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THE NEXT GENERATION OF BIOFUELS: CELLULOSIC ETHANOL AND THE 2007 FARM BILL

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BEFORE THE

SUBCOMMITTEE ON ENERGY, SCIENCE AND TECHNOLOGY

OF THE

COMMITTEE ON AGRICULTURE, NUTRITION, AND FORESTRY

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Wednesday, April 4, 2007

UNITED STATES SENATE,
SUBCOMMITTEE ON ENERGY,
SCIENCE, AND TECHNOLOGY
COMMITTEE ON AGRICULTURE,
NUTRITION, AND FORESTRY,
Washington, DC

The Subcommittee met, pursuant to notice, at 10:00 a.m., in the Volstorff Ballroom, South Dakota State University, Brookings, South Dakota, Hon. John Thune presiding.

Present: Senator Thune.

STATEMENT OF HON. JOHN THUNE, A U.S. SENATOR FROM SOUTH DAKOTA

Senator THUNE. Good morning, everyone. As the Ranking Member of the Senate Agriculture Energy Subcommittee, it is my pleasure to call this hearing to order this morning. I want to welcome you to spring in South Dakota, the beautiful weather we are having. In the spirit of spring and in the spirit of renewable energy, I wore my green tie today, so this is a green energy day here in South Dakota. But we are delighted to have all of you here today, and I want to thank our witnesses for being with us here today as well. We look forward to hearing from them in just a minute.

But what I want to do today is focus this hearing on issues that have to be addressed in the 2007 farm bill to ensure the timely and successful development of commercial cellulosic ethanol over the life of this bill and beyond. Today's hearing is the first Senate Agriculture Energy Subcommittee hearing, and it is the first 2007 farm bill hearing to focus on cellulosic ethanol production. During the 2002 farm bill debate, I served on the Agriculture Committee in the House of Representatives.

My colleagues and I included for the first time ever an energy title in that bill. Since passage and implementation of the 2002 farm bill, our agriculture industry has evolved from producing food and fiber to producing food, fiber, and fuel. Without a doubt in my mind, our expectations for South Dakota's farmers and ranchers as they transition to this new frontier of growing fuel will be met with the same spirit, resolve, and innovation they have shown ever since ranchers began grazing our prairies and farmers' plows began turning over South Dakota sod in the 1800s.

South Dakota's farmers and ranchers will rise to the challenge of growing fuel on the Plains, and I want to ensure that they do it successfully and in a manner that makes biofuels production sustainable. Sound public policy must keep pace with the innovation of our producers and ethanol industry leaders.

Over the past few months, I worked hard to ensure the sustainability of the ethanol industry. Recently I have taken several steps to boost the production and consumption of ethanol. Last month I contacted the Environmental Protection Agency and urged them to make preparations to begin quickly for EPA approval of E20, a blend of 20 percent ethanol and 80 percent gasoline. Our domestic ethanol production will soon meet and exceed the demand for E10. Therefore, E20 approval and wide spread use is an important stepping stone as we transition away from our Nation's dangerous dependence on foreign sources of oil.

In order to lessen U.S. dependence on foreign energy, it is critical that our ethanol industry, the auto industry, and the Federal Government work together to expand the production and acceptance of gasoline with higher blends of ethanol, such as E20. The delivery of E20 and E85 is dependent on increased alternative fuel infrastructure at the retail level. Again in this Congress, I have introduced a bipartisan bill in the Senate that would provide gas station owners with financial incentives to install alternative fuel pumps, including E85 pumps.

Last month I joined a bipartisan group of Senators in sending a letter to Underwriter Laboratories requesting the approval of ethanol pump components. The lack of such approval allows local regulators to block the installation of E85 pumps, which has led to a great deal of uncertainty at the retail level. I have also spoken out against the administration's ethanol compact with Brazil. It is simply bad policy to promote foreign ethanol while our domestic ethanol industry is just getting off the ground.

Alan Greenspan, former Chairman of the Federal Reserve, has publicly stated that South Dakota may be the next energy czar because of our potential for wind energy and renewable fuel production. However, South Dakota will never realize this potential if our focus is on foreign sources of biofuels.

Earlier today I had the opportunity to visit a cellulosic ethanol lab here on SDSU's campus. This afternoon I will be stopping by an established field of switchgrass. Additionally, wind farms and ethanol plants are now a common feature of our rural landscape. Without question, renewable energy has dramatically changed South Dakota's economy, and this is just the beginning.

I envision a future with South Dakota as a net energy exporter. In addition to our existing hydropower generating capabilities and the potential for increased wind energy generation, we have a vibrant and rapidly expanding corn-based ethanol industry in eastern South Dakota. Today South Dakota's ethanol production is comprised of 12 existing ethanol plants with five more under construction or expansion. By the end of 2008, we will have the capacity to annually produce over 1 billion gallons of ethanol in South Dakota.

Cellulosic ethanol, which can be made from prairie grasses, crop residue, or wood ships rather than corn, represents the next fron-

tier of biofuels production. The successful and economic production of cellulosic ethanol will complement our Nation's current corn ethanol production to deliver a robust and sustainable biofuels industry for generations to come. Cellulosic ethanol will potentially yield more gallons of ethanol per acre than corn by utilizing commodity crop residues as well as crops that are native to particular regions across the country. In doing so, ethanol production will extend beyond the Corn Belt as fuel sources such as prairie grasses and wood chips become viable ethanol feedstocks.

One such example is provided by the KL Processing and Design Group based in Rapid City, South Dakota. KL Processing has just begun producing ethanol from woody biomass, with much of the research that has made their process successful having taken place right here in South Dakota. On behalf of the KL Processing and Design Group, I will submit their written testimony in the official Committee record.

[The following information can be found on page 100 in the appendix.]

First on the panel is Kevin Kephart. He is Vice President of Research and Dean of the Graduate School at South Dakota State University. Kevin also serves as the Chair of the Sun Grant Initiative. I worked with my colleagues to secure a steady stream of funding for the Sun Grant Initiative as part of the 2005 transportation reauthorization bill, and I look forward to coordinating with Kevin and his team at SDSU to reauthorize and strengthen this program as part of the 2007 farm bill. I want to thank Kevin for his work and contributions to our ethanol industry, and I would like to give special thanks to Kevin, his staff, and the South Dakota State University for hosting this hearing today.

Don Endres is the chairman of the board and CEO of VeraSun Energy, an exciting company based here in Brookings, South Dakota. Don grew up in Watertown, South Dakota, and is an alumnus of South Dakota State University. Don has a distinguished career in the ethanol industry and is now the head of the second largest ethanol production company in the United States.

Jeff Fox is the Vice President of Legal and Governmental Affairs for Poet Energy, another South Dakota-based ethanol company. The Broin family purchased their first ethanol plant located at Scotland, South Dakota, in 1987. Later this year, Poet and its partner plants, scattered across the Midwest, will have an annualized production capacity of over 1 billion gallons.

Reid Jensen lives near Burbank, South Dakota, where he operates a stock cow and calf operation and has raised corn and soybeans since 1977. Reid graduated from the University of South Dakota with a degree in business administration. In addition to being the President of the South Dakota Corn Growers, Reid is Vice President of the South Dakota Corn Utilization Council and is active on the Clay County Extension Board.

Anna Rath is the Director of Business Development at Ceres, Incorporated. Ceres is at the forefront of transgenic switchgrass development and the sustainable production of energy-dedicated crops. Anna has a master's degree in human genetics from the University of Michigan and her law degree from Yale University. She has been researching the development of cellulosic ethanol and pro-

moting cellulosic ethanol production for the past 3 years at Ceres, Incorporated.

Dave Nomsen is the Vice President of Legislation for Pheasants Forever. I have invited Dave here today because I recognize the importance of conservation and sustainable agriculture as we move into the next generation of biofuels and because of the critical contribution wildlife, and especially pheasants, make to South Dakota's economy. Dave has lived and worked in South Dakota, here at South Dakota State University—I should say he actually lived and worked here in South Dakota, including as a member of the faculty at the Wildlife and Fisheries Department here at South Dakota State University. He brings considerable knowledge of wildlife and conservation issues to this discussion.

Each panelist has submitted written testimony for the public record and will be provided 7 minutes to present their summarized statements. After our panelists have presented their opening statements, I expect to have some questions for each of them, after which we will open up to the floor for questions from the audience.

Before we get to that and open it up to their testimony, there are a number of other agricultural organizations and ethanol groups in South Dakota that I have invited to submit testimony for the official record of this U.S. Senate Agriculture Committee hearing, and I am submitting the written testimony for the American Coalition for Ethanol—see, we need more renewable energy here.

[Laughter.]

Senator THUNE. American Coalition for Ethanol, and that was not your cue, Brian Jennings, to turn out the lights. Lake Area Technical Institute, which we visited yesterday and which is doing some wonderful research on the effect and wear on engines of renewable fuels; South Dakota Wheat, Incorporated; Glacial Lakes Energy. Those will all be submitted for the official hearing record. And I also have this morning written testimony from Ducks Unlimited that will be made a part of the record, and I understand as well that South Dakota Farm Bureau has submitted testimony. So all that will be included as a part of the official record, and the record will remain open until Monday, April 9, 2007.

[The following information can be found on pages 74, 102, 119, 87 and 115 in the appendix.]

So, with that, I want to, as we say, yield the floor to our panelists. I will start on my right with Kevin Kephart. And as I indicated earlier, Kevin will offer some testimony for about 7 minutes, and most of you at South Dakota State University are familiar with him, but he is Vice President of Research and Dean of the Graduate School here at South Dakota State University. So, Kevin?

STATEMENT OF KEVIN KEPHART, VICE PRESIDENT OF RESEARCH, DEAN OF THE GRADUATE SCHOOL, AND DIRECTOR, SUN GRANT INITIATIVE FOR THE NORTH CENTRAL REGION, SOUTH DAKOTA STATE UNIVERSITY

Mr. KEPHART. Thank you, Senator Thune. And, first of all, I want to begin by thanking you especially for having SDSU be the venue for this hearing. I do not think you will find a better venue or place of excitement than SDSU for this wonderful opportunity that agriculture has before it. I see a lot of my colleagues out in

the audience here, and just on behalf of them as well, I want to thank you for this opportunity that you have brought to SDSU, and your support as well.

This is a university, and a big part of a university is to serve in this function as an open venue for logical discussion, scientific discussion, economic discussion, on issues that are before us. And as a university we need to hear both sides of many of the issues, and I think this is what we have before us right now.

My main function here today is to testify on behalf of the Sun Grant Initiative. The Sun Grant Initiative calls to implement the land grant university system into helping to bring forward this totally new industry to the United States and to American agriculture. We have heard over and over again of the challenges that we have before us. Some of them are in regard to national security. We have an excessive dependence on imported petroleum in the United States. Approximately 60 percent day in and day out of our petroleum use is from foreign sources, and people are becoming more and more aware of the threat, economic threat and security threat, that brings.

We believe that agriculture is part of the solution. Agriculture is not the entire solution to correcting this energy imbalance that we have, but agriculture is a big part of the solution that we have before us and the challenges that we have before us.

Agriculture in the United States leads the world in terms of providing a safe and affordable food supply to not only the United States but our friends throughout the world. And we believe that agriculture will play a similar role in energy production as well, with agriculture being involved.

We feel that the land grant university system is a component of that, and we populate the food production industry and the agricultural industry with our graduates. We pursue not just short-term needs in research and development but also long-term needs that I will touch upon here in a few moments. And as I have mentioned, we are a source of education and outreach into helping to lead the policy decisions that need to take place.

The land grant university system has been involved in agriculture since 1862, and from that we have provided opportunities to common people to attend higher education. But from that developed one of the world's leading research agencies, research development throughout the world. I have been to many countries like Bolivia and Russia and throughout Europe, and they see that this tripartite mission that the land grants have of education, basic research, public research, but then extending the results of that knowledge out to the entire community is something that the other countries just do not have. And we believe that will offer us strength to implement these new industries that we have before us.

The Sun Grant Initiative has been an effort that we have been working on since 2001, January of 2001, and the mission of the Sun Grant Initiative is to engage agriculture into national energy security, but also diversify agriculture through biological means and economic means and also produce other products that will help displace imported petroleum in particular and other fossil fuels in general.

So with that as being our mission, we will need more than the agricultural sciences to be involved in this, but we will need engineers and chemical engineers and other disciplines that have not been engaged in agriculture before now.

I want to point out that the Sun Grant Initiative was authorized in 2004 as part of—it is Section 9011 of the existing farm bill, and through your help, we have also been authorized in the highway bill, the SAFETEA–LU bill, and actually are implementing the Sun Grant Initiative with funds that have been appropriated to us through the Department of Transportation with your leadership as well as the leadership of Senator Bill Frist from Tennessee.

The Sun Grant Initiative is a consortium that is led on a regional basis by South Dakota State University as being the national lead. Other universities are Cornell, the University of Tennessee, Oklahoma State University, and Oregon State University. And through those land grant universities, we engage with all the other land grants in those respective regions. We take a regional approach to this because the feedstocks, the agricultural systems, the opportunities are different between the Northeast and the West, for example, or the Upper Midwest and the South Dakota area.

Some people ask why is South Dakota the lead of this and not a bigger school, such as Iowa State. And my answer to that is that we have been engaged in this area since the mid–1970s. We are national leaders in research in cellulose, whether it be through starch or through cellulosic means. We have a feedstock breeding program. You see some of the materials up here before you. We actually are national leaders in that arena. And, also, we have recent investments at the State level on the conversion side through Governor Rounds and his support of a new 2010 center that is jointly led by the South Dakota School of Mines and South Dakota State University. So I believe that we have national leadership just because of our history and the numerous faculty that we have engaged here.

Now, if the Sun Grant Initiative through the Department of Agriculture is to be appropriated and reauthorized, our mechanism of sharing those funds is that no more than 25 percent of the resulting funds will be used here at SDSU or the other centers. We are mandated in that the remaining 75 percent will be provided to other land grant universities through a competitive means, which we will have a leadership role in but we, nevertheless, have to award that through our partners.

So I would say partnership and engagement with other land grants and industry, especially the partners that we see here, other members of the panel, will be a very important part of implementing that.

Recent accomplishments that we have, we are working with the Department of Energy. They have formed a regional feedstock partnership effort that is partly Sun Grant Initiative, partly Department of Energy and their labs, and the Regional Governors Associations, and we have been holding workshops through that partnership to gain their input. We have a new Web presences that I would like all of you to visit, the Sun Grant Bio Web, which is a public resource to help people with policy decisions.

I would like to wrap up by saying what our request is for the upcoming farm bill. Our request is that we be reauthorized. Currently, the Sun Grant Initiative is authorized through 2010, but we want to be in synchrony with the existing farm bill as it rolls out. And we would also request that our authorization limit be increased from $75 million to $100 million for this nationwide effort with the land grant institutions.

Thank you very much.

[The prepared statement of Mr. Kephart can be found on page 57 in the appendix.]

Senator THUNE. Thank you, Kevin.

Next up is Don Endres, who is chairman of the board of CEO of VeraSun Energy. Don, welcome.

STATEMENT OF DON ENDRES, CHAIRMAN AND CHIEF EXECUTIVE OFFICER, VERASUN ENERGY

Mr. ENDRES. Thank you. Senator Thune, I appreciate the opportunity to testify on behalf of VeraSun. Clearly, the expansion of the ethanol industry is a success story in terms of helping decrease our reliance on foreign oil, reducing greenhouse gases, and creating economic development in rural America. But this is just the beginning. We believe the ethanol industry can and will respond to the President's call for 35 billion gallons of renewable fuel by 2017. And even though cellulose holds great promise, we believe that corn-based ethanol will continue to contribute a significant portion to satisfy this goal.

In order to ensure that the industry continues to expand, we believe the Federal Government should focus on growing demand for renewable fuels. Near-term efforts should be focused on increasing ethanol's use as a blend component to support this rapid-growing industry, and longer term, we believe we need to transition to E85.

The Federal Government has succeeded in spurring ethanol production in the United States through the combination of the Renewable Fuels Standard, the Volumetric Ethanol Excise Tax Credit, or VEETC. And we believe that maintaining this blender tax credit as well as keeping the secondary tariff in place to offset VEETC is important for short-term demand. VeraSun also believes that a 20-percent blend of ethanol, or an E20, provides a catalyst for the transition from ethanol as an additive to gasoline to ethanol as an alternative to gasoline. E20 provides the near-term driver that will be critical in achieving the longer-term objectives of E85 and of robust cellulose ethanol production.

Today less than 3 percent of vehicles on the road are E85 compatible. In order to for E85 to develop at sufficient pace under today's law, significant near-term mandates would need to be imposed on automotive companies and fuel retailers. We believe this can be more successfully accomplished over a longer period of time with incentives rather than mandates if there is support for the development of an E20 market. Specifically, E20 would double potential demand in the current blend market. This change not only would foster our energy independence by displacing gasoline, but also would provide incentives for the ethanol industry to continue to grow while we work to develop a nationwide E85 market.

By transitioning from E10 to E85 through E20, we will also ensure the creation of a vibrant cellulose ethanol industry. This new near-term demand in the market would help ensure continued investment in research and early-stage development of cellulosic ethanol. It is interesting that Brazil currently sells blended gasoline at 24-percent ethanol as well as a 100-percent blend with their flex-fuel vehicles. This is quite similar to what I am proposing here today.

In order to spur the use of E20 in the existing automobile fleet, the Federal Government we believe must do two things: first, it must fast-track EPA authorization of ethanol blends up to E20 as a transportation fuel under the Clean Air Act amendments, and we also believe we need to provide assistance for automakers in this transition. I would like to thank you, Senator Thune, for your letter to the EPA requesting a prompt review of the E20 opportunity.

By helping create new demand for ethanol through the use of E20, the Federal Government will provide additional time for the E85 market to develop. As one of the largest producers, we have worked to ensure a robust E85 market. In the past 24 months, VeraSun has pursued an aggressive strategy in cooperation with Ford and General Motors to increase the availability of E85. VeraSun's E85 is available today at over 80 stations across eight States. We plan to continue to expand the number of fueling locations throughout the U.S. in 2007.

From this experience we have gained significant insight on what is necessary to develop E85 in the United States. In order to see a robust E85 market by 2017, the Federal Government must do the following things: first, we must improve the economics of blending E85 through an enhanced E85 blenders' credit; create an incentive for the autos to produce ethanol-optimized, flexible-fuel vehicles; and then increase pump incentives to expand the number of retail stations that offer E85.

Currently, the market values ethanol more highly for E10 blending than it does for E85. Allow me to explain. FFVs are currently not designed to take advantage of E85's high octane. Since refiners are able to take advantage of ethanol's high octane to increase refinery output and improve the economics of gasoline production, the product is more highly valued as a blend component in gasoline. To improve the E85 economics, Congress should create an additional blenders' credit for E85 within the VEETC system. In addition, VEETC, including the E85 incentive, should be extended. By providing additional credit for E85, we will level the playing field and increase the supply of E85.

In addition, the Government should also provide incentives for the autos to improve FFV technology. To spur the production of more efficient FFVs, Congress should provide tax incentives to autos to produce these vehicles. Our experience with VE85 over the last 2 years also indicates that more must be done to help retailers offer E85. To increase the number of retail stations offering E85, the current incentives for retailers to install the pumps, more specifically blender pumps, should be increased.

