industry growth. As EPA moves forward with its proposed rulemaking on implementation, it is vital that such regulations ensure that it is a national program. This applies to both blending requirements and the use of tradable credits to help promote production and availability of renewable fuels on a nationwide basis. It is also important to ensure that state laws and regulations are consistent with this goal.

In looking at the current infrastructure and distribution system, there is a geographic imbalance between where ethanol is produced and where the majority of U.S. motor fuel is consumed. Ethanol production largely takes place in the Midwest. The bulk of our population is in coastal states. Because ethanol and soy esters have different distribution requirements than petroleum, not to mention that the U.S. renewable fuels infrastructure is in

its infancy, supplying Midwest ethanol and soy esters to these coastal states to meet long term future growth will require extra attention.

Currently, trucks are the first means of distribution, but as the production base continues to expand, trucking may become less efficient over longer delivery distances.

Petroleum pipelines cannot be expected to be a means of distribution because of the properties of renewable fuels.

Movement by barges could be an important part of the solution. However, this underscores the need for further improvements to our nation's waterway transportation system, including locks and dams.

Railroads would appear to become the most likely means of shipping bulk renewable fuels. However the terminals needed to handle long trains as well as the system of supplying the necessary types and numbers of rail cars needed are not yet in place.

Again, we are talking about long term future growth of what is still today a young and growing industry.

That brings me to a final question: What can Congress do to further encourage and promote the production and availability of renewable fuels to meet our nation's energy needs, while also helping farmers and rural America?

- First, to pursue the allowance to increase the blending of ethanol with gasoline from 10% to perhaps 15% and ultimately 25% or more in addition to the current option of E-85. Other countries have successfully done this with the same cars we drive. This could go a long way to increasing the usage of renewable fuels and decreasing the consumption of fossil fuels and increase the use of ethanol as a blend component to gasoline. It is also consistent with the goal of the 25x25 coalition, which CHS strongly endorses, which is to have 25 percent of U.S. energy needs come from renewable sources by 2025.

- Second, ensure that the current Renewable Fuels Program is a national program.

- Third, continue to encourage the development and use of renewable fuels. Current programs and tax incentives should be maintained to continue to encourage long term investment, particularly in the new technologies to produce renewable fuels. In addition, Congress could also help set an example for increasing use by requiring federal fleets to utilize renewable fuels.

- Fourth, help meet current and future distribution requirements through continued infrastructure improvements, including support for enhancing our waterway transportation system.

- Fifth, work to ensure that future farm legislation builds on the success of the current Farm Bill, including the Energy and Rural Development Titles, to help promote the development and growth of renewable fuels; and

- Sixth, maintain and strengthen the ability of farmers to join together in cooperative efforts to capitalize on new value-added opportunities and improve their income from the marketplace.

Thank you, Mr. Chairman. We look forward to working with you and the members of this Committee on these and other important issues.

Agriculture, Nutrition and Forestry Committee
United States Senate

Hearing on

Developments in the U.S. Ethanol Industry

Testimony of

Bob Dinneen
President
Renewable Fuels Association

April 26, 2006

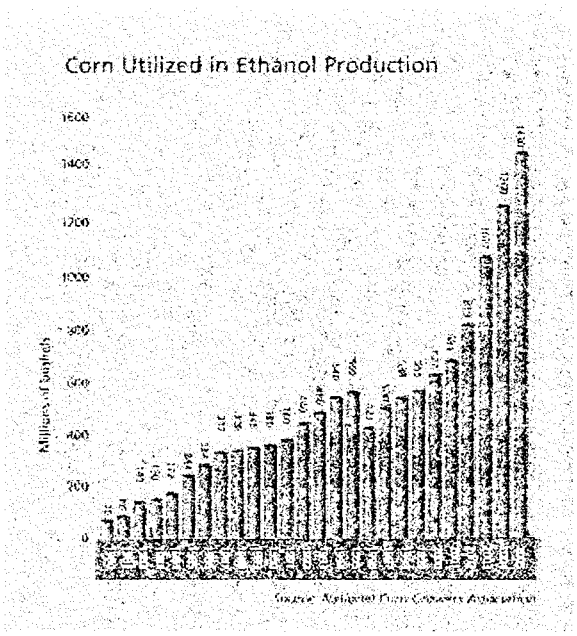
Good morning, Mr. Chairman and Members of the Committee. My name is Bob Dinneen and I am president of the Renewable Fuels Association, the national trade association representing the U.S. ethanol industry.

This is an important and timely hearing, and I am pleased to be here to discuss the unprecedented growth in the domestic ethanol industry, and the attendant economic, energy and environmental benefits resulting from that growth. Ethanol today is the single most important value-added market for farmers. The rapidly increased demand for grain used in ethanol processing has increased farm income, created jobs in the agricultural sector, and revitalized numerous rural communities where ethanol biorefineries have been located.

Background

Today's ethanol industry consists of 97 biorefineries located in 19 different states with the capacity to process more than 1.7 billion bushels of grain into nearly 4.5 billion gallons of high octane, clean burning motor fuel and 9 million metric tons of livestock and poultry feed. It is a dynamic and growing industry that is revitalizing rural America, reducing emissions in our nation's cities, and lowering our dependence on imported petroleum.

Ethanol has become a ubiquitous component of the U.S. motor fuel market. Today, ethanol is blended in more than 40% of the nation's fuel, and is sold virtually from coast to coast and border to border.



In 2005, the U.S. ethanol industry consumed more than 1.4 billion bushels of corn in the production of 4 billion gallons of ethanol. That represents approximately 12% of last year's 11 billion bushel crop. The industry also used 55 million bushels of sorghum, or about 14% of that crop. Finally, ethanol is produced from a variety of agricultural waste products, including cheese whey, beer and beverage waste.

The 4 billion gallons of ethanol produced and sold in the U.S. last year contributed significantly to the nation's economic, environmental and energy security. According to an analysis completed for the RFA[1], the 4 billion gallons of ethanol produced in 2005 resulted in the following impacts:

- Added $32 Billion to gross output;
- Created 153,725 jobs in all sectors of the economy;
- Increased economic activity and new jobs from ethanol increased household income by $5.7 Billion, money that flows directly into consumers' pockets;
- Contributed $1.9 Billion of tax revenue for the Federal government and $1.6 Billion for State and Local governments; and,
- Reduced oil imports by 170 million barrels of oil, valued at $8.7 Billion.

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[1] *Contribution of the Ethanol Industry to the Economy of the United States*, Dr. John Urbanchuk, Director, LECG, LLC, February, 2006.

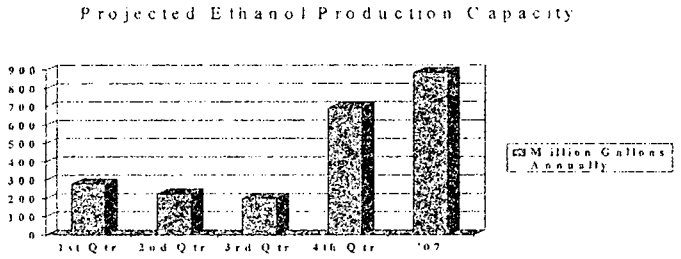
In addition, because the crops used in the production of ethanol absorb carbon dioxide, the 4 billion gallons of ethanol produced in 2005 reduced greenhouse gas emissions by nearly 8 million tons.[2] That's the equivalent of taking well over a million vehicles off the road.

As the industry has grown, it has also changed. Today, the single largest ethanol producer, taken as a whole, is the farmer-owned ethanol plant.

Energy Policy Act Has Stimulated Significant New Ethanol Production

Mr. Chairman, in large part because of the Energy Policy Act of 2005 (EPAct), the U.S. ethanol industry is today the fastest growing energy resource in the world. As you know, EPAct included an historic new direction for U.S. energy policy, requiring refiners to utilize an increasing percentage of renewable fuels. The Renewable Fuels Standard (RFS) began in January and requires refiners to utilize at least 4 billion gallons of ethanol and/or biodiesel this year. The RFS gradually increases to at least 7.5 billion gallons of renewable fuels by 2012. The RFS has been a clarion call to the ethanol industry and the financial community that demand for ethanol and biodiesel was no longer uncertain, allowing the renewable fuels industry to grow with confidence.

Indeed, there are currently 35 plants under construction. Twenty-one of those have broken ground just since last August when President Bush signed EPAct into law. With existing biorefineries that are expanding, the industry expects more than 2.2 billion gallons of new production capacity to be in operation within the next 12 to 18 months. The following is our best estimate of when this new production will come on stream.



This preceding chart reflects eight plants and three expansions we believe will be complete before July, representing more than 500 million gallons of production capacity; and another 16 plants and 2 expansions that will be complete before the end of the year, adding about 900 million gallons more. This new 1.4 billion gallons of new capacity represents a 32% increase in production, a phenomenal rate of growth, particularly when viewed in light of the 20-plus percent growth the industry has already achieved in each of the past several years.

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2 Argonne National Laboratory, U.S. Department of Energy, GREET Model, February, 2006.

Rapidly Increasing Demand

While ethanol supply is growing exponentially, ethanol demand is increasing as well. Indeed, ethanol demand in 2006 is significantly higher than that required by EPAct. The reason for that is refiners have chosen to eliminate the use of MTBE in many of the reformulated gasoline areas where it has not already been removed.[3] Those areas include the Mid-Atlantic, New England and Texas. The Energy Information Administration believes as much as 130,000 barrels per day of ethanol will be needed to meet the demand created by refiner decisions to replace MTBE.

Some have questioned the ability of the ethanol industry to meet such rapidly increased demand. But most analysts now agree there will be sufficient ethanol supplies. In addition to increased production, ethanol supplies will flow from existing conventional gasoline markets to MTBE replacement markets where it is needed more. The market will also encourage increased imports in the short-term.[4]

In addition, the ethanol industry is working diligently with our refiner customers, gasoline marketers, terminal operators and the fuel distribution network to assure a successful transition from MTBE to ethanol in these areas.

Over the past several years, the ethanol industry has worked to expand a "Virtual Pipeline" through aggressive use of the rail system, barge and truck traffic. As a result, we can move product quickly to those areas where it is needed. Many ethanol plants have the capability to load unit trains of ethanol for shipment to ethanol terminals in key markets. We are also working closely with terminal operators and refiners to identify ethanol storage facilities and install blending equipment.

There is no question that the dramatically accelerated removal of MTBE has challenged the marketplace. But the ethanol and petroleum industries have done this successfully before in New York, California and Connecticut. We know we can do it again. As one industry analyst observed recently, "The very fact that these companies are on the record as discontinuing MTBE and replacing it with ethanol tells us one very important fact – they are prepared."[5]

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[3] It is important to note that no provision of the Energy Policy Act or the Clean Air Act requires refiners to eliminate MTBE, nor are they required to use ethanol. This is a decision refiners are making because replacing MTBE with ethanol is the most cost-effective means of meeting Clean Air Act standards while maintaining the octane and performance consumers expect.

[4] Some have suggested repealing the secondary tariff on imported ethanol is necessary to increase supplies. In fact, the secondary tariff is not a barrier to entry. Approximately 130 million gallons of ethanol were imported in 2005, and even higher imports are expected this year. The secondary tariff merely offsets the tax incentive oil companies receive for blending ethanol, regardless of its source. Eliminating the secondary tariff, without changing the structure of the tax incentive would only result in U.S. taxpayers subsidizing already subsidized foreign ethanol. At a time when Congress is contemplating reduced domestic farm programs, it is neither wise nor necessary to begin subsidizing foreign ethanol and foreign sugar growers.

[5] The Ethanol Monitor, published by Oil Intelligence Inc., Oceanport, NJ, Volume 2, No. 11, March 27, 2006.

New Technologies

The only thing more astonishing than the growth in the ethanol industry is the technological revolution happening at every biorefinery and every ethanol construction site across the country. Plants today are using such innovations as no-heat fermentation, corn fractionization and corn oil extraction. With today's natural gas prices, plants are also looking toward new energy sources, including methane digesters and biomass gasification. In short, the ethanol industry is unrecognizable from what it was just five years ago, and it will be unrecognizable again five years from now.

To continue this technological revolution, however, continued government support will be critically important. DOE's biomass and biorefinery systems research and development program has been essential to developing new technologies. Competitively awarded grants provided by this program have played a very important role in developing new technology.

Recently, DOE informed the renewable fuels industry that it was canceling research contracts. Many of the grants provide technologically promising projects that would help move the industry forward. The RFA encourages Congress to continue to provide additional funds for competitive solicitations.

New Feedstocks

To date, the ethanol industry has grown almost exclusively from grain processing. In the future, ethanol will be produced from other feedstocks, such as cellulose. Cellulose is the main component of plant cell walls and is the most common organic compound on earth. However, it is more difficult to break down cellulose and convert it into usable sugars for ethanol. Yet, making ethanol from cellulose dramatically expands the types and amount of available material for ethanol production. This includes many materials now regarded as wastes requiring disposal, as well as corn stalks, rice straw and wood chips or "energy crops" of fast-growing trees and grasses. Cellulosic ethanol production will augment, not replace, grain-based ethanol, but ultimately exponentially expand potential ethanol supplies.

Many companies are working to commercialize cellulosic ethanol production. Indeed, there is not an ethanol biorefinery in production today that does not have a very aggressive cellulose ethanol research program. The reason for this is that they all have cellulose already coming into the plant. If they can process that material into ethanol, they will have a significant marketplace advantage.