I would like to again thank you, Senator Thune, for your leadership on E85 pump legislation, cosponsored by Senator Salazar. Hopefully we will see this legislation move forward in Congress in

the very near future. We believe the market must see a path toward E85 in order for cellulose ethanol to evolve. E10 and perhaps even E20 could largely be served by corn-based ethanol. In large part, the Federal Government's focus on increasing demand for the use of renewable fuels in the near term and the long term will provide confidence to investors to aggressively pursue the commercialization of cellulose ethanol. And we believe the Federal Government could do a couple of things to help support spurring cellulose ethanol: one, increase the biomass ethanol research and development program; streamline and increase the availability of Federal grants and loan guarantees for investment in cellulose facilities; and then offer an additional blenders' tax credit for ethanol, similar to the Commodity Credit Corporation incentive, for a period of time.

In conclusion, we have worked hard to make ethanol and renewable fuels a huge success story here in South Dakota and the United States. But no one—not VeraSun nor any one producer—deserves credit. Our credit really should be given to the American farmers. Our American farmers have provided this opportunity today. There is such optimism and hope in our industry, both for our communities as well as our country, and we look forward to working with you to chart a course forward to continue its development.

Thank you.

[The prepared statement of Mr. Endres can be found on page 38 in the appendix.]

Senator THUNE. Thank you very much, Don.

Next up is Jeff Fox, who is the Vice President of Legal and Governmental Affairs for Poet Energy, which is another South Dakota-based ethanol company, and in front of him I see a number of canisters here of different things. I am sure this stuff looks like something that you should eat for breakfast, that is very healthy for you. But hopefully it can be converted into renewable energy. These are a lot of the byproducts of the research that is going on. This is endosperm fractionalization process, fiber, germ. These are all the different component parts of a kernel of corn that get broken down and made into other things. And so it all starts with this, as you all know, and it becomes these particular things. The research and the technology continue to advance, and they are doing some remarkable, wonderful things, which both Don's company and Jeff's company are very much a part of.

So, anyway, we will turn it over to you, Jeff, and we look forward to your testimony.

STATEMENT OF JEFF FOX, VICE PRESIDENT, LEGAL AND GOVERNMENTAL AFFAIRS, POET ENERGY

Mr. FOX. Thank you very much, Senator and guests here today. Senator, I just want to thank you for holding this hearing. It was said earlier, but it is appropriate that it is in Brookings, it is in South Dakota. When you look at the panel that you have put together, it is reflective of your knowledge of our industry because you have worked helping our industry over the years, not just in this ag bill but in past ag bills, also with energy bills. Your help with regulatory agencies over the years, your staff's help, has been

very greatly appreciated by the industry. But you have got universities here. You have got growers here. You have got ethanol producers, people that do research. You have got a host of people here today that reflect, I think, not only what needs to be talked about today but also your knowledge of the industry.

With that, Senator, I would like to just briefly go over what our file testimony is, and it really digs into financing, a lot of it through USDA, of grants and loan guarantees and how they can change them to help the energy portion of agriculture, which is today corn ethanol, and in the future it is going to be cellulose ethanol, because the programs they have—and they are very good at administering them—we think need to be changed. And you will see kind of our theme throughout our testimony that was filed that we think they need to increase those to a larger amount. They need to make the grants work a little bit different, and also the loan guarantees a little bit different.

I do not want to go into all that detail here with this group because I think you hit on something very important. Don is right. Corn ethanol is here. It has been the backbone. A lot of that has come out of South Dakota. A lot of it has come out of the university. And we ought to all be proud of that, as you are. And then we would look at the next step. What happens?

Everybody pretty much agrees that corn ethanol is going to top out at 14, 15 billion gallons, maybe more, but that is kind of the number everybody is using. So how do we get to the next level? And we talk about cellulose. The Senator pulled up some of those canisters. What you see there is a result of our company's investment in research and technology. We currently design/build ethanol plants. We manage them and we also market their byproducts. But we also do a lot of research.

The initial plant that the Senator alluded to earlier in Scotland, South Dakota, is our research facility. We do a lot of different things down there with a lot of different partners. And what you see in the canisters he held up is the result of a lot of years—and I mean a lot of years—of research that has taken place, assistance from the Government in grants. We just got awarded a grant with DOE to put together a commercial cellulose facility. And these canisters represent the culmination of that process. We call it internally in our world "BPX," which is non-cook or raw starch hydrolysis of the endosperm, which is—as you said, we break it into three different parts. Endosperm is really the starch, and then we take the germ, which is the fat, and we can sell that off in other products. Obviously, you have your DDGs, which is your base product that every ethanol plant has, and then the fiber.

Now, why is fiber important? We do that with BFRAC. Before we run it through the plant now, through our BPX process, we take—what we call we "FRAC" it. It is not something that is brand new, but it is fairly new for the ethanol industry. We take that fiber off, and in our commercial-scale plant that we proposed to DOE and that we are working through the grant process right now, that is going to be part of the fiber we are going to turn into ethanol. The other part that we are going to take is part of the corn stover of the stock, and the combining of those two, we are going to take an existing 50-million-gallon plant, turn it into a 125-million-gallon

plant. We are going to expand the corn side of it, but we are also going to add the fiber and the stover. And our goal with that size of a plant—why did you pick 125 million?—it is a balance of the amount of stover that is produced in the area that we can bring into the plant almost from the same corn farmer. If we can get the corn from the farmer, we would like to get part of the stover from the farmer. It provides them another market.

Why did we pick stover? Why not switchgrass? And I think they all have valuable places at the table because it is not going to be one product. It is going to be a host of products. We picked that because that is what we are most familiar with. That is our business. We deal with corn farmers, as does everybody. They are our customers. They are our investors. So it was a natural for our company to go to stover. Some of the other recipients have gone to other different sources of cellulose material.

We think it is very exciting. We think it does open up that next level of ethanol production. And, Senator, I know you have got a map back there that shows where biomass is produced. If you lay that over with corn production, a lot of your biomass almost reflects parallels with corn production.

So the Midwest we think is going to have a huge opportunity to be a player in cellulosic ethanol in the future, but it does not happen overnight. Our project that we are working on, as soon as we can get the contract negotiated—which sometimes takes some time—we plan on being in the ground, 30 months later have the plant operating. We are going to learn a lot, and you do that through research with universities, with grant money. And so if it would not be for those types of programs, Senator, I do not think corn ethanol would be here where it is at today, and I do not think cellulose ethanol would be where it is at today. It takes a combination of assistance from the Government, from the universities, and then from the people in the industry, and obviously, as Don said earlier, corn farmers.

So we appreciate being here. I look forward to the questions. It looks like a great panel. Thank you for having us.

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

Senator THUNE. Thank you, Jeff, and you are absolutely right. It does not happen without the growers, and we have got representation from the growers today. Reid Jensen, as I said earlier, in addition to being a stock cow and calf operator, who has raised corn and soybeans on his farm since 1977, also serves as President of the South Dakota Corn Growers and Vice President of the South Dakota Corn Utilization Council. So, Reid, welcome, and we look forward to hearing from you.

STATEMENT OF REID JENSEN, PRESIDENT, SOUTH DAKOTA CORN GROWERS

Mr. JENSEN. Thank you, Senator. I would like to thank you, Senator Thune, for holding this field hearing and for your work and commitment on the issues that are important to South Dakota, and on behalf of the South Dakota Corn Growers, I thank you for your continued commitment and ongoing effort to advance ethanol and renewable energy in this country.

Today South Dakota is at the forefront of an emerging biofuels industry. South Dakota boasts 13 ethanol plants, with three more plants in development stages, and over 50 E85 pumps throughout the State. Percentage-wise, South Dakota consumes over half of its corn production for ethanol by using over 250 million bushels and ranks number four in ethanol production, with nearly 1 billion gallons of capacity expected by 2008.

Additionally, there are more than 14,000 South Dakotans invested in some form of ethanol production, making us the leading State in farmer ownership and equity. For South Dakota, ethanol has created economic investment, rural and community development, and unparalleled opportunities in agriculture. For me personally, ethanol has been a great hedge. We have had cheap corn, and by investing in ethanol, we have been able to offset that cheap corn with our returns in our ethanol investment. Now we are finding a little higher corn price, which is great, and maybe our dividends will not be so good. We do not know yet. But so far they have been, but it has been a true hedge against low corn prices and also higher energy costs.

South Dakota Corn Growers are here today to advocate for a national energy policy that continues to support ethanol expansion and development and create increased opportunities for South Dakota farmers. As we look toward the future of energy development in this country, it is important that farmers and agriculture play a key role. From corn-based ethanol to the potential of cellulosic fuels, corn will remain a viable feedstock in growing our energy independence.

Currently, nationwide there are 115 ethanol plants in operation with nearly 6 billion gallons of capacity and 5 billion gallons of additional capacity under construction. Our current Federal energy policy in part is responsible for the growth of this once cottage industry into a $23.1 billion fuels market, displacing nearly 5 percent of the petroleum consumption and creating over 150,000 jobs in rural America.

In 2005, Congress passed and signed into law the Energy Policy Act of 2005. This legislation established the Renewable Fuel Standard, known as RFS, and included several key provisions vital to developing our robust renewable fuel industry. The establishment of the RFS signaled the market to produce more ethanol, grow more corn, and provide a safety net for investors. As set in 2005, the RFS incrementally mandates ethanol production and consumption from 2006 to 2012, peaking at 7.5 billion gallons. Today's ethanol production in this country has exceeded the RFS twofold. We are on the verge of meeting this 7.5 billion gallons in the next 18 months.

In addition to the RFS, the Volumetric Ethanol Excise Tax Credit, known as VEETC, and the secondary ethanol tariff have been extremely critical in the ethanol industry. In 2004, the Jobs Creation Act was passed and signed into law. This landmark legislation extended the ethanol tax incentive, a blenders' credit at 51 cents per gallon, to 2010, as well as creating new tax incentives for biodiesel, and improved the small ethanol producers' tax credit to allow farmers' cooperatives to pass a credit along to its farmer owners. This 51-cent blenders' credit means market access for ethanol

and brings the fuel to the pump. The VEETC stimulates demand and encourages more production, which has created a fair market price for undervalued commodities.

As the ethanol industry continues to expand and more renewable fuels come online, it is imperative we keep VEETC in place and permanent. An offset to the 51-cent tax credit, the secondary ethanol import tariff, places a 54-cent duty on foreign ethanol imported to the U.S. Removing this 54-cent tariff would, in essence, be asking the American taxpayers to further subsidize already heavily subsidized ethanol and sugar cane production in countries like Brazil. U.S. gasoline refiners receive the 51-cent tax incentive for every gallon of ethanol they blend into gasoline regardless of the ethanol's origin. Brazil has built its ethanol industry through 35 years of incentives, production subsidies, mandates, export enhancement, infrastructure and development debt forgiveness, and currency devaluation. Brazil does not need U.S. tax dollars to compete effectively, as evidenced by the fact that over 430 million gallons were imported last year, and those volumes are increasing.

Together, the ethanol tax credit and the secondary tariff are the most critical policies behind ethanol development and expansion and will continue to play a vital role as cellulosic ethanol comes online.

Today grain-based ethanol continues to increase its capacity and expand its reach, and soon we will see cellulosic ethanol enter the fuel market. Together, grain and cellulosic feedstocks can displace potentially 20 percent of the Nation's petroleum usage and increase our reliance on homegrown fuels. However, cellulosic ethanol is still some time away, with transportation, storage, and economic obstacles in its path. As we wait for cellulosic ethanol to join the market, grain will continue to meet the needs of food, feed, and fuel across this country. Although we are making great strides in ethanol production and advances in cellulosic technologies, infrastructure problems could stunt our growth as an industry.

Currently, 85 percent of the ethanol is shipped via rail, and the remaining 15 percent relies on trucks and barges. As we increase ethanol capacity over the next 10 to 20 years, we will need greater railroad capacity, access, and expansion in order to meet the needs of a booming biofuels industry. Combine rail and road constraints with the need for more pumps and more cars, ethanol could hit a wall. Without these infrastructure improvements and addressing head-on these obstacles, ethanol will hit a saturation point, a blend wall near 15 billion gallons. At 15 billion gallons, yes, we will be blending 10 percent of all gasoline; however, we cannot pass this law without investment in renewable fuel infrastructure as well as getting more pumps at the station, more flex-fuel vehicles on the road, and higher blends to the market, like E20. We appreciate greatly Senator Thune's efforts to get E20 online and his work with the EPA on this matter. In the end, these limitations could stunt any progress on key issues that need to be looked at as we push forward our domestic energy security agenda.

Lastly, South Dakota Corn Growers are extremely proud to lead the country in farmer ownership when it comes to ethanol plants. We believe farmer investment brings great returns to local communities, supports rural development, and creates economic growth

throughout the country. It is imperative we continue to foster farmer ownership throughout the State and continue to take ownership of American agriculture. Our future is in the farm.

In conclusion, I would like to thank Senator Thune for his fantastic work in Washington and his effort on behalf of the great State of South Dakota. He has truly been a leader for agriculture and a staunch advocate for the needs of South Dakota Corn Growers and the future of renewable energy in this country. If I could leave you with one last thing, I want to say that good things do come from USD.

[Laughter.]

Mr. JENSEN. Thank you.

[The prepared statement of Mr. Jensen can be found on page 54 in the appendix.]

Senator THUNE. We do not hear too many boos and hisses out here.

[Laughter.]

Senator THUNE. Thank you, Reid.

Next up is Anna Rath, and as I said, she is the Director of Business Development at Ceres, Inc. And I think what is important, her company and others like it are doing some remarkable things in increasing yields, and a lot of the research and technology is yielding some phenomenal results. And so, Anna, welcome. It is nice to have you here, and we look forward to hearing from you.

STATEMENT OF ANNA RATH, DIRECTOR OF BUSINESS DEVELOPMENT, CERES, INC.

Ms. RATH. Thank you. Good morning, and thank you, Senator Thune, for inviting me to testify. As you said, I am here representing Ceres. We consider ourselves to be a leading developer of dedicated energy crops, so my comments this morning will describe some of our efforts towards development and commercialization of dedicated energy crops, as well as some of what we think are important policy priorities for the farm bill in order to help get cellulosic ethanol going.

We believe that dedicated energy crops, such as switchgrass and miscanthus, will be essential to realizing the scale currently envisioned for biofuels. For this reason, Ceres is rapidly developing and scaling up commercial varieties of energy crop species. Over the past 70 years, corn yields have improved more than fivefold. This is due to the development of a variety of technologies, including marker-assisted breeding and creation of hybrids and transgenics. We now have all of these same technologies readily available for deployment in energy crops and should be able to use them to produce multiple-fold increases in energy crop yields within the coming decades.

Ceres is establishing the necessary partnerships and large-scale breeding programs to accomplish this. In addition, improvements in composition and structure of dedicated energy crops will enable more gallons of biofuel per ton of biomass and bring down the costs of processing. Ceres has a leading program in understanding energy crop composition and its implications for different processing technologies.

We also have an extensive field trialing program, including trials in conjunction with what will be some of the first commercial-scale biorefineries at their plant locations. These trials are for the purpose of understanding which are the optimal species and varieties to grow at particular locations, what growing practices should be employed, and what grower economics will be in the particular locations. Ceres anticipates that large-scale planting of dedicated energy crops to support some of these initial biorefineries will begin in 2009. We are rapidly scaling up seed of leading energy crop varieties to meet this need. At the same time, Ceres is developing the next generations of dedicated energy crops using marker-assisted breeding and creation of hybrids and transgenics. We project that improved varieties from our breeding programs will be ready for commercial launch by 2012 and that the first transgenic varieties of dedicated energy crops will be ready for commercial launch by 2015.

So now I will transition to some of our policy priorities aimed at the farm bill.

Because we see the cellulosic biofuels industry as one that is ready for commercialization, our policy priorities are aimed at providing the necessary opportunities and incentives to enable this commercialization. Some of these are feedstock-specific policy priorities while some are more general. The reason for the feedstock-specific priorities and the reason I want to emphasize those today is because within the area of commercialization specific policies, we think the feedstock end of the value chain has been somewhat overlooked.

So in the category of feedstock-specific priorities, the first is feedstock pilot or demonstration programs. Most growers as of today have not had much, if any, experience growing dedicated energy crops. Of course, there are some notable exceptions here in South Dakota. But for this reason, we propose pilot or demonstration scale programs aimed at providing farmers with the opportunity to become familiar with growing these crops. There are many existing proposals for what this kind of program could look like, so we have not chosen to put forth yet another; rather, we would simply offer the guidance that these programs will be most effective if the farmers being given the opportunity to grow dedicated energy crops are farmers that are likely to be called on by some of the first biorefineries to actually provide feedstock to those biorefineries.

The impact of these programs could also be optimized by having enough feedstock grown in a sufficiently concentrated area to allow the study of harvest, transport, and storage logistics for that area, as these logistics will vary substantially by region and by choice of crops. For these reasons, we would recommend that these programs be done in areas where a biorefinery company has expressed an interest in siting a biorefinery.

The second program I want to mention is something we call transitional assistance. For perennial crops such as switchgrass and miscanthus, growers will not achieve a full yield in their first year of cultivation. Depending on what region of the country the grower is located in, the first-year yield achieved may or may not be sufficient to warrant harvesting. The issue for the grower, therefore, is the year of lost revenue on those acres. In order to facilitate adop-

tion of dedicated energy crops, we, therefore, propose a program that would provide transitional assistance to these growers in the form of compensating them for their year of lost revenue. This is a program that we would envision existing as the industry is getting started. We expect that our breeding programs will continuously improve first-year yields so that this opportunity cost declines over time.

The third thing we would recommend is a crop insurance pilot program. As the cellulosic biofuels industry develops, we believe it is of critical importance that dedicated energy crops not be disadvantaged relative to other crops in terms of the safety net that the Government provides for these crops. This safety net can come in a form similar to existing crop programs, or it could be substantially different. The goal must be to allow growers to make decisions about which crops to grow based on market forces, not based on which crops are or are not supported by Government programs. Toward this goal, we suggest a pilot program to begin collecting the data that will be necessary to enable a program like crop insurance for dedicated energy crops. The objective of this pilot program would be that by the 2012 farm bill the necessary data will have been collected to enable the rollout of a crop insurance program for dedicated energy crops.

So now I will switch over to some of our more general policy priorities. The first of these has already been mentioned by a couple of the panelists, which are grant programs and loan guarantees related to cellulosic biorefineries. We are supportive of these programs, and we think that they will really help to foster the construction of the first commercial-scale biorefineries, and we would hope that additional programs of this nature will be forthcoming to help hasten the growth of this industry.

The second thing, which was also referred to earlier, is the Commodity Credit Corporation's Bioenergy Program. So we support the proposal that was made by the USDA that a program similar to the CCC program that existed in the early days of the starch ethanol industry be created for the cellulosic biofuels industry. As with the starch version, this program would help make biorefinery startup and expansion more affordable and easier to finance by covering the cost of initial feedstock in the first year of biorefinery operation and incremental feedstock used to increase capacity in subsequent years.