Many companies are working to commercialize cellulosic ethanol. Iogen, Inc., a Canadian enzyme company, has been producing cellulosic ethanol from wheat straw since 2004 at a one million gallon plant in Ontario. The company is planning to begin construction of a commercial facility in the U.S. during the summer of 2007. Abengoa Bioenergy Corp., which operates four biorefineries in the U.S. today, has begun construction of a grain and cellulose ethanol plant in Spain. The company plans to bring that technology to the U.S. as soon as the technology is proven successful. Numerous other companies are moving toward commercialization and I am confident cellulosic ethanol will be a reality quite soon.

New Markets

Ethanol today is largely a blend component with gasoline, adding octane, displacing toxics and helping refiners to meet Clean Air Act specifications. But the time when ethanol will saturate the blend market is on the horizon, and the industry is looking forward to new market opportunities such as E-85 and ethanol fuel cells.

Today there are approximately 5 million flexible fuel vehicles (FFVs) on the road capable of using E-85, a mix of 85% ethanol and 15% gasoline. There are about 600 E-85 refueling stations across the country. Frankly, we can and must do better.

Five million FFVs represent less than 2% of the total U.S. motor vehicle fleet. This year, the U.S. will purchase about 17 million vehicles. Approximately 500,000, or roughly 3% of those, will be FFVs. In contrast, more than 60% of the vehicles produced and sold in Brazil this year will be FFVs.

Clearly, U.S. auto manufacturers have made a significant commitment to FFV technology, and their commitment is increasing. Ford, General Motors and DaimlerChrysler have made significant strides in producing and promoting FFVs. But we can do better.

Senators Tom Harkin (D-IA) and Dick Lugar (R-IN) have introduced legislation (S.1994) requiring a gradual increase in the production of FFVs by all auto companies. The RFA supports this legislation. If consumers are to have options during times of gasoline price volatility, FFV technology must be more widely available. There may be other approaches to encourage auto manufacturers to maximize FFV production as well, and we remain open to a dialogue with stakeholders that will assure the objective of increased FFV availability is met.

As FFV vehicles are commercialized, it is important to encourage the most efficient technologies. Some FFVs today experience a reduction in mileage when ethanol is used because of the difference in BTU content compared to gasoline. But that debit can be addressed. General Motors has introduced a turbo-charged SAAB that experiences NO reduction in fuel efficiency when ethanol is used. That's the kind of innovation the government should be rewarding in any program designed to encourage E-85 use.

Of course, FFVs will be wasted without a commensurate increase in E-85 fuel availability. Reforms of the ethanol tax incentive authored by Senator Chuck Grassley (R-IA) and passed by Congress last year have made it much easier for ethanol producers to work with gasoline marketers directly to promote E-85. Ethanol producers such as Chippewa Valley Ethanol Company (CVEC) and VeraSun have moved aggressively to market E-85. As a result, there was more E-85 sold last year than ever,[6] and sales continue to grow.

Still, convincing gasoline marketers to sell E-85 under their canopies remains a challenge. Senators John Thune (R-SD) and Barack Obama (D-IL) have introduced legislation (S. 2446)

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[6] In Minnesota alone, the only state for which there is reliable data, approximately 8 million gallons of E-85 were sold in 2005. About 200 E-85 stations are located in Minnesota.

enhancing incentives to gasoline marketers to install E-85 refueling pumps. This legislation will be essential to any effort to expand E-85 use.

In the final analysis, many things have to happen for E-85 to become a more consequential component of the U.S. motor fuel marketplace. There must be more vehicles. There must be more refueling pumps. And there must be more ethanol to supply this market, which likely means cellulosic ethanol capacity. But the need to develop meaningful alternatives to gasoline has never been more apparent. And we must invest now, or that future will never materialize.

In addition to E-85, we believe a necessary component of a national energy strategy must include hydrogen from renewable resources. Today's fuel cells and hydrogen platforms are powered by fossil fuels (generally natural gas). In order to truly capture the benefits of emission free hydrogen, renewable resources like ethanol must be utilized. Furthermore, hydrogen from ethanol is not constrained by natural gas pipelines, which make an electricity generating fuel cell powered by ethanol more accessible and useable in rural America. The RFA has advocated a competitively based ethanol-powered fuel cell demonstration program as part of the fiscal year 2007 agriculture appropriations funding.

Conclusion

In his State of the Union Address, President Bush acknowledged the nation "is addicted to oil" and pledged to greatly reduce our oil imports by increasing the production and use of domestic renewable fuels such as ethanol and biodiesel. The Energy Policy Act of 2005 clearly put this nation on a new path toward greater energy diversity and national security through the RFS. Additional and more focused research, targeted incentives for E-85 vehicles and refueling infrastructure, and the continued commitment of this Committee will make the President's vision of a more energy secure America a reality.

Thank you.

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Senate Committee on Agriculture
"State of the Biofuels Industry"
April 26, 2006

Testimony of Joe Jobe, Chief Executive Officer, National Biodiesel Board

Good morning Mr. Chairman, Ranking Member Harkin, and committee members. It is a pleasure to be here today. We appreciate the committee holding this hearing and providing the opportunity to examine this important issue.

My name is Joe Jobe, Chief Executive Officer, of the National Biodiesel Board (NBB). The NBB is the national not-for-profit trade association representing the commercial biodiesel industry as the coordinating body for research and development in the US. State soybean commodity groups who were funding biodiesel research and development programs, founded NBB in 1992. Since that time, the NBB has developed into a comprehensive industry association, which coordinates and interacts with a broad range of stakeholders including industry, government, and academia. NBB's membership is comprised of state, national, and international feedstock and feedstock processor organizations, biodiesel suppliers, fuel marketers and distributors, and technology providers.

The announced purpose of this hearing is to consider the state of the biofuels industry. Biofuels, particularly biodiesel and ethanol, are currently experiencing tremendous growth. I would like to focus my comments this morning on the factors that have contributed to that growth for biodiesel, why this growth is important to the American people, and what must be done to keep it on its current successful trajectory.

Biodiesel is a diesel fuel replacement that is made from agricultural fats and oils and meets a specific commercial fuel definition and specification. Soybeans are the primary oilseed crop grown in the United States, and soybean oil makes up about half of the raw material available to make biodiesel. The other half consists of all other vegetable oils and animal fats. Biodiesel is made by reacting the oil with an alcohol to remove the glycerin in order to meet specifications set forth by the American Society for Testing and Materials (ASTM). Biodiesel is one of the best-tested alternative fuels in the country and the only alternative fuel to meet all of the testing requirements of the 1990 amendments to the Clean Air act.

Biodiesel is an American soybean farmer success story. After Operation Desert Storm in the early 1990's, soybean farmers struggled to maintain profitability because of high energy prices and low commodity prices. Investment in the development of a biodiesel industry was a priority to farmers eager to contribute to our energy supply, while finding ways to add value to their crops. Farmers invested more than $50 million of their check-off dollars throughout the 1990's to conduct research and development on biodiesel. Much of that effort focused on the testing of

biodiesel to ensure performance, establish quality standards, and gain acceptance by engine and equipment manufacturers.