The final thing I am going to talk about is one of our most unusual ideas for getting this industry going which we call ''renewable reserves.'' So as was demonstrated by Shell's restatement of reserves in 2004 and the resulting decline in their share price, the market capitalization of the oil majors is determined, at least in part, by their proved reserves, the oil that they can show that they have the right to take out of the ground. This provides an incentive for these companies to continue to invest in exploration because their share price should increase with any new fines. As of today, there is no equivalent incentive for these companies to invest in development of renewable fuels, nor is there a good metric for them to be able to measure themselves against one another in terms of how aggressively they are pursuing biofuels. We, therefore, suggest that the SEC be asked to convene the necessary experts and pro-

mulgate a definition of "renewable reserves" which would exist alongside the definition of "proved reserves." From our perspective, long-term contracts with growers around a biorefinery that give the biorefinery the right to purchase biomass feedstock from those growers are not substantially different from long-term leases that oil companies have on oil fields that give them the right to extract oil from those fields. Creating this definition would have negligible cost and would provide a market-based incentive for oil majors to invest significantly in the development of this industry.

Together, we believe that these policy priorities will greatly accelerate the growth of the industry, so thank you again for providing me with the opportunity to discuss our efforts and policy priorities. We look forward to working with you to help ensure the rapid and successful development of this industry.

Thank you.

[The prepared statement of Ms. Rath can be found on page 66 in the appendix.]

Senator THUNE. Thanks, Anna.

And last up is Dave Nomsen, and Dave, as I said before, is Vice President of Legislation for Pheasants Forever, and this afternoon, as part of our sort of Energy Week activities, we are going to go out into a switchgrass field. And I told my staff when they put that on the agenda this morning that I do not walk into a switchgrass field without a 12-gauge in my hand in most cases.

[Laughter.]

Senator THUNE. But one of the reasons that we have so many good opportunities at recreation in South Dakota is the good work that is done by Pheasants Forever and other organizations like Dave's, and they also have an important part and role to play in this next farm bill and making sure that we have a good, strong conservation title and making sure that the energy and the conservation parts of our next farm policy complement each other and do not work at odds with each other.

So, Dave, it is nice to have you here. Welcome.

STATEMENT OF DAVE NOMSEN, VICE PRESIDENT OF GOVERNMENT AFFAIRS, PHEASANTS FOREVER

Mr. NOMSEN. Thank you, Senator. If you are looking for a few extra friends to come along this afternoon, perhaps we could join you.

[Laughter.]

Mr. NOMSEN. But perhaps better yet, perhaps next fall at some time.

Senator THUNE. There you go. It would be legal then.

Mr. NOMSEN. Yes, it would. For the record we should point that out, yes.

Senator I am very pleased to be here today representing Pheasants Forever, and I thank you so much for your starting point where you talked about conservation and wildlife as a critical element, as part of the dialogue, as we do move forward in this area, as the science behind this points out, of biofuels, South Dakota's next frontier.

A few weeks ago, a group called the Great Plains Institute released a report, and let me just read the brief conclusion in that.

The research outlined in that report, they suggested that sustainably produced biomass, particularly native prairie grasses, well adapted to the Great Plains, can make a significant contribution to our country's energy and material needs, and I certainly concur with that recommendation, and we look forward to being part of the dialogue as we develop and enhance and take a look at the new road that we are going down in terms of cellulosic biofuels.

It all started in perhaps January of 2006 when the President said the word "switchgrass"—and you must have great staff because it is close and it is right here, and I thought about those roosters that are busting out of this. But the President mentioned the word "switchgrass" as part of the State of the Union address, and a lot of people kind of scratched their head and said, "What is the world is that?" But about 2.5 million pheasant hunters around the country knew exactly what he was talking about, and switchgrass is an incredible native grass that does have tremendous opportunities to produce both wildlife habitat and energy needs. So it is an exciting time to move forward here.

I would like to think that we have gone a little further than—Paul Harvey the next day called it "weeds" on his particular show, but since then we have had great discussion about the opportunities, and it is great to see all of the different native grasses around the room here this morning.

I had an opportunity last Friday to present some of the conservation priorities to Secretary Johanns while in Washington, and I would like to attach a copy of that particular letter that we gave him to my testimony for the record. There were a number of elements on there. As you might suspect, the conservation community is very anxious to reauthorize and continue 20 more years of the successful Conservation Reserve Program. It has been an incredibly successful program, and we certainly want to see that continue as one of our top priorities.

In the area of biofuels and renewable energy, we talk about research and development funding and how that should promote the next generation of biofuels and renewable energy technologies. Based upon sustainable polycultures that are consistent with fish wildlife, soil nutrient management, water conservation goals, the taxpayer investment in conservation and wildlife gains that we have accomplished in the last 20 years should not be compromised or sacrificed as we go through this process.

We also talk about a number of elements in our testimony, Senator, that talk about things that perhaps the wildlife community can offer as we do develop planting and harvest and management strategies for these biofuels. If you look to the wildlife community, and particularly the State wildlife management agencies, groups like Pheasants Forever and Ducks Unlimited, groups like that have decades and decades of expertise on planting switchgrass and other native grasses, how to establish them and how to manage them appropriately for wildlife. So we really think we have something to offer at the table as we talk about this particular area.

Native grasses have an incredible deep-root system that can protect and enhance soil productivity while protecting and improving water quality. Wildlife benefits, of course, are going to depend upon the species planted, the different harvest and management sce-

narios that are put in place, and landowners can potentially benefit from revenue from the sale of biomass, carbon credits, recreational opportunities associated with those habitats, seed sales. Certainly entire communities can benefit from sustainable next-generation biofuels if wildlife objectives are built into those particular programs.

So on behalf of Pheasants Forever and our entire community, I want to thank you again for asking us to join you on this panel at this hearing this morning, and we look forward to continuing the dialogue so that we can move forward in a positive manner that has new generations of biofuels that are very much compatible with soil, water, and wildlife objectives.

Thank you very much.

[The prepared statement of Mr. Nomsen can be found on page 62 in the appendix.]

Senator THUNE. Thank you, Dave.

What I am going to do now is I am going to ask a couple of questions of some of our panelists for purposes of building the record, and also to get a little discussion going, and then what we will do is open it up at some point here to some questions and some interaction with those of you in the audience that would like to ask questions. And I think they have microphones. If not, the room is not all that big. We should be able to hear from you. I see we do have microphones in the back.

But let me just start by posing a question that I think I can maybe start by directing to Kevin, and then anybody else on the panel that would like to respond to it. But you have done a lot of research already with the Sun Grant Initiative, and I guess I would like to know what is the potential, South Dakota's potential, for producing cellulosic ethanol, what are the biggest obstacles to reaching that potential, as just sort of a general question. And I do not know, maybe this is not a fair question to ask at this point, but perhaps Don or Jeff or somebody could take a shot at this, too.

But if current law is unchanged, how much cellulosic ethanol would be produced by, say, the year 2012? What is our capacity? We talked about corn, sort of the cap is somewhere around 15 or so billion gallons annually. We could very quickly approach and reach that. Cellulosic we hope is online by then. But just generally speaking, I guess, how does South Dakota fit into this? What is our capacity? What are the biggest obstacles to reaching our potential? And how much is realistic if we look down the road another 5 or 6 years? Kevin, do you want to start?

Mr. KEPHART. Well, Senator Thune, you have made comments in the past that you feel South Dakota is the Saudi Arabia of cellulosic energy, and I guess I would agree with that. The basis for me to say that is we are in the heart of what was once the Tall Grass Prairie. So we talk about these native grasses that we have here before us; the greatest production potential was exhibited here in eastern South Dakota, western Minnesota, much of Iowa, as you move toward the Jim River and the Missouri River drainage. So I believe that we are in the heart of what the country has as a potential resource for feedstock production.

I do not have an answer for you specifically for South Dakota for what our tonnage production might be. A lot of that would be just

forecasting, because what was once the Tall Grass Prairie is largely into small grains, row crops, agricultural production now. But a number that has been forecasted by our friends in the National Corn Growers Association—they have done some forecasting for the region. They feel that from a combination of starch, oilseed, and cellulosic feedstocks, in the North Central Region alone we have the capability in a few years of producing 65 billion gallons of renewable fuel, just from our crop resources, our crop residue resources, potential for where grasses are grown, and you say switchgrass or marginal land, CRP or marginal lands, as well as biodiesel production from agriculture.

So that might be a high-limit potential that we have before us from, I would say, Indiana and Illinois, going over to Montana, in that area, 65 billion gallons, and it would be significantly higher than that as we look at the Southeast and the South Central Regions.

Senator THUNE. For those of you who cannot see this, this is corn stover ground up, this is switchgrass ground up, and this is blue-stem grass ground up. And I guess with reference to that, in your research are there any of these particular biomass products that work better for cellulose? Do we have enough data now to be able to determine which is going to yield the biggest result and return?

Mr. KEPHART. Well, as we work on feedstocks, we do not believe that any single species is going to be a silver bullet or any single resource will be a silver bullet as we help to make this industry grow. Certainly some of our strengths are going to be on crop residues, particularly from small grains such as wheat and from corn stover. Those are going to be valuable resources for us to use carefully because as we remove those annual residues from the soil base, we have to be mindful of the impact that will have on conservation and soil organic matter.

As far as these perennial resources go, if we think about, once again, the Tall Grass Prairie and the productivity that that resource had, it came from—it evolved as a mixture. I believe that mixtures are going to be important for this, especially from a sustainability point of view. If we have a mixture of grasses out there, much like how the CRP evolved, you are going to see years where the switchgrass component is going to be dominated in years that are favorable to it. But if you do not have that big blue-stem out there to take advantage of those years where big blue-stem could dominate, then you are losing out in production capability and actually putting the industry at risk. So to help minimize risk in the system for perennial feedstocks, I believe that mixtures are going to be a very important component to that.

One other component I want to touch upon that we need more effort here at SDSU but is being done elsewhere at other land grants are trees. There are research programs in hybrid poplars, hybrid willows, and with that, we have heard mention of a concern that I share of delivery of feedstock to the industry. One thing we can do with trees is store them on the stump. We can store trees and harvest them as needed and deliver to the processing facility year-round and not be reliant on a single-year harvest system.

Senator THUNE. Jeff or Don, any comment on your research? I know you all are very much into the middle of this as well. And

then the second question, limitations or barriers that you see out there that would limit our ability to take full advantage of what cellulosic ethanol might mean for us.

Mr. ENDRES. Sure, I will give a shot at the capacity, and then, Jeff, we will see how we compare notes.

I think in the next 24 months we will see successful pilots producing cellulosic ethanol, so kind of 2008 and 2009 will be piloting years. And then I think we start construction, so I think within the next 5 years you will see commercial-scale facilities running. I am just estimating today maybe there are ten companies that get there, and I think those first plants will be—you know, and this is all just guesstimating—25 to 50 million gallon facilities to start off with, again, thinking back the way the ethanol industry has developed. So that gets you in the 250 million to 500 million gallons per year operating.

Beyond 2012, though, I think what is most important will be the direction, so the number of facilities then that are under construction. So we pilot, we build, and once those are built and perfected, then I think you are going to see an exponential ramp. That is where it gets very interesting. That is where I think we could see very large amounts of biomass, ethanol be produced. So that is just a guesstimate.

Jeff?

Senator THUNE. The facilities initially, though, you are thinking 25 to 50 million gallon——

Mr. ENDRES. Yes, that is kind of where I see it, today at least.

Senator THUNE. All right.

Mr. FOX. Thank you, Senator. It is very interesting because I do not think any of us in the corn ethanol business today, 5 years ago thought we would be where we are at. How quickly it develops is going to be very interesting. I agree with Dr. Kephart. It is going to be a combination. It is not going to be just one feedstock.

I spoke earlier in my testimony about cellulose from corn stover because that is what we are familiar with. There are other companies that got the DOE grant, and there are a variety of different materials that they are using, which I think is good. It is geographically spread out. It is different species of biomass that they are going to use.

I just pulled this. This is an estimate of what is available. You will not be able to see this, but, Senator, I have got the slides. I will submit them to your staff with the testimony.

Senator THUNE. Okay.

Mr. FOX. But I will just read it to you really quickly. Corn stover is 75 percent. This is the biomass from agriculture production. I do not think this includes switchgrass, but it is everything else you could pull off: wheat straw, 11 percent; other small grains, 6; other crop residue, which may be—I do not know their definition on that. It says 21 percent. And then corn fiber, which we talked a little bit earlier about, taking off corn, is another 6 percent.

It is kind of a pie chart, and then they have another one that we have pulled together that shows stover being number two, hemp being number one, switchgrass being number three, and we will put that into our testimony. It is going to be a challenge. Today, right now, and as we refine our techniques and other companies

are doing the same thing, and universities, to get better at it, if you had to make it today, it is not competitive. We have got some work to do. We have got to increase our efficiencies, and I think we will. I think you see that in the corn starch to ethanol production. We have all gotten more efficient. Plants have gotten bigger. The technology has gotten better. We are just kind of starting—I do not want to say we are just starting. I know our company has been at it for 7 years. The universities may have been at it longer than that in trying to get the breakthrough on cellulose. But I think with things like the grant, Senator, that you and your staff worked hard on, and others, I think with the things that are coming together, ethanol has come of age.

I think there was one that was brought up by Anna, a very good point, and we struggle with it and we are still struggling with it, and that is, the collection, storage, and delivery, be it corn stover or be it switchgrass. That is a huge amount of material to even get 25 million gallons produced from a plant.

So that is going to be a challenge for us. We have been working with the likes of John Deere and other manufacturers, and I know others are doing it. But I think it is one that not only this industry is up to, but if you look at the people who helped put this industry together, Senator, with Government, with ingenuity of their own, we will figure it out. We think we will get there.

Senator THUNE. Let me ask you as a follow-up, because you in your testimony had indicated that the Federal Government ought to provide like a $50 incentive per dry ton of biomass delivered to the gate of a biorefinery. I do not know if there was any—how you arrived at that number, why that is significant in terms of making this thing go. And you just alluded to some of the issues of storage and transportation and that sort of thing, but how did your company come up with that number?

Mr. FOX. My title is "Legal and Governmental Affairs."

[Laughter.]

Mr. FOX. That $50 a ton was the number we came up with almost a year ago. Look, we are going to be asking in our process—and I am sure in others—corn farmers for the first time ever—their fathers did not do it, their grandfathers did not do it. We are going to be asking them to do something they have never done before at a very, very busy time in their farming operation, and that is, handle another material. They are going to have to make some investments in equipment. They are going to have to make some other investments in storage and transportation.

So we are asking in our plant—and I can only refer to that because that is what we have been doing the research on. We are asking them to change the way they do some things, add some capital investment—to do what? To deliver a material to a plant that is the first of its kind. And so how long is that investment good for?

So we suggested in our testimony—and we testified earlier in D.C.—$50 a ton. We have looked at that as being $100 total. That gets the incentive for the farmer to invest in his equipment, invest in the transportation and storage, and make the delivery to the plant. They do that better than we do. We know how to make ethanol, but we do not know how to deliver that material and handle

it like they do. They have done it their whole life. It is just a different way of doing it.

We have looked at it since, Senator, and what we are looking at is maybe it is a match with a $50 cap. We do not think it needs to be there forever. We think once the pioneers, those that first do it, get better at it, the cost will come down. There will be some stability in the market so that they know that if they do make this investment, the plants will be there to use it so it does not become a short-term painful experience but a long-term beneficial one for both the producer and the plant.

Now, we may be wrong on that, but our numbers showed early on it would take $100 a ton to get them to do the investment, deliver it, get it there. We have backed off that. We are looking maybe at changing our position on the $50 to maybe cap it and make it a match with the plant. The plant pays $30, the Government would pay $30, for the first couple years, maybe for the first few plants, not just corn stover but other plants. Once you get through that, you can then assess it after a couple years of operation. The reason we looked at this ag bill is because it would be for 5 years.

Senator THUNE. Right.

Mr. FOX. We think we will be up and running in 2 to 3 years. That will give our client 2 years. We think others are going to have some of those same time constraints. So this is a good vehicle to do it. And maybe it is a match so that they are sharing it with the Government and you are getting the producer interested in and introduced to a new system.

I can get you the number, the breakdown. We have got that. It is changing a little. It may be 80, it may be 60.

Senator THUNE. Let me ask, as a farmer, Reid, if Congress through this next farm bill were to create a Federal program that encourages farmers to transition to energy-dedicated crops, what minimum payment rate would it take to ensure adequate producer participation? Along the lines of sort of a follow-up to the last question, from an on-the-farm perspective you want to get people to plant blue-stem or switchgrass or even from that standpoint, what is the corn stover worth to you and the effort that would be involved with obviously removing it from the field, storing it, transporting it, all those sorts of things? I know that is probably a hard question to ask, and you are probably going to have to ballpark it a little bit, but it is clearly an issue as we look at this next farm bill and how energy ties into it and making—if we want to go down this road to cellulosic ethanol, we have got to make sure that the incentives are in place to make that happen. And I guess I am—from a farmer's standpoint, what is your sort of take on Jeff's number?

Mr. JENSEN. Well, Senator, I think Jeff is probably in the ballpark pretty close at $100 a ton. If you look at what the value of the stover is as far as the fertility value, we have seen the numbers around $16 a ton on the stover for the NP&K, and then you put baling and transportation on that, pretty soon you are up to $50 to $60 a ton pretty quick.

The concerns we have as far as South Dakota Corn Growers are concerned is how much stover are we going to take off. I think we

are concerned about future generations. We do not want to be mining our soils. I think it is going to depend on the rotation the farmer is in. If he is in a corn-soybean rotation, I do not know if he will take any stover off. If he is in a corn-corn rotation where he continues corn, he probably could see maybe 40 percent.

Mr. FOX. Senator, if I could, and it fits with what Reid is talking about, our proposal in our plan is to take 25 percent of the stover. We kind of got that number from USDA working with them and trying to make sure that we did not take everything off. They claim if you go corn on corn, you could probably take more. But Reid is right. You have got to make sure your soil stays stable. In some areas it may be more, in some areas it may be less. That is the number we have put into our proposal, and we think that is—it will not be maybe a universal number, but that is a pretty solid number.

Mr. JENSEN. And fertility, I mean, just because you take $16 an acre worth of fertility off or fertilizer off of that in the form of stover does not mean you can go back and just put $16 worth of NP&K out there and replace it. It is like Kevin was talking, it is organic matter that you are concerned about.

The other thing I would say as far as comparing switchgrass versus corn stover, whatever we are doing, I think the market has got to dictate what we are doing, not the Government payment.

Senator THUNE. How much ethanol can you produce from a dry ton of biomass?

Mr. KEPHART. The general rule of thumb when the technology matures, it will be 100 gallons per ton.

Senator THUNE. A hundred gallons per ton.

Mr. KEPHART. A dry ton. I do not think we are there quite yet, but a lot of that will hinge upon whether we are taking a fermentation approach or there are other approaches that are being worked on by industry and universities using gasification of pyrolysis techniques. The advantage of that is that we can utilize the lignin that is part of this, and with fermentation we cannot.

I want to join in on some of this discussion about value of the feedstock, and that is dominating a lot of the discussion that we are having with the Department of Energy, and I want you to be aware of that, Senator Thune. The Department of Energy and OMB and the White House, their target figure for feedstock value is $35 a ton, and I am not really sure where they got the value, but they break that down as $10 of expected profit to the producers and then an overhead charge of delivery and other overhead costs of $25 as it is delivered to the processing gate.

So their target that they are struggling with to help get the industry up and going from their point of view is $35. Then after 3 or 4 years——

Senator THUNE. And you said that is USDA?

Mr. KEPHART. Department of Energy.

Senator THUNE. Oh, DOE, okay.

Mr. KEPHART. The Department of Energy's target is $35, and after 4 or 5 years of maturation in the industry and creation of demand for feedstock, then it will rise from there.

Senator THUNE. One of the questions that—or Dave Nomsen, I should say, in his testimony raised the issue of mixed stands of

grasses, and I think you alluded to this, too, Kevin, or someone did, about rather than a monoculture of one type of grass, what would be better in terms of benefiting wildlife and preventing soil erosion, and I guess the question—and maybe, Anna, you could take a stab at this. But when you are producing ethanol from a mixture of prairie grasses, is there a concern about the quality and the consistency of ethanol produced from this type of a feedstock, if you have got those all integrated in a typical field like you would find them in their natural state in South Dakota.

Ms. RATH. Sir, once you get to the ultimate fuel molecule, that fuel molecule will be the same, regardless of the feedstock that it came from. The question is how will you affect the conversion efficiency of the process by having a mixed feedstock rather than a more homogeneous feedstock.

And so what we would suggest is that, as with all things in cellulosic ethanol, there is not going to be a single answer here. On more environmentally sensitive lands where having a mixed stand can really provide benefits for the kinds of wildlife that inhabit those lands, that may absolutely be the right choice. On lands where what you want to do is absolutely maximize your yield of biomass tons per acre in order to maximize the farmer revenue from that and minimize the transport distance around your biorefinery, over time the industry will improve some of these crops more than it will improve others. And eventually you will see three-, fourfold yield in some crops, and it just will not make sense in most cases when you are going for this high-intensity cultivation to try to mix those very intensively cultivated crops with others.

Having said that, we do research together with the Noble Foundation in Ardmore, Oklahoma, where we look at a number of different intercropping strategies, including nurse crops, using other crops along with switchgrass to get them started, and including intercropping with legumes to provide a little bit more nitrogen to switchgrass.

So there may be some applications, but as a general matter, we think you move towards high-yielding, individual dedicated energy crops on the highly cultivated lands.

Senator THUNE. And as a sort of follow-up to that, your company is currently producing transgenic switchgrass seed that would substantially boost the biomass per acre.

Ms. RATH. Sir, transgenics are a ways away.

Senator THUNE. Okay.

Ms. RATH. Transgenics are about 10 years away, but we are working on increasing yields, initially through breeding, and then eventually through transgenics.

Senator THUNE. Through transgenics. What is the potential for that kind of an increase in a semiarid area like the Northern Great Plains? What you are talking about doing, is that—and is that level, if you increase those levels through that technology and eventually through transgenics, is that sustainable over a long period of time?

Ms. RATH. It should be sustainable, yes, as long as over the course of your breeding program and over the course of your transgenic development program you are not using sort of nitrogen as your crutch to get to your increased yields. In fact, some of the

leading traits being developed for second-generation biotech in corn include things like nitrogen use efficiency and drought tolerance, and a lot of these kinds of traits are things that Ceres has helped to develop.

So we expect that as we are improving yields of these dedicated energy crops, we are also, in fact, improving some of the agronomic traits alongside of that, and so hopefully at least maintaining the same kind of environmental footprint, and perhaps even improving that footprint.

In terms of yield potential, I would say the sky is the limit, but I think the thing that we can do is look back at the history of corn yield improvements where we have seen, since the creation of the first hybrids, fivefold improvements in corn grain yield over the past 70 years. And so what we see is we have now got all of the technology that was used to do that ready to apply to these dedicated energy crops, so there is no reason why we cannot do similar-fold improvements in yield in an even sort of shorter time horizon by deploying these technologies that we now have.

Senator THUNE. Let me ask, and, again, this is probably just directed at the panel generally, and maybe Dave could take the first whack at this, but there has been some discussion—and I have asked this question at hearings in Washington of Department of Energy and USDA officials about the CRP program, because the CRP program already we have over 1 million acres in South Dakota. We have been as high as 1.8 million. I think we are down to about 1.5 million now, and there is a concern that people are going to be pulling acres out of CRP and putting them into corn production for ethanol because you now have a corn price that is pretty favorable for the economics of that.

But if you have got a CRP program that has been effective and working in terms of wildlife production and conservation and preventing a lot of the erosion, the environmental benefit that comes with it, if you were going to look at harvesting for energy production, some of these CRP acres, can the energy production objective of that complement or coincide with the conservation benefit? Can you accomplish both of those so that a lot of the—and I guess what I am thinking is, you know, you want to keep a certain amount of base acres in that CRP program for wildlife production and all the other things. There is a lot of land in South Dakota that should be in CRP and probably should not be in production. But would either upping that and providing a farmer who perhaps maybe does not have land in CRP today, increasing the acreage limit on CRP, to put into CRP to increase their overall tonnage that could then be used for—certainly some of it would be used for harvest. Do you still get the conservation benefit from that? And I know it is always when you get into increasing CRP acreage, it cuts both ways here in South Dakota. A lot of your small-town Main Street businesses do not like talking about additional CRP acres. I understand that. But I guess I am trying to ask this in sort of a macro sense about that program and its application to the growth in cellulosic ethanol and how those might interact.

Mr. NOMSEN. Senator, let me start by just saying that we think CRP is part of the solution—it is not part of the problem—to all of this. For example, as I listened to some of my colleagues talk

about removing corn stover and raising concerns about protecting soil productivity, in my mind I was thinking about, Gee, I wonder what it would look like if we had a native grass buffer around each of those fields and grass waterways, and that we were doing things that perhaps could be very strong for water quality but also potentially provide a biofuel.

The challenge that we have is to do it, if you are going to do this within the CRP program, I think very strongly that you have to protect the soil, water, and wildlife objectives of the program.

Now, having said that, we do try and do mid-contract management on CRP acres, and CRP acres, like any other crop out there, need to be managed to effectively maintain its productivity.

But my main answer to your question is we do not know yet, and we need to take a look at where the possibilities are for compatibility here and additional benefits into the program.

Let me finish. I would like to build upon a comment that Dr. Kephart mentioned when he talked about mixtures and encouraged moving toward mixtures of grasses. That is exciting to the wildlife community when we hear that type of statement because not only do we think it can potentially provide a more stable, sustainable system for the grower, the minute you move to a more mixed-grass stand of grasses and perhaps flowers, different forms that are in there, all of a sudden you are talking about much better wildlife habitat than you would with any type of a monoculture.

Senator THUNE. Okay. I want to—go ahead.

Ms. RATH. Could I just build on that? As it relates to the CRP program, two things. First is we want to make sure that everybody thinks of the CRP program as a possible piece of the answer to where we get all this biomass from and not as the answer to where we get all this biomass from, because if you are out to build a biorefinery, what you want to do is put it in the location where you are going to be able to get as much biomass as possible within as small a radius as possible. And so it is very unlikely that that is going to turn out to be an entirely CRP area, right? You are probably going to want some very productive land in mind to get some very high biomass yields for your biorefinery.

Having said that, we have actually submitted an earmark proposal together with Ducks Unlimited this season to try to do a large-scale, a large-acreage switchgrass study in North and South Dakota to look at whether, in fact, you can sort of have your cake and eat it, too, whether it is possible to harvest biomass for biorefineries, but still maintain wildlife benefits and carbon sequestration benefits. And so as part of that we would look at different harvesting practices and measure all of these, measure the wildlife impact and measure the carbon sequestration impact to try to actually come up with a good understanding of how this should all look.

Senator THUNE. Well, if you hire SDSU to do it, then we will support that grant request.

[Laughter.]

Senator THUNE. This would be, I suppose, probably—I know that the corn growers and both VeraSun and Poet have submitted a lot of policy—actually, everybody on the panel I think has submitted policy suggestions for the 2007 farm bill. But I guess I would like to ask this question, and, again, I know that this is probably a fair-

ly difficult question to answer because there are a lot of things that tie into successful policy initiatives that lead to further advancement and growth of the ethanol industry. But if you could rank or prioritize what is the most important thing to see this industry really continue to grow—because we have talked—there are lot of things that have been mentioned today—E20, maybe E30. I mean, we went to Watertown yesterday, and they have got E20 and E30. We filled up with E30 at the station up there in Watertown. And, actually, some of the work that has been done by Lake Area Tech shows that you get better fuel efficiency at a higher blend than you do at E10. And they have done a lot of analysis of that, which I found fascinating yesterday.

I guess, you know, going to E20 is one thing. Increasing the Renewable Fuel Standard has been talked about as another thing, and the President talked about 35 billion gallons of alternative energy as a goal; of course, the tax credit, tax incentives that are currently in law, the tariff on foreign imports, that sort of thing. So, again, it is not entirely—I would think it is a difficult question to answer, but I guess if you could sort of narrow that down, Don and Jeff, as to what you see as the most important policy priority for the Congress, for people in Washington who want to see this industry continue to take off and explode to that next level, your thoughts about what we ought to be doing?

Mr. ENDRES. Sure. Well, we think about this a lot. In fact, we are convinced that increasing the blend is the most important thing we need to accomplish. As you look—and this is important for cellulose; it is important for corn-based ethanol. With 6 billion gallons under construction, with 5.6 to 6 in operation, that gets you to 12; with the 10-percent blend, 140 billion gallons of gasoline, you can see very quickly within a couple of years we are going to satisfy that demand. So changing that blend allowance is very big, and, in fact, it is not even a legislative function. We find it is really a regulatory function of the EPA, and the EPA, with obviously thorough analysis on emissions, we think the data will be on our side, with the thorough analysis of the safety systems and the fuel management system, and the vapor pressures, I think as we analyze this, we will find that the EPA really with the stroke of a pen can, in fact, allow for a larger blend, whether it be 15 or 20 or 30.

Then I think the free market takes hold here, and the market will help drive this. As we see in Watertown, a significant number of consumers are willing to fuel with a higher blend, and obviously we believe that over the long haul we would see an economic advantage for refiners because they can produce a sub-octane, even a lower-octane fuel blend, a higher rate of ethanol, that will get them to finished-grade gasoline. That dilutes some of the lower-value blend components that they have, so refiners actually are embracing this higher-blend concept.

So we think if there is one thing we could change, if we only had one opportunity for legislative change—and, in fact, this is more a regulatory change—it would be to figure out how to increase the allowable blend.

Senator THUNE. Okay. Jeff?

Mr. FOX. We would probably encourage the VEETC credit being made permanent. Some of us have worked in ethanol since we were

very young. Tax credits, tax policy for any energy source, be it ethanol, be it wind, be it oil, has always been the backbone. And you can attract financing. You can help fund to do the things we need to do if you have tax credit in place or tax policy in place that supports that type of energy source.

Sometimes I think we get a little apologetic and we say, well, you know, we have got a tax credit, like that is a bad thing. That is your Government's direction of what they want to see developed, be it wind, be it ethanol. That is how oil got started.

So I do not think we need to be apologetic about it, but if we had to pick one thing in our industry from our company's standpoint, it would be making that tax credit—extend it, make it permanent, because we can build off everything else if we have solid tax policies.

Senator THUNE. Reid, do you have the Corn Growers' thought on that?

Mr. JENSEN. I would agree with what Don and Jeff said. I think what would do more for agriculture would be being able to go to the 20-percent blend and creating more demand. One thing we have as a position, whether it be cellulosic ethanol or grain-based ethanol, is keeping that blenders' credit the same for either one of those, because we just want to consider ethanol as ethanol and not give one an advantage over the other one.

Senator THUNE. Well, one of the things that I have always—you talk about the tax incentive and people who complain about that. You are absolutely right. I mean, the oil industry benefited enormously from those types of incentives and has over time. And I also think that, you know, when you talk about—is it important as a national priority to become energy independent or isn't it? And if it is, we need to steer our policies in the direction that will develop homegrown energy sources. And to me, when you pay $60 or $70 a barrel for oil to a country like Iran or Saudi Arabia or Venezuela, you are essentially paying a terrorism tax, because they can make money at $30 a barrel. And so we send them an inflated rate for our energy so that they can fund organizations that turn around and attack us. That to me makes absolutely no sense, and so I do not think we have to be apologetic at all for the things that we are trying to do to promote and advance the growth of an industry that will make South Dakota and America more energy independent.

So what I would like to do right now is open it up to those audience members who perhaps have questions or comments. If you would, I would like to try and make sure there is a question there, and I know that there are folks here who probably have strong opinions, and we welcome those two. But we would like to, if we can, get some questions for our panel of experts here.

Mr. JENSEN. Could I just say one more thing?

Senator THUNE. Yes. Hold one. One comment before we do that.

Mr. JENSEN. One other thing we have not talked about is identity theft in the Midwest, and we all know you have been working to help get the DM&E Railroad through, and we all talk about energy independence in this country. But we need that railroad infrastructure to help that come to pass, and we want to thank you for the work you have done on that, and hopefully that will get done sometime.

Senator THUNE. Thank you, and I am sure that is a statement which meets with a mixed reaction in this room.

[Laughter.]

Senator THUNE. Nevertheless, infrastructure is important. It is important to ethanol because ethanol moves on rail, and so you are absolutely right.

Right here.

Mr. JONES. Thank you. I am Owen Jones from Britton, South Dakota. We are the home of one of the first blended pumps put into use.

Senator THUNE. That is right.

Mr. JONES. We have been in operation for 12 months. I would just like to share, before I ask a question, we have 12 months of a spread sheet of the ethanol sales that we have made. The consumer that has a choice prefers 30 percent. That is being documented. And there is a good indication that he may, in fact, like a higher blend. We are selling 40 percent now. We have been in operation for 12 full months. We have sold an additional 24,000 gallons of ethanol by having that blended pump in place.

I think that the blender pumps in the E85 distribution system that will be in the current farm bill need to play a role in that distribution system. And I would urge that Congress give tax credits to get those blender pumps in place.

My question would be: Why do we need to stop at 20 percent? Why not go for a little higher? Or do we need to do this in a step-by-step process?

Senator THUNE. Good question.

Mr. JONES. But the distribution system has to be in place to move our ethanol. Thank you.

Senator THUNE. Well, thank you for sharing your experience. I am familiar with your—I know you guys were the first ones up there in Britton, and it is interesting to get the evidence and the documentation about what people's preferences are and how it is working, so thank you.

Would you want to answer that?

Mr. ENDRES. Yes, I would just comment first of all to say I applaud you in your efforts. I think it is leading edge to move forward and do courageous things, and we are going to have great data back. Anecdotally, at least, we are finding that consumers love it and they want more of it. Whether or not there are issues longer term, we are going to find out. Anecdotally, again, we do not see anything, at least on the horizon.

The reason that 20 percent has been kind of the number that has been most talked about is there is actually data that will become available fairly soon from work going on with the State of Minnesota. The Renewable Fuels Association, with the University of Minnesota, and North Dakota State University have been working on research to provide data to the EPA to show that the emissions are okay—or actually, we believe now they will be improved; that vapor pressure is not a problem. So we need the data, and we have data at the 20-percent blend. We probably should initiate research to look at these higher blends almost immediately. In fact, the industry is working on kicking one off fairly soon that would go to these higher blends as well. But we need data in order—the EPA

will need that information in order to make a fact-based decision versus kind of a ''shoot from the hip.'' But we believe you are on track, that we probably could go to higher levels.

Mr. FOX. Very quickly, Owen, thanks for your documentation. I think now you have been a proponent of that. I think you are on the right track. Blender pumps make sense, because when this issue got looked at—and the American Coalition for Ethanol is doing a study on 10, 20, 30, and then also on flex-fuel vehicles to see which blend works best so maybe we do not lose that mileage in the current engines. This is going to be a combination of working with automobile manufacturers. We have got to get their warranties up. So I think the blender pump makes a huge amount of sense.

When we started looking at this back when Governor Pawlenty brought up 20-percent blends for Minnesota, we started looking for their data for 10 and 85. There wasn't any. So look what we have done as an industry without data backing those two types of fuel up from the inception. If we have got studies like Don has talked about over in Minnesota or ACE's study that is being done up in, I think, North Dakota, if we get data behind it, where the bill today says 20, or we can switch to 30 or something in between, like Don said, the higher blends, that is a number you can change in the bill. I think the fact that the efforts being made to get EPA to start looking at higher blends is just a start, and I think we are going to get there. But I think these studies Don talked about are important. We may have to do more.

That is part of what we get when our industry builds itself and gets strong, because nobody else is doing this. And as we get better at what we do and we bring more people into industry and we make more of our product, we can help fund some of that. The Government can help you so much, but you sometimes have got to step up to the plate, as you know, and put some money in and help. I think it has been a great complement of what we are working on as an industry.

Senator THUNE. I would just add to that sometimes, in Washington especially, things kind of happen incrementally, and I agree with you. I think we ought to shoot for as high a blend as we can get. EPA and the car companies, the auto manufacturers, are pushing back a little bit against it. And Don is right about the clean air. I think that we will find that is not going to be an issue.

The car companies are concerned about warranties and liability, but the more data we present them that demonstrates that the wear on an engine from a higher blend is minimal or perhaps even better than it is on a traditional, I think we are going to win that argument. But I know that they are—we have been pushing EPA to go to 20. Minnesota is going to make a request for a waiver, and we want to build on that. But I do not think we need to stop there. No question about that.

Yes, over here in the corner.

Mr. MITCHELL. My name is John Mitchell, and our big problem is getting the oil companies to accept E85.

Senator THUNE. Right.

Mr. MITCHELL. And I do not know what you can do, but that is where a big problem is, and this is to Kevin Kephart. Can you hear

me? South Dakota State out at the research farm has got to do more research on developing corn that can grow west of Highway 281. That is what we can do something about.

Mr. KEPHART. Well, I can happily say that we are going to be doing exactly that. Actually, we got a phone call last year from Governor Rounds in the height of our drought here saying SDSU needs to focus more on drought. And Governor Rounds, working with the College of Agriculture and Biological Sciences, is setting up a new 2010 center on drought research, working with companies such as Monsanto and other biotech companies, to marry our knowledge of agricultural production and their tools and techniques and biotechnology to do just that. Actually, the dean of the College of Agriculture is in here, and he can elaborate. We are headed exactly in that direction.

Senator THUNE. We need an ethanol plant in Murdo, so I am working on that.

[Laughter.]

Senator THUNE. But your first point is right, and I want to come back, and if you have not seen this Wall Street Journal story—this is, I guess, Monday's issue—you ought to take a look at this. This is what the oil companies are doing to block the installation of E85 pumps at gas stations across this country. Contractually, they are preventing fuel retailers from doing it. They have all kinds of leverage that they apply, and this is part of our problem right here.

Mr. KEPHART. I met with a Vice President of Chevron a couple weeks ago at a meeting I was at, and we talked quite a bit about this. At least in that visit, he was saying he was favorable to moving E10 across the country, but that they were resistant to higher blends.

I have a Ford F150, a 1997, so it is not flexible-fuel, and I am running about 35 percent ethanol in it right now. It has 100,000 miles. He did not seem to be interested in that. He just wanted to go E10 across the country.