The biodiesel industry has shown slow but steady success since the early 90's, however, in the past two years, it has grown exponentially. In 2004 there was approximately 25 million gallons of biodiesel sales. That increased to 75 million gallons in 2005. We are currently on track to exceed 150 million gallons in 2006. Likewise, we went from 22 biodiesel plants in 2004 to more than 60 biodiesel plants currently. There are over 40 more plants currently under construction, with another 30 projects in pre-construction.

America relies on imports for 60 percent of its petroleum needs. Imported petroleum makes up the single largest component of our national trade deficit amounting to approximately one third of the total. As crude oil prices continue to rise, America's trade deficit continues to balloon. Every gallon of domestic, renewable biodiesel that is used to replace diesel fuel refined from imported crude reduces the need for imported crude and finished fuel, extends the diesel supply, and expands domestic refining capacity. Even a small reduction in demand has a positive effect on straining price pressures.

The need for increased use of biofuels has never been more pressing. Diesel fuel prices are at an all-time high. The majority of diesel fuel in this country is used in over-the-road trucks. The trucking industry serves as a critical part of our economy, and impacts every industry, business, and consumer in America. Virtually every product that we use everyday is brought to us by a diesel-powered truck. Everything that is in this room, this chair I am sitting in, this table, this microphone, all brought here by diesel powered trucks and America's truckers. In addition, America's manufacturing sector has moved to "just-in-time" inventory systems to reduce storage and inventory costs. America's manufacturing inventory is now stored primarily in the trucks that are driving down the highway at any given time. Fuel is the single largest operational cost in the trucking industry. Average diesel fuel prices have nearly doubled over the past four years. This dramatic increase in operational cost offers enormous challenges to the trucking industry, and will be felt throughout our entire economy.

The American Trucking Association (ATA) has endorsed the use of B5 as a way to supplement our nation's energy supply. Likewise, Sysco Corporation, the largest private truck fleet in the nation has begun using B5 it its trucks. Truckers often become interested in biodiesel because they would rather rely more on farmers for their fuel and less on the Middle East. However, after they begin using it, they are most often impressed by its premium fuel characteristics. Biodiesel contains oxygen so it burns cleaner, reduces smoke and smell, increases cetane, and improves lubricity. As ultra-low sulfur diesel (USLD) fuel gets phased in beginning in June of this year through June of 2007, biodiesel is well positioned to replace the lubricity that will be lost in ULSD. Diesel fuel injection systems rely on the lubricating characteristic of fuel to keep them functioning properly. Just 2 percent biodiesel can improve lubricity by as much as 65 percent.

The high price of fuel is one of the factors contributing to increased biodiesel use. However, there are three main federal policy measures that have been extraordinarily effective in stimulating biodiesel's increased production and use. Because of these three policy measures, biodiesel is beginning to make a small but significant impact on our nation's energy supply. These three measures are all working extraordinarily well, but are soon scheduled to expire, and must be continued in order to keep the growth in biodiesel going strong. Although biodiesel is showing signs of success, the industry is still in its infancy, and is where ethanol was in 1982.

First, the biodiesel blenders tax credit, which was part of the restructured Volumetric Ethanol Excise Tax credit or "VEETC" legislation in the JOBS Act of 2004. The new blender's tax credit for biodiesel went into effect in January of 2005. It functions similarly to the ethanol tax credit, and it has been extraordinarily effective in incentivizing the blending of biodiesel into the nation's diesel fuel supply. It has been the primary stimulant in 2005 for the dramatic increase in new plants and jobs in biodiesel, bringing economic opportunity to both rural and urban areas.

Senators Grassley and Baucus have introduced the Alternative Energy Extender Act, S. 2401. This act includes the extension of the biodiesel blender's tax credit through 2010, which would make the biodiesel tax credit provision consistent with the ethanol tax credit. It is likely that the need for this program will go beyond 2010, but it is critical that this tax credit, which has been so effective for biodiesel, not be allowed to expire. Legislation is also currently pending in the House extending this credit through 2010 (HR 2498, Representatives Hulshof and Pomeroy).

The second policy measure that has been very effective in energizing biodiesel's growth is the Bioenergy Program. The program was initiated by the USDA in 2000 to stimulate the use of crop surpluses for energy needs. It was memorialized as part of the 2002 Farm Bill. However, the program is set to expire in July of this year. This program provides a production incentive which has been highly effective in the growth of the biodiesel industry. A 2005 OMB Program Assessment Rating Tool or "PART" evaluation reported that the program did an excellent job of stimulating biodiesel growth, and indicated that the program could continue to be effective for the emerging biodiesel industry. The report stated, "Increases in the production of biodiesel indicate a rise in the supply of domestically produced renewable fuels. It's also an indicator of the viability of the biodiesel industry and its expanded consumption of agricultural commodities."

High diesel prices are also hurting farmers as they have entered spring planting. Fuel is a very large operational cost for farmers. But while costs are going up, the projected value of their crop is going down. Soybean acreage in 2006 is estimated at a record 76.9 million acres, and USDA is projecting that soybean prices may drop below $5.00 per bushel in 2006/07. The Food and Agricultural Policy Research Institute (FAPRI) is forecasting Marketing Loan Gains and Counter-Cyclical Payments to soybean producers of $0.72 per bushel for the 2006 crop. According to Centrec Consulting Group, if an extended 2007 Bioenergy Program for biodiesel increased soy-based biodiesel production by a very modest 40 million gallons it would be expected to increase soybean prices by approximately $0.07 per bushel. Based on a 3.0 billion bushel crop, this increase could reduce soybean farm program outlays by up to $210 million. This would more than offset the cost of extending the Bioenergy Program for biodiesel for FY-2007. Extension of this program for biodiesel has many positives. It will be good for farmers, good for biodiesel, and will be a net plus for the US Treasury. I ask that you please consider doing what you can to extend this important program which is scheduled to expire in July of this year.

The third program that has greatly contributed to biodiesel's success is the USDA's Biodiesel Fuel Education Program. This program was a part of the energy title of the 2002 Farm Bill. The program provides educational funding to support increased fuel quality measures, increased acceptance of biodiesel by engine and equipment manufacturers, petroleum partners, users, and the general public. The USDA has done a superb job in implementing this program and it has been a key ingredient to biodiesel's recent growth. A recent survey done to benchmark the program's progress showed that the public's awareness of biodiesel rose from 27 percent in August 2004 to 41 percent in December of 2005. To impact the American public's awareness that significantly on any given issue is remarkable. In addition to greater awareness from the

general public, market research shows familiarity among trucking executives increased from 27 in 2004 to 53 in 2005. Also of note:

- Four-in-five consumers continue to support a tax incentive that would make biodiesel cost-competitive with regular diesel fuel.
- 88 percent of environmental group leaders and 84 percent of health organization leaders support biodiesel as a transitional fuel, because biodiesel can make an immediate impact on reducing emissions until zero emissions technology is developed.

While the program has been highly effective, the biodiesel industry is still immature, and faces enormous challenges. Continued education is needed. I ask that you please look for ways to expand and extend this program beyond 2007.

To summarize the three federal policy measures that have been very effective in the development of the biodiesel industry and should be continued:

1) Extension of the biodiesel blender's tax credit;
2) Extension of a Bioenergy Program for biodiesel;
3) Extension and expansion of the biodiesel fuel education program.

During the 2006 State of the Union speech, President Bush outlined his Advanced Energy Initiative, which stated the goal of reducing petroleum imports from the Middle East by 75 percent by the year 2025. Biodiesel and ethanol can be the first tools used to begin reaching that goal, because they are liquid renewable fuels that are available right now, ready for blending into our existing fuel supply and used in our existing vehicles. As an illustration of how biodiesel can play a role in that effort, please note that Iraq is the second largest provider of crude oil into the United States from the Persian Gulf region. Of the crude that comes from Iraq, approximately 1.85 billion gallons of diesel fuel is refined for the US market. If long-term, America were to replace just 5 percent of its 37 billion gallons of on-road diesel fuel with biodiesel, it would equal 1.85 billion gallons – the same amount of diesel fuel that we get from Iraq.

Finally, in addition to the significant benefits that biodiesel offers to increase our domestic refining capacity and overall energy supply, biodiesel offers enormous benefits to our agricultural sector. Biodiesel does much more than just utilize surplus agricultural commodities; it adds multiple layers of value to agricultural economics. There have been 5 major comprehensive economic studies evaluating biodiesel in the last 4 years. All of these studies, using different economic models, had similar conclusions: that increased utilization of fats and oils for biodiesel increases the value that farmers receive for their crops, while making protein meal cheaper as a feed for our domestic livestock producers and more competitive in international protein markets for food and feed. Not only does this allow farmers to more profitably supply global food markets, it may have the effect of increasing agricultural processing in the United States. Additional biodiesel production further increases domestic chemical processing from renewable by-products.

Mr. Chairman, members, we appreciate the opportunity to come before you today on this most critical issue. On behalf of the biodiesel industry, I want to thank you for all of the support you have given not only to the biodiesel industry, but the development of the biofuels industry overall. We look forward to continue working with you in this important endeavor. I would be happy to answer any questions you may have.

DOCUMENTS SUBMITTED FOR THE RECORD

April 26, 2006

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American Forest & Paper Association
Agenda 2020 Technology Alliance
Statement for the Record

U.S. Senate Committee on Agriculture
The State of the Biofuels Industry
April 26, 2005

The American Forest & Paper Association's (AF&PA) Agenda 2020 Technology Alliance welcomes this opportunity to present its views on the state of the biofuels industry and related issues. The forest products industry can be an important resource in accomplishing the nation's shared biofuel goals, particularly for production of cellulosic ethanol. The industry strongly supports private/public investments in Integrated Forest Products Biorefineries (IFPBs), which are conservatively estimated to have the potential to annually produce nearly 2 billion gallons of ethanol and another 1.09 million barrels (oil equivalent) of other renewable transportation fuels. Our intention is to facilitate growth of domestic production capacity for renewable fuels using the industry's existing infrastructure. In addition to re-invigorating a critical sector of the U.S. economy, IFPBs could revitalize the primarily rural communities where our industry is based. Finally, introduction of IFPBs will advance national goals for energy, environmental performance, and economic competitiveness of U.S. industries.

The Forest Products Industry

The Agenda 2020 Technology Alliance is an industry-led partnership with government and academia that holds the promise of reinventing the forest products industry through innovation in processes, materials and markets. The collaborative, pre-competitive research, development, and deployment supported through Agenda 2020 provide the foundation for new technology-driven business models that will enable our industry to meet competitive challenges, while also contributing solutions to strategic national needs. The technology solutions developed through Agenda 2020 are aligned to provide solutions to the competitive challenges faced by the U.S. forest products industry, which accounts for approximately 7 percent of total U.S. manufacturing output, employs 1.3 million people, and ranks among the top 10 manufacturing employers in 42 states with an estimated payroll of $60 billion.

As is the case with many U.S. manufacturing industries, we face serious domestic and international challenges. Since 1997, 101 pulp and paper mills have closed in the U.S., resulting in a loss of 70,000 jobs, or 32% of our workforce. An additional 67,000 jobs have been lost in the wood products industry since 1997. New capacity growth is now taking place in other countries, where forestry, labor, and environmental practices may not be as responsible as those in the U.S. In addition, globalization, aging process infrastructure, few technology breakthroughs, as well as recent financial performance and environmental concerns, hinder the ability of U.S. companies to make new investments. Each year without new investments, new technologies and new revenue streams, we lose ground to our overseas competitors.

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Agenda 2020: Creating Value Through Innovation

One approach being taken by our industry to address these challenges is represented by Agenda 2020, our industry's technology alliance. Agenda 2020 was initiated in 1994 in partnership with the Department of Energy to improve energy efficiency and accelerate the delivery of new technologies to our manufacturing processes. Now organized as a membership alliance within AF&PA, Agenda 2020 is building on a decade of tangible results to expand its federal and state partnerships, and establish new international and cross-industry collaborations. Current federal partnerships, in addition to the existing efforts with the Department of Energy, include projects with the U.S. Forest Service and the CSREES (Cooperative State Research, Education and Extension Service) programs of the U.S. Department of Agriculture (USDA), as well as the National Science Foundation.

Agenda 2020's technology initiatives leverage these collaborative partnerships to drive innovation in the forest products industry's processes, materials, and markets. Technology objectives are defined to address shared industry and national strategic goals. The research, development and deployment (RD&D) projects coordinated through Agenda 2020 provide the foundation for new technology-driven business models. **The objective is to create options to meet industry's competitive challenges, while contributing solutions to strategic national needs associated with energy, the environment, and the economy.**

Agenda 2020 builds on our industry's strategic advantage as stewards of abundant, renewable and sustainable forest materials. Since we are also owners of the fundamental infrastructure for its conversion, our industry has the potential to produce new renewable bio-based products – fiber, fuels, chemicals, and power – with "smart" properties and high performance characteristics. Agenda 2020 initiatives are designed to use emerging technologies, such as biotechnology and nanotechnology, coupled with breakthrough advances in process and conversion technologies, to create and capture value from both new and traditional products.