Mr. ENDRES. I would comment on where the oil companies are at. Clearly, the integrated oil companies are going to have a tough time with E85. It is 85 percent not their product. If you put yourself in their shoes, it would be pretty hard for you to support a product like that. But I believe they will support this bridge concept of higher blends because they actually can benefit the refineries. So I think we get to the blender pumps out there. They will benefit because they get better production through the refineries with using sub-octane gasoline, and the ethanol industry benefits because we give the consumer the option. So I think we will get there.

By the way, the independent gasoline marketers are a great opportunity for our industry. We probably will not go sell E85 to the integrates, but we can sell it to the independent marketers out there because they are just selling fuel and they just want to make money, and they work for us.

Senator THUNE. We have Orrie and Bill, a couple here, right here and then a couple there.

Audience Member. I would hope that we do not get into debates of E20 or E30. I think we need to——

Senator THUNE. Orrie, why don't you use that microphone?

Audience Member. I think we need to agree that a blender pump infrastructure has to be in place to deliver whatever that higher blend is. And if it is just E20—because E10 is not going to go away. And no retailer is going to put in an extra pump to sell E20.

Senator Craig has legislation—Senator Craig and Senator Dorgan have legislation to increase the incentive for E85 pumps if they are blender pumps. And that incents getting the new E85 structure everybody wants to be blender pumps. And that will be more key to getting cellulosic ethanol into the marketplace than anything, because it will allow the free market to work.

Mr. ENDRES. Orrie, I could not agree more, and what we are finding is it is a great synergy, actually a lower-cost method for rolling out multiple blends, because if you put a blender pump in place, you can use the existing tanks, and the majority of the costs to convert a station is on the tank side, because most of these stations have two gasoline tanks, so what you do is you dedicate one to ethanol, E95, if you will, and the other to 87 octane gasoline. And then you can blend any blend. You can sell a premium. You know, there are a number of blends all with multiple buttons.

So we think that is a lower-cost approach, and we think that incentive should be only for blender pumps.

Audience Member. Yes. I think that is what I am saying.

[Laughter.]

Mr. ENDRES. I am agreeing. I am agreeing.

Senator THUNE. Orrie, I think you may want to sit down while he still agrees with you.

Bill, right here, the front row.

Audience Member. Thank you for hosting this, Senator. It is a great time for agriculture right now. My question relating to cellulosic ethanol is related to what anticipated byproducts will be generated from that process. And what are some of the uses that could add value to reduce the cost of the ethanol produced by it?

Mr. FOX. A great question. I will indicate what we have at liberty, and then maybe let Dr. Kephart speak to it. We are going to take in our plant—and, you know, this is our first commercial. We have done it out in Scotland, but this will be our first commercial. We look at using 84 percent less natural gas. We are going to take the lignin that is left over from the cellulose process, put some stover with it, and burn it in a solid fuel burner. We are using anaerobic digesters. We will use about 24 percent less water. So we think those two things will be a big plus.

From that process of taking the fiber off the corn and taking the stover off, you will increase your yield about 11 percent of ethanol per bushel by taking fiber and use it. Right now fiber is a pass through. It becomes an environmental footprint because it does not get digested an it moves on.

So we think those will be some of the things that we see as a benefit in our process. Different byproducts, a little bit different dried distiller's grain when you go through a fractionation. We call it—what do we call it?—critical HP, which is high protein, because you have taken a lot of things out of it, you leave more protein in it, in your end product. There will be others. There are people working on polymers and some other things that you can do. Oil, taking oil off with it. It is at the front of the process or at the back.

So there are a number of things I think you are going to see out of it. I do not think it is all done yet.

Mr. KEPHART. I think that we are at the very beginning of an evolution that is going to entail different types of conversion processes, and, of course, that impacts the answer to your question. Right now, clearly, the emphasis is going down a fermentation track, so if we think about that track and you look at materials such as this, what you are after in this material, as the title of our session entails, is cellulose. The three main fractions that you have to work with here are lignin, which is wood, and that is not fermentable. Those of you that are cattle producers have been in the cellulose fermentation industry for centuries. And the hemicellulose is another one that also has limited fermentation characteristics.

So a liability in this whole thing, and as a co-product that will be coming off, is lignin. There is a well-renowned scientist at Michigan State University, Bruce Dale, and he says you can make anything out of lignin except money.

[Laughter.]

Mr. KEPHART. So I view lignin as a liability in a fermentation track, although you can take advantage of it by combusting it to try to capture heat and use that heat or that energy to power other segments of your fermentation process.

As we look down the road, however, as I mentioned earlier, there are processes that are called gasification or fast pyrolysis. Fast pyrolysis will take material such as this, or rubber tires or other organic material such as that—it shot timber there—and it creates a liquid. And I am excited about that because we could have—if we can develop these liquification facilities across the landscape at low cost, low capital cost, actually we can be transporting that liquid to biorefineries, high-capital, more centralized biorefineries, rather than transporting just large round bales or big square bales of biomass to those facilities.

So a liquid approach takes care of two things: it captures value out of the lignin fraction, and it helps with this huge, huge transportation issue that we have to deal with to get this industry going.

From that point, we can make all kinds of things, just like we can make all kinds of things out of petroleum right now. There is some of that liquid that is fermentable. Some of it we could be making plastics out of or lubricants, the whole host of things that we can do with petroleum right now. And that is much further down the road, but I am especially excited about that as an approach.

Ms. RATH. Can I just mention that, in addition to the co-products that can come out of the process themselves, since Ceres was the recipient of two of the 17 joint DOE–USDA biomass R&D grants this year, one of those was simply to double switchgrass yields, but the other one was a grant that we submitted together with one of the major specialty chemical companies to actually work on producing one of their major monomers directly in switchgrass as something that could be extracted at the beginning of the process in order to improve the overall economics.

So I think you will see co-products that are generated both from the process, from fermenting to other molecules or from refining to

other molecules, and also the engineering of some co-products right into the plant material itself.

Mr. ENDRES. I would just say one of the benefits of the thermochemical route, which is this gasification approach, is this will literally break down material to its very basic components, carbon monoxide and hydrogen, and then you can reform that into all kinds of different chemicals, including fuels.

So I think there are a number of tracks even within the biological approach and thermochemical approach and we are just too early. What we need to do is evaluate what the best economic paths are, best returns on investment. And we just do not know. We do not know yet. We have to run some models, do some tests before we know what the right product mix should be.

Senator THUNE. Okay. Maybe one more question. Back here, yes?

Audience Member. Thanks very much for having Brookings as your venue.

Anna, I was interested in the testimony that you provided on extending the oil reserve credit to renewable fuels, and I was wondering if you could maybe just talk a little bit about how that might affect the politics of the situation with biofuels and bioenergy.

Ms. RATH. Well, the hope is that what you would do is turn ethanol into something that is, in fact, a product of the oil majors rather than something that is not their product, and by doing so put them on the right side of the battle of promoting ethanol. And so the idea here is that you would—you know, they have an incentive to invest in fossil fuel resources because they have this thing called proved reserves and they get credit for that in the form of their stock price. The idea would be to give them an equivalent incentive to invest in renewable reserves. And so the concept here is if you have a contract with the growers around your biorefinery that lets you take the biomass from—buy, let's you purchase the biomass from those growers and bring it to your biorefinery, from our perspective that is not very different from having a lease on an oil field that lets you take the oil out of the ground. So we see no reason, especially in the world that we are in today, where people are thinking about expanding the definition of proved reserves to include non-traditional fossil fuel sources, like tar sands and oil shale, we see no reason why we should be, you know, expanding the incentive for the oil majors to invest in fossil fuels but not creating an equivalent incentive to invest in renewable resources. So that is the concept.

Senator THUNE. I really like that idea. Another 20 or 30 years, we will probably get it through Congress.

[Laughter.]

Senator THUNE. Well, I want to thank you all for attending, and I appreciate your participation, your input, and your leadership on this issue. I particularly want to thank our panelists and South Dakota State University and Dr. Kephart and his team for allowing us to be here today.

As you can see, there is, I think, a lot of interest and a lot of opportunity for South Dakota in the renewable energy area. We did not even talk about wind today, but there are some good things happening with wind technologies as well. But the folks up here

are very much at the forefront of what is happening nationally, and like you said before, this is good for South Dakota, but it is good for America. It is the right thing to do for our country and our national interest, our national security interests, our energy security interest.

And so if you have additional comments or input that you would like to provide, feel free to do that. As I said before, we have received testimony from organizations that are not up here in front today but, nevertheless, want to have their statements on the record as we begin deliberations on the 2007 farm bill. But we welcome all that input, and we will keep the hearing record open until April 9th of 2007.

With that, this hearing of the Energy Subcommittee is adjourned. Thanks.

[Applause.]

[Whereupon, at 11:57 a.m., the Subcommittee was adjourned.]

APPENDIX

APRIL 4, 2007

Statement of Don Endres
CEO, VeraSun Energy

"The Next Frontier in Bio-fuel Production"
Hearing of the
United States Senate Agriculture Committee's Subcommittee on Energy, Science, and Technology

April 4, 2007

Senator Thune, I appreciate the opportunity to testify on behalf of VeraSun Energy today.

Ethanol Industry is a Success Story

Clearly, the expansion of the ethanol industry is a success story in terms of helping to decrease our dependence on foreign oil, reducing greenhouse gases, and creating economic development in rural America. But we are just beginning.

We believe the ethanol industry can and will respond to the President's call for 35 billion gallons of renewable fuel to be produced by 2017. Even though cellulose ethanol holds great promise, we believe corn-based ethanol will contribute substantially to satisfying this goal.

In order to ensure the industry continues to expand. The Federal Government should focus efforts on **growing the demand** for renewable fuels. Near-term efforts should be focused on increasing ethanol's use as a blend component to support the rapid growth of the industry. Long-term efforts should focus on policy to help us transition to E85.

Near- Term – Increasing Blends beyond 10%

The Federal Government has succeeded in spurring ethanol production in the United States through the combination of the Renewable Fuels Standard and the Volumetric Ethanol Excise Tax Credit (VEETC). We believe maintaining the blender's tax credit and keeping the secondary import tariff as an offset to VEETC are important short-term drivers of demand.

VeraSun also believes that a 20% blend of ethanol or "E20" provides a catalyst for transition from ethanol as an additive to gasoline to---ethanol as an alternative to gasoline. E20 provides the near-term demand driver that will be critical to achieving the longer-term objectives of E85 and robust cellulosic ethanol production.

Today, less than three percent of the vehicles on the road are E85 compatible. In order for E85 to develop at a sufficient pace under today's law, significant near-term mandates would need to be imposed on automotive companies and fuel retailers. We believe this can be more successfully accomplished over a longer period of time with incentives rather than mandates, if there is support for the development of a nationwide E20 market.

Specifically, E20 would double potential ethanol demand in the current blend market. This change will not only foster our energy independence by displacing gasoline, but also will provide incentives for the ethanol industry to continue to grow while we work to develop a nationwide E85 market. By transitioning from E10 to E85 through E20, we also will ensure the creation of a vibrant cellulosic ethanol industry. This new near-term demand in the

market would help ensure continued investment in research and early-stage development of cellulosic ethanol. Interestingly, Brazil currently sells gasoline blended with 24% ethanol, as well as 100% ethanol to fuel its automobiles--quite similar to the suggestion I am making today.

In order to spur the use of E20 in existing automobile fleets, the Federal Government must do two things.

1. It must fast track EPA authorization of ethanol blends up to E20 as a transportation fuel under the Clean Air Act.
2. It should provide assistance to automakers in making the transition.

I would like to thank Senator Thune for his letter to the EPA requesting a prompt review of the E20 blend.

Long-Term – Provide Incentives for the Development of an E85 Market

By helping create new demand for ethanol through the use of E20, the Federal Government will provide additional time for the E85 market to develop.

As one of the largest ethanol producers, we have worked to insure that a robust E85 market occurs. In the past 24 months, VeraSun has pursued an aggressive strategy in cooperation with Ford and General Motors to increase the availability of E85.

VeraSun's E85 is available today at more than 80 retail locations across eight states. We plan to continue to work to expand the number of fueling stations offering VE85 from coast to coast in 2007.

From this experience, we have gained significant insight on what is necessary to develop E85 in the United States. In order to see a robust E85 market by 2017, the Federal Government must address the following items.

1. Improve E85 economics through the creation of an E85 Blenders Credit;
2. Create an auto incentive for the production of ethanol optimized FFVs; and
3. Increase pump incentives to expand the number of retail stations offering E85.

Currently, the market values ethanol more highly for E10 blending than it does for the E85 market. Allow me to explain; FFV's are currently not designed to take advantage of E85's high octane. Since refiners are able to take advantage of ethanol's high octane to increase refinery output and improve the economics of gasoline production, the product is valued more highly as a blend component in E10.

To improve E85 economics, Congress should create an additional blenders credit for E85 within the VEETC system. In addition, VEETC, including the new E85 incentive, should be extended. By providing an additional credit for blending E85, we will level the playing field and increase the supply of E85.

In addition the Federal Government should also provide incentives for automakers to improve FFV technology. To spur the production of more ethanol-efficient FFVs, Congress should provide tax incentives for

automakers that produce FFVs with ethanol economy comparable to gasoline.

Our experience with VE85 over the last two years also indicates that more must be done to help retailers offer E85. To increase the number of retail stations offering E85, the current incentives for retailers to install E85 pumps – more specifically blender pumps – should be increased.

I would again like to thank Senator Thune for his leadership on the E85 pump legislation co-sponsored with Senator Salazar. Hopefully we will see this legislation move forward in congress in the very near future.

Fostering Cellulose Technologies

We believe the market must see a path toward E85 in order for cellulose ethanol to evolve. The E10 and perhaps the E20 market could largely be served by corn-based ethanol. In large part, the Federal Government's focus on increasing demand for the use of renewable fuels in the near and long term will give investors' confidence in aggressively pursing the commercialization of cellulosic ethanol.

The Federal Government can, and should, do more to jumpstart the commercialization of cellulosic technologies. Specifically, the Federal Government should do three things to help spur the development of cellulose technologies.

1. Increase biomass to ethanol research and development funding.
2. Streamline and increase the availability of Federal grants and loan guarantees for investments in cellulose production facilities.
3. Offer additional blenders tax credit for ethanol produced from cellulose.

Conclusion

We have all worked hard to make ethanol and renewable fuels a huge success story here in South Dakota and in the United States, but no one…. Not VeraSun, or any other producer deserves more credit that our nation's farmers. It is because of our American farmers that we have this opportunity today. There is such optimism and hope for what this industry can do for our communities and our country. We look forward to working with you to chart the course for years to come. Thank you.

Mr. Jeff Fox
Vice President Legal and Governmental Affairs
Broin Companies

Statement Of Jeff Fox Vice President, Legal and Government Affairs Poet

Senate Agriculture Committee Energy Subcommittee Field Hearing "The next Generation of Biofuels: Cellulosic Ethanol and the 2007 Farm Bill"

April 2, 2007

Preamble:

Mr. Chairman and distinguished committee members, thank you for the opportunity to visit with you today. My name is Jeff Fox. I am Vice President, Legal and Government Affairs for the Poet. I would like to talk with you today about financing challenges for the cellulosic ethanol industry. POET – INTRODUCTION Poet, headquartered in Sioux Falls, South Dakota, is the largest dry mill ethanol producer in the United States. Poet, formally Broin Companies, is an established leader in the bio-refining industry through project development, design and construction, research and development, plant management, ownership, and product marketing. The 20-year old company has built twenty-five (25) ethanol production facilities and currently manages nineteen (19) plants in the United States while marketing more than one billion gallons of ethanol annually.

Since 2000, Poet Design and Construction, formally Broin and Associates, has constructed nineteen (19) green field ethanol plants in five (5) states and completed five (5) major expansions of existing facilities. The value of our design build contracts since 2000 has exceeded $900,000,000. Additionally, four (4) green field projects of similar size and scope are currently under construction with several others in development. Each project has been successfully designed, built and managed by Poet. These projects have resulted in the addition of 875 millions of gallons per year (MGPY) of new fuel ethanol capacity.

The Poet development model is unique. It started on the Broin family farm in Minnesota and has spurred the growth of investment by thousands of farmers and individual main street investors. Poet's business model is to invest in, develop, design, construct and manage ethanol production facilities called Premier Partner Plants. However, the facilities are independent limited liability companies (LLC) owned primarily by individuals and local farmers that provide the corn feedstock. Poet employs the facilities general manager and on-site technical engineer. All other employees are employed by the LLC. Poet also has Board of Director representation at each plant.

By leveraging business size and position, Poet has created the most successful and profitable ethanol facilities in the industry. Poet has achieved breakthrough progress beyond ethanol processing, extracting extraordinary new value from each kernel of corn.

COST OF CONSTRUCTION Just 10 years ago, most ethanol plants' capacity was 10 – 15 MGPY. Poet's first plant was 1 MGPY and was one of the largest in operation at the time. Traditional ethanol plants were built in corn producing states which put incentives in place to stimulate investment by farmers and other local main street investors. Incentives stimulated development of an industry at a time when new interest was sparked by technology advancements. Public policy, which was driving these incentives, was sparked by the oil crisis in the 1970's and the clean air initiatives that followed. The cost per gallon to build and fund working capital for these plants was approximately $1.75 per gallon or a total of $20 - 25 million dollars.

Those plants are small by today's standards. Most dry mill ethanol facilities are now designed at 50 – 125 MGPY capacity. The cost of an ethanol plant project just five years ago was ~$1.20 per gallon capacity. Today, the design and construction costs exceed $2 per gallon, reaching upwards of $250,000,000 to $300,000,000 or more to deliver a completed project. The significant increase is due to inflation of construction materials and labor. Most notably are stainless steel, concrete, other metals and qualified, skilled, manpower.

While certain economies of scale can be achieved in the capital cost of construction, it is not as much as you might think due to the volumetric nature of the process and equipment. The most influential cost factor in the success of the operation will be the cost of corn which is strongly influenced by supply and availability near the plant.

Due to additional storage, feedstock and waste handling, and pre-treatment equipment, the cost to expand an existing facility to a cellulosic ethanol facility is approximately 100% greater than a traditional corn-to-ethanol facility. Project LIBERTY, Poet's commercial cellulose project for converting corn fiber and corn cobs to ethanol, will expand an existing 50 MGPY traditional corn-to-ethanol plant in Emmetsburg, IA to a 125 MGPY bio-refinery. Expansion costs to an existing facility are projected in the range of $4.00 per gallon expanded capacity. A cellulose facility designed and constructed on a "green field" site would be substantially greater due to utility and product handling infrastructure.

The following table depicts the design and construction costs ($) per gallon of plant capacity:

Corn-to-Ethanol Facility 1995 Corn-to- Ethanol Facility 2000 Corn-to-Ethanol Facility 2007 Cellulose-to-Ethanol Expansion Facility 2009 $1.75 - $2.00 $1.15 - $1.35 $2.00 - $2.25 $4.00 +

As technology develops and the cellulosic ethanol industry matures, the cost of construction is predicted to go down as long as the materials of construction do not inflate at a greater rate.