Integrated Forest Products Biorefineries (IFPBs)

Through Agenda 2020's *Advancing the Forest Biorefinery* initiative, the forest products industry can evolve existing infrastructure to develop *Integrated Forest Products Biorefineries (IFPB)* — geographically distributed facilities that process both forest and agricultural materials to produce renewable "green" bio-energy and bio-products This can be done while preserving existing traditional product lines, creating higher skilled and better paying jobs, strengthening rural communities, and opening new domestic and international markets for forest products companies. These IFPBs would contribute to reducing greenhouse gas emissions and dependence on foreign fossil fuel by substituting domestic, renewable ligno-cellulosic materials as the feedstock for products now derived from nonrenewable carbon. If fully developed and commercialized, these technologies could produce enormous energy and environmental benefits for the industry and the nation both, including contributing to a diversified, more secure national energy supply. **Early estimates show an industry-wide potential to reduce fossil energy consumption by over 250 TBTUs/yr, with an additional benefit of cutting approximately 40 million tons of carbon emissions annually.**

The general IFPB concept features both cultivation and conversion of ligno-cellulosic materials to produce bio-energy and bioproducts in conjunction with manufacturing traditional forest products. High-quality feedstocks can be cultivated in specially engineered softwood and hardwood plantations. Once the trees have been harvested, IFPBs present opportunities to make bio-based fuels or chemicals at several points in the manufacturing process. Hemicelluloses can be extracted from residuals from wood manufacturing or from wood chips destined for pulping. The hemicelluloses are then converted to cellulosic ethanol or chemical intermediates. After the wood has been pulped, the residual pulping liquors can be gasified. The resulting synthetic gas can be converted to electric power, transportation fuels (including ethanol), hydrogen, and/or to high value chemicals.

Agenda 2020 is focusing on three component areas to develop and implement the enabling technologies for the IFPB:

- ***Value Prior to Pulping (VPP)*** seeks cost-effective, high-yield processes to separate and extract selected components from wood prior to pulping, and to process the extracted components to produce commercially viable chemical and liquid fuel products. Researchers are particularly interested in extracting hemicelluloses for conversion to ethanol or a biochemical feedstock. **Commercial-scale demonstrations of these technologies are possible in 3 years. Assuming adoption by 75% of existing Kraft pulp mills, the minimum annual ethanol production would be in the range of 1.9 to 2.4 billion gallons using feedstocks already available at mills. Based on USDA/DOE estimates of the biomass that could be made available on a sustainable basis for biofuel conversion, the potential for ethanol production could nearly triple.**

- ***New Value Streams from Residuals and Spent Pulping Liquors*** addresses the opportunity to manufacture bio-products from the co-products of the pulping process. The objective is to use gasification technologies to convert biomass, including forest residues and spent pulping liquor (black liquor), into a synthetic gas (syngas), which subsequently is converted into liquid fuels, power, chemicals and other high-value materials. These IFPB processes will maximize utilization of energy streams and minimize waste. **Gasification and gas-to-liquids technologies are currently being commercialized, and applications within the forest products industry to produce transportation fuels could come online within 3 to 5 years. The potential production volume for renewable fuels is 1.09 million barrels. Additional research in syngas fermentation would be needed to support ethanol production.**

- ***Sustainable Forest Productivity*** applies biotechnology and nanotechnology breakthroughs to sustainable forestry to manage U.S. forest land at a high intensity to supply affordable, sustainable biomass supplies of high quality. This longer-term research focuses on developing fast-growing biomass plantations designed to produce economic, high-quality feedstocks for bio-energy and bio-products. From an energy "life-cycle" perspective, these feedstocks could be

vastly superior to the current use of crops or residues. **In the short-term, IFPBs will draw from an abundant sustainable supply of forest-based biomass (estimated by USDA and DOE to be 368 million dry tons/year), which is 2.5 times current consumption. In the long term, the advanced forest management practices and customized biomass cultivation enabled by this research will not only augment IFPB yield, but will also lead to healthier forests.**

The forest products industry's manufacturing facilities are an ideal foundation to develop the IFPB. Those facilities, which today produce pulp, paper and wood products, also are geared to collect and process biomass. Rather than creating a "greenfield" operation, additional bioconversion or thermochemical processes can be built around existing mills (either as extensions of the mill or as "across-the-fence" operations) to generate bio-energy or manufacture bio-products. This presents industry with dramatic potential to increase the productivity and profitability of its manufacturing infrastructure. Possible benefits include: improved efficiency of raw material utilization, protection of traditional product lines, creation of higher skilled and better paying jobs, and access to new domestic and international markets for bio-energy and bio-products.

The choice of whether to manufacture power, fuels and/or chemicals would be driven by mill economics and location. It is important that policies encourage private/public investments in RD&D to bring IFPB technologies into full commercial use. This is especially important to our industry, as our renewable fuel production capabilities will kick in more fully after 2009.

The IFPB uses an abundant, renewable, sustainable resource: forest material. Because forest material is carbon neutral, the bio-energy it produces helps reduce greenhouse gas emissions. Bio-energy also helps ease dependence on foreign fossil fuel by substituting for products now derived from nonrenewable carbon. By installing key IFPB technologies such as black liquor gasification, existing facilities could reduce emissions by 80-90 percent. Since forest products mills are located throughout the country, renewable bio-based fuels can be supplied more economically throughout the country. This improves both the diversity and security of the national energy supply.

Both the U.S. national and regional economies stand to benefit from implementation of the IFPB. Global competition has led to numerous domestic mill closings as production moves overseas. These closings impact mostly rural communities. The IFPB offers an opportunity to preserve high paying, skilled jobs and revitalize manufacturing facilities in these communities – all while creating a new domestic bioindustry based on one of the world's largest sustainable biomass supplies. **However, these benefits cannot be realized if forest products mills continue to move overseas. Assisting the development of domestic market demand will make it economically feasible to keep operating existing infrastructure and install IFPBs throughout the country.**

Industry is Already Committed to IFPBs

IFPB technology could radically and favorably alter the global competitiveness of the entire US forest products industry by creating a national infrastructure capable of producing a variety of biofuels, bio-chemicals, and bio-based precursors to a range of adhesives, films and polymers. Top forest products companies have committed to support a commercial scale biorefinery demonstration in Southeast Arkansas. In the first phase of the demonstration, biomass gasification and gas-to-liquids technology would be implemented to substitute for natural gas consumption and to produce liquid transportation fuels, respectively. A subsequent phase would implement hemicellulose extraction (VPP) technologies. Biofuels from production from gas to liquids technologies could exceed 175 MM barrels per year. Ethanol production from hemicellulose extraction might exceed 45 MM barrels per year. The technology has the potential to be replicated throughout the industry, and also could be integrated into other manufacturing processes that have a high need for heat, (i.e. refining, chemical processing, steel production), providing a carbon neutral source for process heat and power, and for biofuel production. This integrated facility, which will use both forest-based and agricultural feedstocks, has drawn the support of state and regional governments, the local agriculture industry, and not-for-profit rural and sustainable development organizations. Federal co-funding will be critical to the success of the project.

In consultation with DOE, a consortium of seven forest products companies, representing well over 65% of industry revenues, are investing their own funds in developing core VPP technology with the objective of having a DOE co-funded industrial scale demonstration in place prior to 2009. Other smaller scale efforts are taking place throughout the industry.

Working Together to Address Key Challenges

Our industry welcomes the opportunity to work with the Senate Agriculture Committee to address the key challenges that exist to realizing our potential as an important contributor to national biofuels goals. Working with our partners in the federal government, Congress, and the private sector, addressing these obstacles will be critical to reaching many of the possible achievements during the next few years.