Historically, the majority of financing for ethanol plant construction has been accomplished using local individual investment and bank debt financing provided through the farm credit system and a few other Midwestern lending groups. All Poet projects have a strong local farmer investment component, which promotes not only delivery of corn to the plant but ownership as well. Common financing structures require a 40 – 55% equity contribution in the project with the rest provided by debt. Severe restrictive covenants are common; these, together with loan amortization schedules, commonly retire debt in a 6 – 12 year period. This timeframe is exceptionally short for this type of long term asset. Minimal opportunity has existed for the use of federal grants or loan guarantees.

In the last couple of years, public financing and venture capital began emerging with interest in the industry and will play a role in future growth along side traditional and other models.

In terms of financing cellulose-to-ethanol production facilities, success will be achieved using new cellulosic processing technology. To achieve production at commercial volumes, we believe federal grants and the use of properly designed loan guarantee programs will be absolutely necessary to attract investors, creditors and banks. The involvement of these groups is essential in supporting rapid development of these new, evolutionary cellulosic technologies. CURRENT FEDERAL LOAN GUARANTEE PROGRAMS Poet has considered utilizing the three (3) programs below:

• DOE Loan Guarantees for Projects that Employ Innovative Technology in Support of the Advanced Energy Initiative • USDA Business and Industry • USDA Renewable Energy Systems and Energy Efficiency Improvements Guarantee program

Poet has not utilized any of the above loan guarantee programs due to the challenges detailed in the next few paragraphs. Department of Energy (DOE) Loan Guarantees for Projects that Employ Innovative Technology in Support of the Advance Energy Initiative

While Poet has submitted a pre-application to guarantee a $137 million loan under this program for construction of a cellulosic ethanol facility, we see the following challenges to a successful final application and issuance of a loan guarantee:

• §1702(g)(2)(b) requires, with respect to any property acquired pursuant to a guarantee, "the secretary" shall be superior to the rights to any other person with respect to the property. This statutory provision requires DOE to possess a first lien priority in the assets of the project and other collateral security pledged. Therefore any holders of non-guaranteed debt have a subordinate claim to the DOE in the event of default and will not receive payment on their debt until the DOE is paid in full. Since the need for a guarantee is a result of a lender's perceived higher risk, when compared to other lending

opportunities, it will be difficult, if not impossible to obtain commitments for the un-guaranteed portion of the loan, due to the un-guaranteed portions' subordinate position. • The guaranteed portion of the loan must not be separated from, or stripped from the un-guaranteed portion of the loan, or sold in secondary debt markets. To meet this requirement, the lender that originated the guarantee is required to hold the un-guaranteed loan. It is highly probable that a lenders risk appetite, at least one who is willing to do a guaranteed loan, is much different than a lender who focuses on the subordinated debt market. Since the originating lender is required to hold both types of debt, it will be difficult, if not impossible to find a lender to hold both portions of the loan. • Delays in processing our application may cause delays in start-up and delays in the commencement in construction of the project. • The guaranteed loan cannot be subordinate to other debt. In some cases the new loan is for expansion of an existing facility with prior debt that is still outstanding. • Payment of fees to cover administrative cost for DOE issuing the guarantee, servicing and monitoring costs of the DOE, and normal fees charged by the originating lender, are a significant challenge for a start-up or expanding company. • The subsidy cost of the expected liability to the federal government from issuing the guarantee, which is the estimated net present value at the time the guaranteed loan is dispersed, is an extreme burden to a start-up or expanding company. The liability would be a result of default payments made to the originating lender on the loan, due to lack of payment by the company from cash-flow or liquidation of the collateral. The subsidy cost is wholly distinct and separate from fees for issuing and servicing the loan guarantee. The subsidy fee can either be an appropriation by congress or payment by the borrower. At present, it is our understanding that the borrower is expected to make this payment and no appropriation has been made. Since we do not intend to bring a project that we do not expect to be successful, we do not feel a subsidy payment should be required. Should the DOE, through their analysis, require an upfront cash subsidy payment, this undo burden may keep the project from moving forward. United States Department of Agriculture (USDA) Business and Industry Loan Guarantee Program • The Maximum Loan amount of $25 million is too low. Most renewable energy projects are now of a capacity in excess of 50 million gallons, with total project costs in excess of $100 million (current facilities cost $2.00 - $2.25 per gallon to construct). • Loans greater than $5 million require national office approval. (Due to the seasonal nature of construction in cold climates, if the time to receive a commitment for guarantee is lengthy, the project could be delayed for a full year.) • The percent of the loan guarantee diminishes to 60% for loans greater than $10 million. Lending institutions see almost no value in a guarantee at the 60% level. • When adding the potential one-time 2% fee and the annual renewal fee for a guarantee to a lender's typical cost, the total financing costs are excessive and very challenging for an expanding or start-up company. • Since in most circumstances ownership is by a large group of rural investors, personal and corporate guarantees are not possible. • If the guarantee is contingent upon successful start up, performance guarantees and no substantial deterioration in financial position, limited or no-value will be given to the guarantee by a lender considering financing for the project. USDA Renewable Energy Systems and Energy Efficiency Improvements Loan Guarantee Program • Loans cannot exceed 50% of total project costs. • The maximum loan amount is $10 million. This is too low. (Current ethanol facilities cost $2.00 to $2.25 per gallon to construct with most project scopes being in excess of 50 million gallons.) • Loans greater

than $5 million can only be guaranteed for a maximum of 70%. (This results in a maximum of 35% of the total project cost being guaranteed. Fifty percent of the total project costs times 70%.) This provides no value to the lender. • Loans greater than $5 million require national office approval. (Due to the seasonal nature of building in cold climates, if the time to receive a commitment for loan guarantee is lengthy, the project could be delayed for a full year.) • The one-time 1% guarantee fee and annual renewal fee along with typical lender fees result in total financing costs that are very challenging for a start-up or expanding company. • Personal and corporate guarantees are not possible due to the large number of investors and the need to treat investors equally regardless of percent ownership.

CURRENT FEDERAL GRANTS Department of Energy (DOE) The DOE utilizes the project management process called "stage gate management" to manage projects investigated internally and by industrial partners. The DOE has been instrumental in providing grant funding for applied research and development stages of pre-treatment technologies and fermentative organisms for the conversion of lignocellulosic biomass to ethanol. Poet partners and suppliers, most notably NREL, DuPont and Novozymes, are past awardees and potential future recipients of such awards.

Poet utilizes the same project management process to validate organisms and processes prior to scaling up to commercial scale. Poet is self-funding a cellulosic ethanol demonstration plant at our Scotland, SD research facility in 2007 in order to validate fermentation organisms and pre-treatment processes.

Poet was recently named a recipient of the DOE Integrated Bio-refinery Commercial Demonstration grant in which a 50 MGPY ethanol plant will be converted to a 125 MGPY bio-refinery. This grant represents the first commercial cellulosic ethanol demonstration project. Poet is honored to be a recipient.

The basis of the commercial integrated bio-refinery proposal was a 2002 DOE grant to validate an advanced corn dry milling technology, BFRAC™, which fractionates the corn kernel into three segments: endosperm, bran or fiber, and germ. The endosperm is processed in Poet's BPX™ fermentation process. The germ and bran are sold as animal feed product. However, the bran along with corn cobs will be utilized as feed products for the commercial cellulosic ethanol bio-refinery demonstration. Poet, DuPont and NREL, are leveraging knowledge and processes gained from past DOE grants to further cellulosic ethanol technology.

Poet Research is the only industrial ethanol partner in three DOE GTL Bioenergy Research Center applications. If awarded, Poet Research, along with university and industrial partners, will conduct comprehensive, integrated research and training programs in energy-related systems and synthetic biology.

United States Department of Agriculture (USDA) USDA Rural Development Renewable Energy and Energy Efficiency Grants Whereas the DOE is interested in applied research, development, and validation project stages, the USDA – Rural Development is primarily

interested in technologies that have been validated and ready for commercial application. The most notable grant program is the Renewable Energy Grants (up to $500,000) and Energy Efficiency Grants (up to $250,000). Similar to the comments above regarding the Renewable Energy and Energy Efficiency Loan Guarantee program, these grants are better suited for projects with limited cost scope. The grant application and approval process becomes cumbersome with eligible project costs above $400,000 for Renewable Energy and $250,000 for Energy Efficiency projects.

The Premier Partner Plants in which Poet Plant Management operates would be interested in utilizing the above programs for solid fuel boilers and energy efficiency projects. Our cellulosic ethanol integrated bio-refinery design calls for anaerobic digesters. Again, the scope of these projects is above $20 million – well above the designed scope of these grant programs.

USDA Cooperative State Research, Education, and Extension Service (CSREES) National Research Initiative (NRI) Grant Program Dakota Gold® Research Association, a non-profit organization associated with Poet, is currently investigating a development research grant for animal nutrient studies utilizing dried distillers grain, a co-product of ethanol production. Small Business Innovation Grants (SBIR) The DOE, USDA, and National Science Foundation (NSF) offer SBIR grants for applied research (Phase I) and development (Phase II) stage projects. Poet is currently investigating SBIR grants for our four independent research companies ranging from cellulosic ethanol fermentation organisms, animal nutrient studies, specialty chemical development, and alternative co-product utilization. RECOMMENDATIONS The primary economic challenges facing the developing cellulosic ethanol industry are (1) biomass collection and logistics; and (2) economic process to breakdown cellulosic sugars to convert to ethanol. Until biomass collection processes and cellulosic technology is proven, government support will be crucial to launch the cellulosic ethanol industry to a sustainable level. Farmer Incentives - Biomass Collection and Logistics The call to action to the biofuels industry and the American farmer to address the nation's energy demands via cellulosic ethanol is the most significant business and behavioral change the farm industry has seen in decades. In order for cellulosic ethanol to be economic on a large scale, the government, biofuels and farm industries need to remove barriers for the American farmer. The farmer needs to be engaged as soon as possible and as aggressively as possible, in order to meet specific plant requirements as well as the nation's goal of significantly replacing petroleum imports.

Government assistance is required to remove economic barriers in order to supply sufficient feedstock to the cellulosic ethanol facilities. Poet respectively suggests an incentive to cellulosic growers for each ton of biomass delivered to an ethanol plant.

1. We suggest an incentive of a $50 per dry ton of biomass delivered to a cellulosic ethanol plant gate based on modeling of farmer economics as well as the cellulosic ethanol plant economics. 2. The ethanol plant will make a payment in addition to the incentive directly to the farmer to make the cellulosic logistics sufficiently attractive to

the farmer for infrastructure investment to take place. 3. This incentive payment would be terminated after the industry has proven the technologies and gained some critical mass.

Harvesting, drying, storing, and transporting biomass material is a new business model for the farmer, which means the economics behind changing their current business practices need to be very persuasive in order to motivate local farmers. Farmers will need to invest in additional equipment including: (1) combine modifications to harvest biomass; (2) storage to keep biomass relatively clean; (3) dryer equipment to meet specifications; and (4) trucks and specialized trailers to transport the biomass to ethanol plants.

The American farmer would benefit from several united fronts working together to provide education. The following is a suggested list of public and private agencies that can partner to provide education:

• USDA – Rural Development • University Agricultural Extension Agents • Farm and Commodity Organizations • Cellulosic Ethanol Producers • Harvest Machine Manufacturers • Seed Corn and other Biomass Seed Companies Loan Guarantee Program Recommendations The 2007 Farm Bill has a USDA loan guarantee program for broad renewable energy initiatives as well as specific cellulosic ethanol projects. The $2 billion DOE loan guarantee program targets broad renewable energy initiatives as well. Federal loan guarantee programs will be essential to commercialize cellulosic ethanol plants until technology is proven and the industry is matured to a point where conventional lending is feasible.

As outlined above, we have found challenges with all three (3) guarantee programs: USDA Business and Industry Loan Guarantee Program, USDA Renewable Energy Systems and Energy Efficiency Improvements Guarantee program, and DOE Loan Guarantees for Projects that Employ Innovative Technology in Support of the Advance Energy Initiative. An enhanced program that draws from aspects of all three programs, we believe, would be acceptable to the lending community and significantly increase investments in new technologies that will enable renewable fuels to replace our dependence on imports of fossil fuels.

The following are specific recommendations for a proposed federal loan guarantee program supporting the Advanced Energy Initiative: Eligible Areas • Projects that employ innovative technologies for renewable energy and energy efficiency. • Loans can be guaranteed in cities with a population of up to 50,000. • Priority given to applications for working in rural communities of 25,000 or less. Eligible borrowers • Any legal entities, including individuals, public and private organizations and federally recognized Indian Tribal groups may borrow. • There is no size restriction on the business. Benefits to the business: • Higher loan amounts, stronger loan application, less equity injection, lower interest rates, and longer repayment terms assist businesses that may not qualify for conventional lending or financing. • Assist business in stability, growth, expansion, and rural development. • Assist in brining new technology to commercial scale much sooner. • Assist in deploying new technology on a broad scale faster. Eligible Lenders Most

lenders are eligible, including national and state chartered banks, farm credit system banks, and savings and loan associations. Other lenders, such as insurance companies and mortgage companies may be eligible if approved by USDA. Benefits to Lenders • Provide lenders with another tool to expand their loan portfolio. • Improve the economic and environmental living climate in rural communities. • Guaranteed and or/un-guaranteed portion can be sold to enhance liquidity and increase profitability while limiting financial exposure. • Allows lender to make loans above its loan limits.

Eligible Project Costs • Cost of acquisition, lease or rental of real property, including engineering fees, surveys, title insurance, recording fees, and legal fees incurred in connection with land acquisition, lease or rental, site improvements, site restoration, access roads and fencing. • Engineering, architectural, legal, and bond fees, and insurance paid in connection with construction of the facility and materials, labor, services, travel and transportation for facility construction start-up and test. • Equipment purchase and start-up testing. • Cost to provide equipment, facilities, and services related to safety and environmental protection. • Financial and legal services and costs, including other professional services and fees necessary to obtain required licenses and permits and to prepare environmental report and data. • Interest cost and other normal charges affixed by lender. • Necessary and appropriate insurance and bonds of all types. • Costs of start-up, commissioning and shake-down. • Cost of obtaining licenses to intellectual property necessary to design, construct and operate the project. • Machinery, equipment and storage facilities to support the collection and storing of raw materials for the production of cellulosic ethanol. • Other necessary and reasonable cost approved by the Secretary. Maximum Loan Amount Loans would be limited to a maximum of $200 million per borrower. Loans greater than $10 million require national office concurrence. Loan Guarantee Limits $160 million (80% of $200 million) Loan to Appraise Market Value Ratios • 80% Real Estate • 75% receivables • 75% inventory • 80% machinery and equipment Interest Rate Interest rates for loans may be fixed or variable. The rate is negotiated between the lender and borrower and will not be more than those rates customarily charged to other borrowers in similar circumstances. The variable rate must be tied to a nationally published rate. Variable rates cannot be adjusted any more than every 30 days. Borrower Equity Requirements A minimum of 15% tangible balance sheet equity is required for exiting business. A minimum of 25% tangible balance sheet equity is required for new businesses. Personal and corporate guarantees are not required. Tangible balance sheet equity will be determined accordance with generally accepted accounting principles (GAAP). Maximum Repayment Terms • Working capital – 7 years • Machinery and equipment – 10 years or useful life • Real estate – 20 years • Combination real estate, machinery and equipment – 15 years Fees and Costs A one-time guarantee fee not to exceed one half of 1% of the guarantee principle amount along with an annual renewal fee not to exceed one tenth of 1%. No subsidy costs should be assessed for potential future costs to the federal government for making payments due to lack of cash-flow or if upon liquidation, the proceeds received do not fully repay the loan. It is our belief that a subsidy payment by the borrower defeats the purpose of a guaranteed loan program. Other typical lender costs may also be incurred. Appraisals and Appraisal Report Appraisals and appraisal report prepared by an independent, qualified fee appraiser will be required on property that will serve as collateral. Appraisals will be

made in accordance with the accepted format and standards of the industry. Collateral All collateral pertaining to the specific project supported by the guarantee shall secure the entire loan. Repayment of the loan must be reasonably assured. Personal and corporate guarantees are not required. Loss Sharing In the event of default if the liquidation of the collateral or cash-flow payments do not repay the guaranteed and un-guaranteed portions of the loan, shortages would be shared on a pro-ratio basis, 80% of the shortage being paid by the guarantor and 20% of the shortage being covered by the holder of the unguaranteed portion of the debt. Loan Covenants/Conditions Normal and customary commercial lending covenants that are reasonably acceptable to financial institutions. Contingencies of issuing the guarantee based on successful completion and start-up of the project without financial deterioration are not acceptable. A clause of this type will eliminate the value to a lender since the lender must commit the loan prior to commencing construction or expansion. The lenders greatest risk is during construction and start-up. Report Once the project has been constructed, the lender must provide the agency annual financial reports from the borrower. Servicing Liquidation Annual financial statements should continue to be required. Lender services and liquidates with USDA or appropriate agency concurrence.

The USDA is in a particularly good position to facilitate grant and loan guarantee programs due to personnel capacity and office location infrastructure. USDA has an established reputation and integrity with farmers. The local and state offices have outstanding personnel who are eager to assist with applications and knowledgeable about programs and processes. However, if one were to inquire with a local or state USDA Rural Development officer, they would agree both the loan guarantee and grant processes are ripe for improvement and stream lining. As much as the local director would like to assist, his/her hands are tied by application and approval processes and turnaround. Grants Poet solidly supports the recommended appropriations for research grants: (1) DOE Biomass R&D ~$500 million; and (2) USDA Biomass R&D ~$500 million. The following suggestions further expand the referenced recommendations: Feedstock development, production practices and collection logisitics The development of cellulosic feedstocks is limited by the current germplasm developed for corn protein and starch processing. The development of new genotypes for biofuels production (e.g. corn plants with starch potential and accessible and processible cellulose/hemicellulose) offers greater yield of biofuels per acre. The acceleration of no-till farming practices could yield significantly more biomass per acre while maintaining environmental benefits. Research to understand and develop corn no-till practices and corn-on-corn farming practices and implications is required. Collection, storage and transportation of low bulk density cellulose biomass remain a daunting challenge. Research to support each of these areas is needed to provide one billion tons of biomass desired in order to address our need for energy independence. Analytical chemistry, instrumentation and data processing The development of chemical and physical methods, instruments, and data processing capabilities used to understand the products of pretreatment, saccharification and fermentation will greatly accelerate the development of new and novel processes from which to produce biofuels. Real time analyses will also allow improved processing and reduced cost of operation. Development of novel processes The development of the potential to consolidate multiple bioprocesses will provide for reduction of biofuels

production costs. The integration of pretreatment, saccharification and fermentation holds potential for a step change in ethanol and other biofuels development. Development of specialty chemicals / materials at biofuel refineries An important aspect of refineries is the ability to produce multiple products. The emerging bio-refineries are limited in the number of chemicals that can be cost effectively produced using biotechnology. Applied research, development, and validation of specialty chemicals and materials is needed to increase the economic viability of bio-refineries. Evaluation of higher ethanol blends in conventional gasoline engines The current market for gasoline/ethanol blended fuels is 10% or 85%. An effort to address the maximum ethanol/gasoline displacement potential using the existing gasoline engine is required.

Bio-refinery construction grants will be essential to validate bio-refinery research described above, incrementally drive down operations costs, and improve unit operations. Carbon Credits Poet supports the system of monetizing greenhouse gas credits. Further, we support the recommendation for the USDA to develop a system to monetize greenhouse gas credits generated by production of ethanol and other products from agricultural feedstocks. SUMMARY Poet is honored to testify to the Agriculture Subcommittee for Conservation, Credit, and Energy. On behalf of the renewable fuels industry, we applaud the Department of Agriculture 2007 Farm Bill recommendations. The initiatives outlined in the new Farm Bill will accelerate cellulose ethanol to the marketplace. Without the initiatives outlined, the industry would have difficult, and in some cases impassable, financial barriers to conduct research and development, validate, and commercialize renewable fuels technology, particularly cellulosic ethanol.

In order to launch the United States cellulosic ethanol industry, we respectively submit the following recommendations for your review and consideration for the 2007 Farm Bill:

1. Incentive to the farmer to encourage adoption of new farm practices required to provide stover for cellulosic ethanol processing of $50 per dry ton of biomass delivered to a cellulosic ethanol plant gate.

2. Modified loan guarantee programs will be essential to commercialize cellulosic ethanol plants until technology is proven and the industry is matured to a point where conventional lending is feasible. This document provides specific recommendations in the loan guarantee recommendation. Statement Of Jeff Fox Vice President, Legal and Government Affairs Poet

Senate Agriculture Committee Energy Subcommittee Field Hearing "The next Generation of Biofuels: Cellulosic Ethanol and the 2007 Farm Bill"

April 2, 2007

Preamble:

Mr. Reid Jensen

South Dakota Corn Growers

Reid Jensen President, South Dakota Corn Growers

Senate Agriculture Committee Energy Subcommittee Field Hearing "The next Generation of Biofuels: Cellulosic Ethanol and the 2007 Farm Bill"

April 4, 2007

First, I would like to thank Senator Thune for holding this field hearing and for his work and commitment to the issues important to South Dakota; and on behalf of the South Dakota Corn Growers, I thank him for his continued commitment and ongoing efforts to advance ethanol and renewable energy in this country.

Today, South Dakota is at the forefront of the emerging biofuels industry. South Dakota boasts 13 ethanol plants with three more plants in development stages and over 50 E85 pumps throughout the state. Percentage wise South Dakota consumes over half of its corn production for ethanol by consuming over 250 million bushels and ranks number four in ethanol production with nearly one billion gallons of capacity expected by 2008. Additionally, there are more than 14,000 South Dakotans invested in some form of ethanol production making us the leading state in farmer ownership and equity. For South Dakota, ethanol has created economic investment, rural and community development, and unparalleled opportunities for agriculture.

South Dakota Corn Growers are here today to advocate for a national energy policy that continues to support ethanol expansion and development and create increased opportunities for South Dakota farmers. As we look towards the future of energy development in this country, it is important farmers and agriculture play a key role. From corn-based ethanol to the potential of cellulosic fuels, corn will remain a vital feedstock in growing our energy independence.

Currently, there are 115 ethanol plants in operation with nearly 6 billion gallons of capacity and 5 billion gallons of additional capacity under construction or undergoing expansion. Our current Federal energy policy, in part, is responsible for the growth of this once cottage industry into a $23.1 billion fuels market, displacing nearly 5% of petroleum consumption and creating over 150,000 jobs in rural America.

In 2005, Congress passed and signed into law the Energy Policy Act of 2005. This legislation established the Renewable Fuel Standard (RFS) and included several key provisions vital to developing our robust renewable fuel industry. The establishment of

the RFS signaled the market to produce more ethanol, grow more corn, and provided a safety-net for investors. As set in 2005, the RFS incrementally mandates ethanol production and consumption from 2006 to 2012 peaking at 7.5 billion gallons. Today, ethanol production in this country has exceeded the RFS two-fold. We are on the verge of meeting the 7.5 billion gallons in the next 18 months.

In addition to the RFS, the Volumetric Ethanol Excise Tax Credit (VEETC) and the secondary ethanol tariff have been extremely critical to the ethanol industry. In 2004, the Jobs Creation Act was passed and signed into law. This landmark legislation extended the ethanol tax incentive, a blenders' credit, at 51 cents per gallon through 2010 as well as created a new tax incentive for biodiesel and improved the small ethanol producer tax credit to allow farmer cooperatives to pass the credit along to its farmer owners. This 51-cent blenders' credit means market access for ethanol and brings that fuel to the pump. The VEETC stimulates demand and encourages more production, which has created a fair market price to our undervalued commodities. As the ethanol industry continues to expand and more renewable fuel comes online, it is imperative we keep VEETC in place and permanent.

An offset to the 51-cent credit, the Secondary Ethanol Import Tariff places a 54-cent duty on foreign ethanol imported to the U.S. Removing the 54-cent tariff would in essence be asking American taxpayers to further subsidize already heavily subsidized ethanol and sugarcane production in countries like Brazil. U.S. gasoline refiners receive that 51cent tax incentive for every gallon of ethanol they blend into gasoline, regardless of the ethanol's origin. So, imported ethanol from Brazil, for instance, qualifies for the tax incentive. Brazil has built its ethanol industry through 35 years of tax incentives, production subsidies, mandates, export enhancement, infrastructure development, debt forgiveness and currency devaluation. Brazil does not need U.S. tax dollars to compete effectively, as evidenced by the fact that over 430 million gallons were imported last year and those volumes are increasing. Together, the Ethanol Tax Credit and the Secondary Tariff are the most critical policies behind ethanol development and expansion and will continue to play a vital role as cellulosic ethanol comes online.

Today, grain-based ethanol continues to increase its capacity and expand its reach and soon we will see cellulosic ethanol enter the fuel market. Together, grain and cellulosic feedstocks can displace potentially 20% of the nation's petroleum usage and increase our reliance on homegrown fuels. However, cellulosic ethanol is still some time away with transportation, storage, and economic obstacles in its path. As we wait for cellulosic ethanol to join the market, grain will continue to meet the needs of food, feed, and fuel across this country.

Although we are making great strides in ethanol production and advances in cellulosic technologies, infrastructure problems could stunt our growth as an industry. Currently, 85% of ethanol is shipped via the rails and the remaining 15% relies on trucks and barge. As we increase ethanol capacity over the next ten or twenty years we will need greater rail capacity, access, and expansion in order to meet the needs of a booming biofuels industry. Combine rail and road constraints with the need for more pumps and more cars,

ethanol could hit a wall. Without making these infrastructure improvements and addressing head on these obstacles, ethanol will hit a saturation point, a blend wall, near 15 billion gallons. At 15 billion gallons, the US will be blending 10% ethanol in all gasoline; however, we cannot surpass that wall without investment in renewable fuel infrastructure as well as getting more pumps at stations, more FFVs on the road, and higher blends to market like E-20. We appreciate greatly Senator Thune's efforts to get E-20 online and his work with the EPA on this matter. In the end, these limitations could stymie progress and are key issues that need to be looked at as we push forward our domestic energy security agenda.

Lastly, South Dakota Corn Growers are extremely proud to lead this country in farmer ownership when it comes to ethanol plants. We believe farmer investment brings great returns to local communities, supports rural development, and creates economic growth throughout the country. It is imperative we continue to foster farmer ownership throughout this state and continue to take ownership of American agriculture. Our future is in the farm.

In conclusion, I would like to again thank Senator Thune for his fantastic work in Washington and his efforts on behalf of the great state of South Dakota. He has truly been a leader for agriculture and a staunch advocate for the needs of South Dakota's corn growers and the future of renewable energy in this country.

Mr. Kevin Kephart
Director of Sun Grant Initiative for North Central Region
South Dakota State University

Testimony submitted on behalf of the

Sun Grant Initiative

To the U.S Senate Committee on Agriculture, Nutrition and Forestry Subcommittee on Energy, Science and Technology

The leadership of the Sun Grant Initiative appreciates the opportunity provided by Senator Thune to address the subcommittee on Energy, Science and Technology. As the Congress prepares to draft the next Farm Bill, the nation is at a critical juncture. Our future economic and strategic security is eroding because of excessive dependence on imported petroleum. It is also becoming increasingly clear that continued use of fossil energy passes on enormous environmental problems to future generations of Americans. American agriculture represents part of the solution toward reversing these concerns. American farmers, foresters, agribusinesses, and agricultural scientists can lead the world in development of agriculture-based energy systems; however, the Congress must enact policies, programs, and funding that empower these sectors. Starch-based ethanol production in the United States has become an advanced industry because farmers, companies, and public scientists in land-grant universities have worked together. As priorities shift to exploit cellulosic resources, few people understand the magnitude of change that will be required to annually produce, transport and convert in excess of one billion tons of biomass annually. Farm bill policies will need to provide incentives to farmers and businesses that will bear the initial risks of a major transformation in agriculture. Moreover, the land-grant university system must be supported with additional resources to address immediate issues regarding cellulosic biofuels as well as conduct early basic research that will result in biofuels technologies that will be deployed in future decades. The Sun Grant Initiative has been planned to direct the enormous capabilities of the land-grant system and achieve a secure energy future, a quality environment, and a vibrant rural economy.

Figure 1. Predicted biomass feedstock production potentials by region. (De La Torre Ugarte et al. 2003. The economic impacts bioenergy crop production on US agriculture. USDA Office of Chief Economist, Office of Energy Policy and New Uses, Agric. Econ. Rp) The Sun Grant Initiative (SGI) is a key component to the nation's development of domestic renewable energy. The SGI was authorized in 2004 as an amendment to the Farm Bill to harness the capacities of all land-grant universities to conduct research and educational program that emphasize agriculture-based renewable energy and products. Because of environmental differences, biomass and bioenergy production must be

developed at regional and local levels (Figure 1). The SGI establishes a regional structure to develop integrated regional solutions to national issues. This regional approach provides a mechanism for strategically coordinating and leveraging federal and state efforts. The products of the SGI will include improved national energy security, environmental remediation, and economic diversification. This work is essential for the nation's future prosperity and strategic security.

Energy goals set by President Bush (Twenty In Ten), the US Department of Energy (30 x 30), the private sector and interest groups (25 x 25) and Congress will require an unprecedented engagement of American agriculture in domestic energy production. The National Corn Growers Association projects that the North Central region alone has the potential to produce 65 billion gallons of biofuels annually from starch, oilseed, and cellulosic feedstocks. The United States has enormous resources to develop cellulose-based energy systems, but development of these industries will require unprecedented changes to agriculture, will present unique environmental risks, and will cause widespread social concern. Public research conducted at land-grant universities will be necessary to not only develop enabling technologies, but also research that will shed light on the impacts made on the environment, the economy, and society. The nation's land-grant universities have served a critical role in scientific advancement of agriculture and the SGI will focus their expertise and talent toward the energy needs and workforce development for the country. Recognizing that the SGI and land-grant system are assets, the 25 x 25 Initiative has endorsed full funding in FY2008 for the SGI.

Sun Grant Initiative Authorization

The Sun Grant Initiative was authorized in January 2004 as section 9011 under provisions of Title IX of the Farm Security and Rural Investment Act of 2002 (7 USC 8109). Additionally, SGI is authorized as section 5201(m) under provisions of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users of 2005 [SAFETEA-LU (23 USC 118)]. The authorized appropriation limit for fiscal years 2008 through 2010 is $75 million for each year. The authorization culminated 3 years of planning and development by the land-grant universities and Congress. Since passage of the authorization, the SGI has developed collaborative working relations and projects with the U.S. Departments of Transportation, Energy, and Agriculture. Discussions are underway regarding future collaboration with EPA and the Department of Defense. Recently, the SGI has been assigned with specific tasks and proposed for $4.5 million in the President's FY2008 Budget Request in the Department of Energy's Energy Efficiency and Renewable Energy Office of the Biomass Program (OBP).

The mission of the Sun Grant Initiative is to: • Enhance America's national energy security through development, distribution and implementation of biobased energy technologies. • Promote diversification and environmental sustainability of America's agriculture • Promote opportunities for biobased economic diversification in America's rural communities.

Figure 2. Sun Grant Initiative regions and regional Sun Grant Centers of Excellence as defined in 7 USC 8109. A network of five land-grant universities serve as regional Sun Grant centers, including South Dakota State University, Oklahoma State University, the University of Tennessee, Oregon State University, and Cornell University (Figure 2). The regional centers currently emphasize research, Extension, and educational programs on renewable energy technologies and promotion of biobased industries in rural communities. Each center will receive base Federal funding to establish them as leading research, extension, and higher education institutions for the biobased economy. The regional centers already facilitate ongoing and proposed Federal-funded research, extension and education programs in their respective regions. These programs embrace the multi-state, multi-function, multi-disciplinary integrated approach that is at the heart of the land-grant method of addressing national problems. Moreover, the centers interface their activities with other Federal agencies such as DOE, DOT, and EPA.

Other key guidelines that define how the regional Sun Grant centers are to function include: • Funds are to be allocated evenly among the five regions • No more than 25% of regional funds will be used directly for center's programs • Remaining 75% of regional funds are to be allocated in the region to land grant institutions through competitive processes. • Research, Extension, and educational programs on bioenergy and biobased products will include activities aimed at technology development and technology implementation.

Accomplishments Since Authorization

The SGI has worked with DOE-OBP, Idaho National Laboratory (INL), Oak Ridge National Laboratory (ORNL), and regional Governor's Associations to form a Regional Biomass Feedstock Partnership. The partnership is establishing complementary goals, objectives, milestones and accomplishments for biomass energy. Two Regional Biomass Workshops were hosted in 2006 by the University of Tennessee and South Dakota State University to identify regional needs for research and development. Participants included experts from research universities, Federal agencies, Congressional offices, industry, and non-governmental organizations. These workshops detailed the region's unique capacity to address the goal of sustainable production of a billion tons of biomass for energy purposes, focusing on creation of a new generation of biomass resources that support biorefinery needs. These regional partnerships also will enable development of more accurate cost supply information and improved communication with all elements and partners in the feedstock supply chain.

The SGI recently released a new web-based public resource for information on bio-based energy; the Sun Grant BioWeb (http://bioweb.sungrant.org). The Sun Grant BioWeb is a non-commercial, educational website that provides current information about biomass energy and bioproducts. This resource grew out of discussions with USDA-OCE and is funded mostly through DOE. It should be particularly valuable to agencies and organizations that are involved in policy development. The Sun Grant BioWeb will help stakeholders understand: (1) what biomass is, where it is, and how much is available; (2) ways that biomass can be converted to biofuels, biopower, and bioproducts; (3) the

current state of biomass technology, research, production and use; and (4) biomass economics and policy.

The SGI is already underway in a limited and small scale. The 2005 SAFETEA-LU appropriated $10.4 million for each fiscal year through FY2010. This funding is allocated equally to each of the five SGI Centers and regions. About 25% of these funds are being used by each Center to develop leading bioenergy transportation projects and about 75% of the funds are being competitively awarded to land-grant universities within each SGI region. The priorities for the Centers and the regional competitive grants program have been developed collaboratively with DOT and an interagency panel that includes USDA, DOE, DOD and EPA.

What Will Be Done

With the full appropriation of the authorized $75 million, the SGI will enable land-grant universities to lead the development of a biobased economy. Their land-grant responsibilities will be broadened beyond traditional agricultural issues to also encompass making significant advances in biobased industries for the benefit of independent farmers, rural communities and the public at large. Land-grant universities have a proven record of accomplishment of objective research and commitment to agriculture, rural families, and public service.

These efforts will revitalize rural communities and enhance the nation's energy security. The primary challenges that must be faced include: • Develop biobased industries that can coexist with and complement petroleum based industries. • Develop biobased industries that improve the environment and protect air, water, soil, and other natural resources. • Develop biobased industries that diversify American agriculture and complement food production. • Develop industries that provide opportunities for the growth and prosperity of rural America.

The transition to agriculturally-based industries will create economic opportunities for other sectors of the US economy through creation of high-tech companies and jobs. Through SGI, the US will continue to be a world leader in technology and innovation for future high-technology commerce and trade. We will not only produce biomass feedstocks, we will also lead the world in the technologies and the intellectual property that makes this transition to a biobased economy possible.

Based on stakeholder input, planning with Federal agencies, and coordination with regional land-grant institutions, the SGI will address regional barriers to biomass energy development. Key activities will include: ¤ Biomass Resource Assessment Develop preliminary supply curves for regional feedstocks. ¤ Education and Outreach Report on the outcomes of regional biomass workshops and continue to improve the Sun Grant BioWeb. Work with the Cooperative Extension Service to provide basic bio-energy production information and training. ¤ Crop Breeding and Genetics Develop an inventory of work done on the genetic evaluation of perennial herbaceous, woody, and other crops for energy use. Example candidate species include switchgrass, big bluestem, prairie

cordgrass, reed canarygrass, Miscanthus, poplar, and willows. Form regional teams to conduct research on breeding, genetics, physiology, and pest management. ¤ Research on Agronomic and Environmental Issues Form regional teams to conduct field-based research on production systems, basic management, and environmental stewardship. Management research would emphasize sustainability and diversity. Basic production research on biomass feedstock improvements Inventory and model biomass feedstock resources through GIS and satellite technologies. ¤ Natural Resources Form regional research teams to conduct research on biomass production impacts on wildlife, soil, water, and air. ¤ Integrating Production Management Systems Form regional research teams to conduct research on biomass production economics and sustainability. ¤ New Processes and Enabling Technologies Form regional research teams to improve processing efficiencies and capture value from biomass feedstocks.

Indicators of success for the SGI will be through scientific publications, patents, licenses, startup businesses, implementation of new technologies, effective Extension programs, graduates from new university programs in renewable energy, and other objective measures of advanced economic development.

2007 Farm Bill Request

The Congress will undoubtedly consider many new provisions and programs to support bioenergy and bioproducts in the 2007 Farm Bill. We appreciate the opportunity to work with the Congress to insure that there is sufficient research and education outreach to support these new programs, and that the bioenergy research and education programs of the Farm Bill are carefully coordinated. The current authorization for the SGI addresses the critical overarching goals for bioenergy and bioproduct development for the country. As new programs to support the efforts of farmers, ranchers, and foresters to produce bioenergy are developed, as new strategies emerge to support our rural communities through the development of alternative energy resources, we ask for the opportunity to work with the Congress to ensure that the SGI authorization is responsive and can adapt to ensure that our research and education objectives fully support these new efforts. Research and education outreach alone will not ensure the necessary development of bioenergy developments to transition to a new energy economy, but without focused and coordinated research and education efforts, it will not be possible at all.

We respectfully request that the Congress reauthorize the Sun Grant Initiative as a critical component of the Energy Title of the Farm Bill (Section 9011 of the 2002 Farm Bill), Although the current SGI authorization will continue to FY2010, the goals and mission of the SGI to support the development of agriculturally-based energy resources will be best served if the SGI is concurrent and integrated with the other essential agricultural programs of the Farm Bill. Because of the enormous goals of the President's Twenty-In-Ten Initiative, we request that the authorized funding limits for the SGI should be increased to $100 million per fiscal year.