First, there are various definitions for renewable energy, biomass, and cellulosic fuels in federal legislation and in the federal agencies. Wood and other ligno-cellulosic materials have three primary components: cellulose, hemicellulose, and lignin. Some federal definitions exclude one or more of these key components, all of which can be converted to carbon neutral, renewable energy. At present, many companies in our industry produce energy from both cellulose (ethanol) and lignin (electric power). With IFPB technology, it will also be possible for us to directly convert hemicellulose to ethanol, and convert the lignin-based materials to a variety of bio-fuels and/or chemicals. Some of this technical capability will be transferable to the agricultural industry. **Our industry would like to work with Congress and the relevant federal agencies to construct inclusive definitions of biomass, renewable energy and/or cellulosic ethanol which includes the cellulose, hemicellulose, and lignin content of forest materials.**

Second, sustained and adequate funding of RD&D partnerships are essential to overcome remaining barriers to achieving IFPB technical goals. For our industry, strong and sustained

partnerships with the federal government are essential for accelerating the development and adoption of the new technologies. This is particularly important for the IFPB, where adequate co-investment for RD&D can help mitigate the technical risks (especially integration with capital-intensive, legacy infrastructure) of early adopters of emerging IFPB technologies. **Our industry plans to continue to work with Congress in order to ensure adequate overall funding of the joint USDA/DOE biomass research program and to ensure inclusion of forest industry priorities for development of IFPB enabling technologies and demonstration of integrated forest-based biorefineries.**

Third, federally-funded research institutions such as the U.S. Forest Service's Forest Products Laboratory (FPL) are home to scientific expertise and research facilities that the industry relies upon to address IFPB research goals. The FPL's capabilities have been diluted by budget difficulties that have delayed facilities construction and resulted in cuts in scientific staff. **Our industry would like to work with Congress to support adequate funding of research facilities and IFPB-related programs to develop a Center of Excellence for forest biorefinery R&D within FPL, to make more effective use of its research capabilities to meet both industry technical needs and USFS mission imperatives.**

Farm Bill Reauthorization

The forest products industry recognizes that one of the primary opportunities for addressing these concerns is the reauthorization of the Farm Bill in 2007. We look forward to working with this Committee, its House counterpart, and other Members of Congress to maximize the industry role during this process, especially regarding biofuels. Furthermore, both the USDA and the USFS are integral partners in the development of integrated forest products biorefineries. As this Committee begins to work towards the reauthorization of the Farm Bill during coming months, we look forward to working with you to ensure all opportunities are realized.

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FOREST PRODUCTS INDUSTRY – INDUSTRIAL BIOREFINERY DEMONSTRATIONS

In February 2005, the Department of Energy's Office of Biomass Programs (OBP), within the Energy Efficiency and Renewable Energy (EERE) Office, released a Funding Opportunity Announcements (FOA) for biorefinery research and development. The FOA will provide funds for commercial demonstrations of an industrial biorefineries. This biorefinery initiative was authorized by Section 932 of the Energy Policy Act of 2005 and has a proposed FY07 budget amount of $150 million.

The forest products industry is seeking to participate in these industrial biorefinery demonstrations. We are pleased that DOE has committed the scope of the solicitation to ensure the eligibility and inclusion of forest-based feedstocks and new integrated forest products biorefinery (IFPB) facilities. IFPBs hold great promise for assisting the industry with its energy challenges and achieving the nation's energy goals.

The Forest Products Industry is a Critical Part of the Solution to National Energy Challenges

- The industry has much of the infrastructure and expertise – feedstock harvesting, transportation and storage; manufacturing and conversion infrastructure; waste handling and recovery – necessary for successful commercialization of integrated biorefineries. Also, the industry's facilities are located primarily in rural communities where they can realize important synergies between agricultural and forest-based feedstocks.
- Forest-based materials constitute a vital part of the feedstock base for biorefineries. Nearly 2.5 times the current forest biomass consumption can be harvested sustainably and used to produce enough carbon-neutral biofuels to displace up to 10% of the country's petroleum production.
- Integrated forest products biorefineries at existing forest products mills can readily complement corn-based ethanol production, supplying up to 2 billion gallons annually. Mandates under the Energy Policy Act of 2005 will only accelerate the need for larger volumes of domestically produced, renewable ethanol.
- IFPBs at existing wood-processing and pulp and paper mills would create a geographically distributed supply source that is less vulnerable to sabotage and natural disasters, and may provide advantages for transportation and logistics in supplying biofuels to major demand centers.
- IFPBs would continue to manufacture traditional wood and paper products along with biofuels, allowing the industry to draw maximum value from renewable forest resources with reduced environmental impacts and improved energy efficiencies.

The Forest Products Industry is Already Committed to IFPB

- IFPB is a top economic and technical priority for the industry. It could radically and favorably alter the global competitiveness of the entire US forest products industry by creating a national infrastructure capable of producing a variety of biofuels, bio-chemicals, and bio-based precursors to a range of adhesives, films and polymers.
- Top forest products companies have committed to support a commercial scale biorefinery demonstration in Southeast Arkansas, using biomass gasification to substitute for natural gas consumption and produce liquid transportation fuels. This integrated facility, which will use both forest-based and agricultural feedstocks, has drawn the support of state and regional governments, the local agriculture industry, and not-for-profit rural and sustainable development organizations. Federal co-funding will be critical to the success of the project.
- In consultation with DOE, a consortium of seven forest products companies, representing well over 65% of industry revenues, are investing their own funds in core technology development with the objective of having a DOE co-funded industrial scale demonstration in place prior to 2009. Other smaller scale efforts are taking place throughout the industry.

We urge Congress to preserve and leave unencumbered the proposed $150 million funding of Biomass and Biorefinery Systems R&D, so that there will be sufficient appropriations to fund the FOA. We also will continue to work with Congress and the Department of Energy to ensure that forest-based materials are eligible for this and future biorefinery research and demonstration funding.

Last Updated: 4/25/06

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Senate Agriculture Committee
Hearing on the State of the Biofuels Industry
Submitted by the National Association of Conservation Districts
April 26, 2006

On behalf of the nation's 3,000 conservation districts, the National Association of Conservation Districts (NACD) is pleased to provide comments to the Committee on the State of the Biofuels Industry. Established under state law, conservation districts are local units of government charged with carrying out programs for the protection and management of natural resources at the local level.

NACD supports the development and use of biofuels from agriculture and forestry products to help stretch our nation's energy supplies and reduce the amount of imported oil by millions of barrels each day. Our members help landowners implement conservation practices such as no-till that can save farmers over 200 million gallons of fuel and up to $480 million per year. We are also interested in the use of crop acreage in conservation programs for the production of biofuels – corn ethanol, biodiesel and biomass ethanol. In looking toward the future many conservation programs can serve several purposes of soil and water quality benefits, habitat improvement, reduced energy inputs and contribute to biofuel production through crop and grass production, however we must ensure that these lands continue to be managed to protect natural resource conservation benefits.

One example of the Conservation District's commitment to biofuels is the Spokane County Conservation District's "BioBug". This Clean Green Bio Machine, a 2003 Volkswagen Beetle is fueled with 100% biodiesel. The BioBug is part of the District's educational efforts to increase awareness of biodiesel and its positive impacts on our environment and our economy. The District is coordinating the efforts of several public agencies, private industry and agricultural producers to develop the biodiesel industry in Eastern Washington. These efforts include the production of agricultural feedstocks, building oilseed processing facilities, developing biodiesel processing plants, and increasing demand for the fuel.

With energy prices at all-time highs and little expectation of change in the near future, there is a great opportunity for the development and use of biofuels and alternative energy sources made from biomass. Many conservation practices actually save energy while also benefiting the environment. Farmers can help solve America's energy problems by producing clean, renewable energy sources.

NACD encourages support for policies and programs that provide incentives for the development and use of biofuels and biomass and for conservation practices that reduce energy use and support for the USDA Bioenergy Program. We look forward to continuing to work with the Committee on these programs and working at the state and local level to increase the awareness and use of biofuels.

QUESTIONS AND ANSWERS

April 26, 2006

Senator E. Benjamin Nelson
U.S. Senate Committee on Agriculture, Nutrition and Forestry
Hearing on the State of the Biofuels Industry
Written Questions for Witnesses

To: Mr. Bob Dineen, President of the Renewable Fuels Association:

(1) On Tuesday April 26, 2006, President Bush stated that he was going to direct the EPA Administrator to use all of his available authority to grant certain waivers with regard to fuel regulations in order to help with gas prices. I understand from the EPA that the President was talking about the authority Congress gave to the Administrator of EPA in the Energy Policy Act of 2005 to waive a control or prohibition respecting the use of a fuel or additive under extreme or unusual supply circumstances for 20 days or less. I would like your opinion as to what affect, if any, this will have on the ethanol industry and on gas prices in general.

(2) Additionally, this section of EPAct specifically states that waivers are not to be granted for "lack of prudent planning." As the oil industry and others continue to try and lay some of the blame for gas prices on ethanol due to their decision to phase-out MTBE, can you state generally how more prudent planning by gas producers could be utilized and what role the ethanol industry can play in this and future efforts to increase our usage of ethanol?

(3) On a similar note, ethanol was phased-in for gasoline in the Midwest in 2000, California in 2003 and New York and Connecticut in 2004. The first two of these experienced problems that are similar to the ones being discussed now; what was learned or what should have been learned by each of those experiences and what can we learn for future efforts to increase our national usage of biofuels?

Senator Salazar
Regarding the State of the Biofuels Industry
Questions
April 26, 2006

1. ***Question for All Witnesses:*** In January, I hosted an Energy Summit in Denver – bringing together Colorado's renewable industries, researchers and producers. At the Summit, NREL presented attendees with a very optimistic scenario on their continued research and development on the biofuels industry, identifying it as a potentially significant substitute for petroleum in the medium to long term. I think we all agree that this is the case. Therefore, where do you foresee roadblocks in the future, and what do you think are the most important ways that we, as legislators, can help facilitate the research, development and implementation process?

2. ***Question for Bob Dinneen, President of the Renewable Fuels Association***: Corn- based ethanol shows great promise in Colorado. It's good for CO farmers and helps support our livestock operations. But water is a limited and precious resource in Colorado and other Western States.

   - What is the average amount of water actually consumed (and not available for re-use by other users) in the production of a gallon of ethanol?

   - Are some ethanol technologies more efficient in their use of water than others?

   - Are you aware of any research directed specifically at water efficiency in ethanol production?

   - Can you predict if cellulosic ethanol technologies will be more or less efficient in their use of water?

3. ***Question for Joe Jobe, CEO of National Biodiesel Board:*** Your testimony highlights the close historical relationship between soybean commodity groups and the National Biodiesel Board.

   - Has the National Biodiesel Board provided support for research or development of biodiesel from other feedstocks such as canola or other oilseeds?

   - If so, what kind of support has been provided?

4. ***Question for Jay Derbertin, Executive Vice President and COO, Processing for CHS:*** You have indicated that other countries use blends of ethanol up to 25% in traditional gasoline engines.

- Is this E-25 blend being used in gasoline engines with no modification to the engines?
- Are the vehicle manufacturers warranties dishonored or reduced because of the use of the E-25 blend?
- If the warranties are being fully honored, even with use of this E-25 blend, is this a result of voluntary industry action, regulation, or legislation?
- Are U.S. manufacturers honoring their warranties with the use of E-25?
- Is additional testing necessary to establish that blends up to 25% ethanol are safe, efficient and protective of traditional gasoline engines?

5. ***Question for Robert Brown, Professor of Mechanical Engineering, Chemical and Biological Engineering, Agricultural and Biosystems Engineering Director, Center for Sustainable Environmental Technologies at Iowa State University:*** You have indicated that there is a range in the reported values of net energy return in the production of ethanol.

    - What is the net energy gain in the most up-to-date ethanol plants?
    - What is the net energy gain or deficit in the most up-to-date production of gasoline from petroleum?
    - Do you expect the net energy gain in the production of ethanol to increase in future technologies?

<u>If the answers are positive in regard to net energy gain – you may want to point out the following:</u>
<u>From the perspective of energy efficiency then we want to produce more ethanol and use less gasoline.</u>

Senator Thomas
Senate Committee on Agriculture, Nutrition, and Forestry
Hearing on the state of the biofuels industry
April 26 2006

Questions

For Bob Dinneen, Renewable Fuels Association

1. You mentioned that there are currently 97 "bio-refineries" in operation.
    a. How many use natural gas as the heat source? Please provide the amount of natural gas consumed.
    b. How many use coal? Please provide the amount of coal consumed.

2. How many of the newly proposed plants will use:
    a. Natural gas (please provide the amount of gas consumed, the output of the plant in million gallons per year of ethanol and the name of the plant owner)
    b. Coal (please provide the amount of coal to be consumed, the output of the plant in million gallons per year of ethanol, and the names of the plant owner)

3. Please provide an estimate of the amount of natural gas used to provide the fertilizer for the corn used to make ethanol.

4. What currently happens to the CO2 produced from fermentation of the corn?

5. Please provide the historical data for the years 2000-2005 for the following:
    a. Total gallons ethanol produced for fuel blending
    b. Total corn consumed for ethanol
    c. Price of ethanol

d. Price of fertilizer

6. What is the RFA's estimate of the level of usage at which corn for ethanol will begin to have an impact of corn use for food?

7. It is my understanding that some of the by-product of ethanol production can be used as animal feed. What is the feed value of the by-product? How much feed value of corn is lost in ethanol production?

8. I am aware of 34 new ethanol plants and 8 expansions. When will the plants that are currently under construction be on-line and producing ethanol?

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