1783 Buerkle Circle St. Paul, MN 55110
Phone (651) 773-2000
Fax (651) 773-5500

TESTIMONY OF

DAVID E. NOMSEN
BEFORE THE

SUBCOMMITTEE ON ENERGY
COMMITTEE ON AGRICULTURE
U.S. SENATE

ON

"THE NEXT GENERATION OF BIOFUELS: CELLULOSIC ETHANOL AND THE 2007 FARM BILL"

APRIL 04, 2007
SOUTH DAKOTA STATE UNIVERSITY
BROOKINGS

Mr. Chairman, members of the Committee, my name is Dave Nomsen. I am the Vice-president of Governmental Affairs for St. Paul, MN based Pheasants Forever and Quail Forever and I reside in Garfield, MN. My primary duties involve supporting a strong framework of federal policies and programs supporting natural resource conservation that compliment our habitat-focused mission at Pheasants Forever. I am especially pleased to be here today in Brookings and to acknowledge my strong personal ties to SDSU. I received my M.S. Degree here in Wildlife Management in 1980 and spent a number of years afterwards as a member of the faculty of the Wildlife and Fisheries Department.

I am pleased to be here today to offer Pheasants Forever's thoughts on "The Next Generation of Biofuels: Cellulosic Ethanol and the 2007 Farm Bill." Pheasants Forever and Quail Forever's 700 chapters nationwide and 115,000 members complete on average more than 20,000 individual habitat projects annually in partnership with America's conservation minded farmers and ranchers. The vast majority of these projects are completed on private lands and involve grassland establishment and management, while complimenting the operations of America's working farms. Projects involve the establishment of nesting, brood rearing, and winter cover for pheasants, quail, and a wide array of wildlife. In 2006, PF spent more than $33.8 million completing 23,552 projects benefiting wildlife on over 460,000 acres. Since the organizations inception in 1982, PF has spent nearly $200 million to complete 4.4 million acres of habitat work.

Senator Thune, a Spring 2007 report entitled *Home Grown Energy Security – The Potential for Chemicals, Fuels, and Power from Prairie Grass* and completed by the Great Plains Institute concludes: The research outlined in this report suggests that sustainably-produced biomass – particularly native prairie grasses well-adapted to the Great Plains – can make a significant contribution to our country's energy and material needs. I agree.

One of the potential fuels for the next generation of cellulosic ethanol was thrust into the national spotlight when in January 2006 as part of the State of the Union address; President Bush mentioned the word switchgrass. While many in our country were unclear about how this related to energy production, many of our nations' 2.5 million pheasant hunters thought of good wildlife habitat and pheasant hunting. Switchgrass is a very valuable native species in the diverse grassland habitat mix important to wildlife and pheasants in particular.

Over the past several years, many states; including Minnesota, North Dakota, and Kansas have experienced record high levels of pheasant harvest with populations not seen since the Soil Bank days of the 50s and 60s. There is no better example of what those harvests have meant to the heartland than here in South Dakota. In 2005, 174,217 hunters harvested 1.9 million pheasants contributing $153 million to the SD economy. The common element contributing to these record and near record harvest levels is the habitat impact of the successful Conservation Reserve Program (CRP). Protecting the benefits of CRP for soil, water, and wildlife should be the starting point for discussion about future cellulosic biofuels programs.

By last summer, numerous proposals and media called for using land enrolled in USDA conservation programs, and especially the CRP for the production of biofuels. The outcry become so intense that Pheasants Forever and many of our nations' leading wildlife conservation organizations wrote to Committee members expressing our collective support for renewable biofuels in diminishing the Nation's dependency on fossil fuels. We expressed concern that in the rush to develop biofuel crops, we may inadvertently sacrifice many of the natural resource conservation victories achieved over the past two decades.

We asked that as you seek ways to promote biofuels that you carefully consider the impacts of increased stubble removal and diminished vegetative cover as they relate to wildlife, soil, water, and air quality; and investigate all proposals and facts regarding the use of land enrolled in conservation programs as a source of crops grown for biofuels production. We concluded that utilization of CRP lands for biofuels is premature. We simply don't have adequate research that supports use of CRP for biofuels as the best available option.

In the interest of continuing our dialogue about future generations of cellulosic biofuels let me offer several elements for discussion that will likely be important from a wildlife conservation standpoint:

Perennial vs. Annual. Perennial crops offer much more in terms of environmental benefits for soil, water, and wildlife conservation when compared to annually planted crops. In addition, perennial crops such as deep-rooted native warm season grasses offer benefits including carbon sequestration important to offset global warming.

Harvest scenarios. Annual harvest regimes with complete plant removal offer limited environmental benefits. Scenarios where 50% removal is the goal can provide important wildlife habitat for resident species including ring-necked pheasants and white-tailed deer. Leaving stubble height of at least 12-15 inches may ensure adequate residual cover to attract nesting hens the following season, in addition to helping capture moisture for higher biomass yields. Also important is the timing of the harvest. Harvest after the nesting season can be critical for wildlife production.

Monocultures vs. mixed species stands. Monocultures of any grass are very limited in providing wildlife habitat whereas mixed stands of grasses and forbs or flowers can provide very valuable habitat for multiple species. Switchgrass grows in bunches and adding additional species of grasses and forbs can dramatically improve benefits for soil erosion, water quality, and wildlife habitat.

"Sodsaver" or Non-cropland Conversion. Any land that does not meet the definition of cropland, as determined by the USDA/Farm Service Agency, converted from non cropland status to cropland should be made ineligible for any federal benefit, including but not limited to price and income support payments, crop insurance, disaster payments, conservation program enrollment, and FSA farm loan benefits. Remaining prairies provide tremendously valuable wildlife habitat and should not be converted for commodity crop or biofuel production.

Research and Development. Research and development funding should promote the next generation of biofuels and renewable energy technology based upon mixtures of grasses and forbs vs. monocultures. Goals should include fish, wildlife, soil, nutrient management, and water conservation. Conservation benefits from farm bill conservation programs should not be sacrificed or diminished.

Native grasses have deep root systems that can protect and enhance soil productivity while protecting and improving water quality. Wildlife benefits will depend upon species planted and management and harvest parameters. Landowners may receive revenue from the sale of biomass, carbon credits, recreational opportunities, and seed sales. Entire communities may benefit from sustainable next generation biofuels if wildlife objectives are built into the programs. On behalf of Pheasants Forever, I offer our organizations assistance to have a continued dialogue leading to conservation-friendly cellulosic programs. Thank you for the opportunity to testify. I will be glad to address any of your questions or comments.

Ms. Anna Rath
Director of Business Development
Ceres, Inc.

Ceres Written Testimony to Senate Agriculture Committee Energy Subcommittee Field Hearing in Brookings, South Dakota:

"The Next Generation of Biofuels: Cellulosic Ethanol and the 2007 Farm Bill"

Anna Rath, Director of Business Development, Ceres Thousand Oaks, California

Good morning and thank you to Senator Thune for inviting me to testify. My name is Anna Rath, and I am here representing Ceres, a leading developer of dedicated energy crops for cellulosic biofuels.

Why Dedicated Energy Crops?

We believe that dedicated energy crops such as switchgrass and miscanthus will be essential to realizing the scale currently envisioned for biofuels. There are three reasons for this: critical mass, productivity and feedstock cost.

Critical Mass: The President has called for 35 billion gallons of alternative fuels by 2017. As part of meeting this objective, one can imagine that we will derive 15 billion gallons from starch-based ethanol and 5 billion from a combination of sources including biodiesel, coal-to-liquids, gas-to-liquids, etc. This leaves another 15 billion that must come from cellulosic biofuels. At a conversion ratio of 100 gallons per ton of biomass (higher than today's technology can deliver but likely achievable by 2017), this 15 billion gallons of cellulosic biofuels will require 150 million tons of biomass.

If we could harvest an average of two tons of agricultural residues per acre, it would require 75 million acres to meet this demand. This represents a large fraction of the total potential acreage from which agricultural residues could be collected in the United States And while there are some areas of the country, such as the Corn Belt, where these resources are sufficiently concentrated to enable the creation of biorefineries based entirely on agricultural residues, these areas are relatively few and would not serve to greatly expand the geographic scope of biofuel production.

In contrast, with a high-yielding dedicated energy crop producing an average of 10 tons per acre, only 15 million acres would be required. We do not believe that this is an "either/or" choice. Rather, we believe that in some cases energy crops will be used as sole feedstocks to cellulosic biorefineries and in other cases as complements to

agricultural and forestry residues to enable biorefineries to collect a sufficient volume of feedstock within a reasonable radius.

Productivity: The corn seed industry has projected that by 2030 we will see average yields of 300 bushels per acre. This is a worthy goal and one that we will help enable through our collaboration with Monsanto. However, even when this goal is reached, energy crops will remain the more productive alternative in terms of producing gallons of fuel per acre. With 300 bushel per acre corn, one could reasonably expect to harvest four tons of stover. At 3 gallons per bushel and 100 gallons per ton of stover, this would yield a total of 1300 gallons of biofuel (900 from the corn grain and 400 from the stover). By the time we reach 300 bushel per acre corn, though, dedicated energy crop yields will also have improved substantially – we believe to 20 tons per acre. At the same conversion ratio of 100 gallons per ton, a 20 ton per acre energy crop will yield 2000 gallons per acre.

Feedstock Cost: In mature fuel and bulk chemical industries, the cost of feedstock is typically greater than fifty percent of the wholesale cost of the finished product. This is true today for both gasoline and starch ethanol and will likely be true in the future for cellulosic biofuels. As of today, more than fifty percent of the delivered cost of biomass feedstocks is the cost of harvesting and transporting the material to the biorefinery. This cost varies greatly with the yield density (tons per acre) of the biomass feedstock. It costs little more to harvest ten tons of biomass from a dedicated energy crop acre than it does to harvest two tons of residues. In the case of the dedicated energy crop, though, this cost can be allocated over ten tons of biomass rather than only two in the case of residues. In addition, higher yield densities can mean a reduction in the radius from which the biorefinery must draw its feedstock. A smaller radius means lower transportation costs. Thus, while harvest and transport costs can be as much as $40 per ton for two ton per acre residues, they will be closer to $20 per ton for ten ton per acre biomass crops.

Ceres' Efforts in Energy Crop Development and Commercialization

Over the past 70 years corn yields have improved more than five-fold. This is due to the development of a variety of technologies including marker-assisted breeding and creation of hybrids and transgenics.

We now have all of these same technologies readily available for deployment in energy crops and should be able to use them to produce multiple fold increases in energy crop yields within the coming decades. In addition to yield, there are several other traits that will be important breeding targets for energy crops. Improvements in composition and structure will enable more gallons of biofuel per ton of biomass and will bring down the cost of processing through reducing the severity of pretreatment and volume of enzymes required. Maintaining and improving disease and pest resistances will be essential for yield stability and risk mitigation. Optimized architecture will help increase per acre yields by allowing increased planting density and will improve the ease and efficiency of harvesting. Salt tolerance will be important for growth on more marginal soils. Maintaining and improving drought tolerance and nitrogen use efficiency will be critical

for minimizing the cost of production and environmental footprint of energy crops as well as maximizing the potential growing area. Maintaining the perennial nature of these crops will also help with production costs and environmental impact. Improving stand establishment will help overcome what is currently the most challenging aspect of growing dedicated energy crops – getting a good stand established. Finally, increasing the efficiency and reducing the cost of propagation will be essential to meeting the rapidly growing demand for these crops.

We project that the pace of improvement in energy crop yield (tons per acre), composition (gallons per ton) and processing technologies will mean that, over time, the number of acres required to produce a given fraction of transportation fuel needs will actually decline, despite the fact that the amount of fuel associated with this fraction will increase. For instance, we estimate that in 2020, 50 million acres of biomass crops would be sufficient to meet 25% of U.S. then current gasoline demand. By 2030, this same 50 million acres could supply 33% of demand even though demand will have increased during this interval.

Ceres is rapidly developing and scaling up commercial varieties of energy crop species. We have an extensive field trialing program including trials in conjunction with what will be some of the first commercial scale biorefineries at their planned locations. These trials are for the purpose of understanding which are the optimal species and varieties to grow at particular locations, what growing practices should be employed and what grower economics will be in the particular location. Ceres anticipates that large-scale planting of dedicated energy crops to support some of these initial biorefineries will begin in 2009. We are rapidly scaling up seed of leading energy crop varieties to meet this need. At the same time, Ceres is developing the next generations of dedicated energy crops using marker-assisted breeding and the creation of hybrids and transgenics. Ceres is creating high-density marker maps of these crops using the hundreds of gene-trait associations we have identified using our genomics platform to enable this process. We project that improved varieties from our breeding programs will be ready for commercial launch by 2012 and that the first transgenic varieties of dedicated energy crops will be ready for commercial launch by around 2015. Challenges in Energy Crop Commercialization

Large-scale commercialization of dedicated energy crops will not be without challenges. The first of these is that most farmers are not familiar with the growing practices necessary to successfully establish and optimize the production of dedicated energy crops. Also, there is limited information about the potential range and optimal growing conditions for existing varieties. Ceres is working to understand these issues at our field trial locations, but more work will be necessary for large-scale adoption.

The logistics of harvest, transport and storage have not been fully worked out for commercial scale biorefineries. All of the necessary technologies and equipment exist, but the first biorefineries will truly be pioneers in bringing these elements together on a commercial scale. There is significant opportunity going forward for optimization of many of these elements.

Finally, seed quality and availability is an issue that this industry should be concerned with. As part of our efforts to understand the capabilities of existing forage seed producers, Ceres has collected switchgrass seed samples from many of them. What we found was that while some companies produce high quality seed, others produced seed that contained large fractions of weed seed and/or had extremely low germination rates. It will be important for growers to have access to high-quality seed to avoid bad experiences, which could have repercussions for the industry for years if not decades to come. In addition, to my knowledge, Ceres is the only company rapidly scaling up leading energy crop varieties and doing so in conjunction with companies planning to build biorefineries to ensure that there is supply available to meet the coming demand.

Policy Priorities for Enabling Cellulosic Biofuels

Because we see the cellulosic biofuels industry as one that is ready for commercialization, our policy priorities are aimed at providing the necessary opportunities and incentives to enable this commercialization. Some of these are feedstock-specific policy priorities – an area that has been somewhat overlooked by commercialization-related policies to date – others are more general.

Feedstock Specific Priorities:

Feedstock pilot or demonstration programs: As mentioned above, most growers have not had much if any experience growing dedicated energy crops. As a result, getting farmers comfortable with growing these crops will be a challenge for the first commercial biorefineries that choose to use these feedstocks for part or all of their supply. For this reason we propose pilot or demonstration scale programs aimed at providing farmers with the opportunity to become familiar with growing these crops. There are many existing proposals for what this kind of program could look like, so we have chosen not to put forth yet another. Rather, we would simply offer the guidance that these programs will be most effective if the farmers being given the opportunity to grow dedicated energy crops are farmers that are likely to be called on by some of the first biorefineries to provide energy crops to them. The impact of these programs could also be optimized by having enough feedstock grown in a sufficiently concentrated area to allow the study of harvest, transport and storage logistics for that area as these logistics will vary substantially by region and choice of dedicated energy crops. For these reasons we would recommend that these programs be done in areas where a biorefinery company has expressed an interest in citing a biorefinery.

Transitional assistance: For perennial crops such as switchgrass and miscanthus, growers will not achieve a full yield in their first year of cultivation. Depending on what region of the country the grower is located in, the first year yield achieved may or may not be sufficient to warrant harvesting. Because it will require 18 months or more to construct a biorefinery, this lag in achieving full yields is acceptable. If farmers plant dedicated energy crops around the same time that the biorefinery company begins construction, they will be ready to provide a full or near-full yield of their dedicated energy crop at the point when the biorefinery is operational. The issue for the grower, though, is the year of

lost revenue on those acres. In order to facilitate adoption of dedicated energy crops, we therefore propose a program that would provide transitional assistance to these growers in the form of compensating them for their opportunity cost for their year of lost revenue. This is a program that we would envision existing as the industry is getting started. Once the industry is established, growers may be more willing to shoulder the risk of this year of lost revenue in exchange for the long-term contracts they will likely be provided by the biorefinery. We also expect that our breeding programs will continuously improve first year yields so that this opportunity cost declines over time.

Crop insurance pilot program: As the cellulosic biofuels industry develops, we believe it is of critical importance that dedicated energy crops not be disadvantaged relative to other crops in terms of the safety net that the government provides for these crops. This safety net could come in a form similar to existing crop programs or could be substantially different. The goal must be to allow growers to make decisions about which crops to grow based on market forces, not based on which crops are or aren't supported by government programs. Toward this goal, we suggest a pilot program to begin collecting the data that will be necessary to enable a program like crop insurance. The objective of this pilot program would be that by the 2012 Farm Bill, the necessary data will have been collected to enable the roll-out of a crop insurance program for dedicated energy crops.

Additional Priorities:

Biorefinery grants and loan guarantees: We are supportive of the cost-sharing grant programs and loan guarantee programs that the government has created to help foster the construction of the first commercial scale biorefineries. We would hope that additional programs of this nature will be forthcoming to help hasten the growth of this industry.

Commodity Credit Corporation's bioenergy program: We support the proposal made by the USDA that a program similar to the CCC program that existed in the early days of the starch ethanol industry be created for the cellulosic biofuels industry. As with the starch version, this program would help make biorefinery start-up and expansion more affordable and easier to finance by covering the cost of initial feedstock in the first year of biorefinery operation and incremental feedstock used to increase capacity in subsequent years. The USDA suggested that this program could be simplified to provide a per gallon payment rate, include a payment limit per eligible entity, and be terminated as cellulosic ethanol becomes commercially feasible.

Renewable reserves: As was demonstrated by Shell's restatement of reserves in 2004 and the resulting decline in their share price, the market capitalization of the oil majors is determined at least in part by their proved reserves. This provides an incentive for these companies to continue to invest in exploration because their share price should increase with any new finds. As of today, there is no equivalent incentive for these companies to invest in development of renewable fuels nor is there a good metric for them to be able to measure themselves against one another in terms of how aggressively they are pursuing biofuels. We therefore suggest that the SEC be asked to convene the necessary experts

and promulgate a definition of "renewable reserves", which would exist alongside the definition of proved reserves. From our perspective, long-term contracts with growers around a biorefinery that give the biorefinery the right to purchase biomass feedstock from those growers are not substantially different from long-term leases that oil companies have on oil fields that give them the right to extract oil from those fields. Creating this definition would have negligible cost and would provide a market-based incentive for the oil majors to invest significantly in the development of this industry.

DOCUMENTS SUBMITTED FOR THE RECORD

APRIL 4, 2007

STATEMENT OF BRIAN JENNINGS, EXECUTIVE VICE PRESIDENT
AMERICAN COALITION FOR ETHANOL (ACE)

FIELD HEARING OF THE SUBCOMMITTEE ON ENERGY, SCIENCE, AND TECHNOLOGY OF THE SENATE AGRICULTURE COMMITTEE

SOUTH DAKOTA STATE UNIVERSITY
BROOKINGS, SOUTH DAKOTA
APRIL 4, 2007

Senator Thune, thank you for the opportunity to submit testimony on behalf of the American Coalition for Ethanol (ACE) at today's field hearing on the future of cellulosic ethanol in the U.S. ACE is the grassroots voice of the ethanol industry, comprised of more than 1600 members nationwide, including ethanol producers, commodity and farm organizations, rural electric cooperatives, and businesses and individuals supportive of increased ethanol production and use. As such, ACE is the nation's largest ethanol advocacy association.

Several ACE member-companies are conducting research and development initiatives to successfully deploy cellulosic ethanol production on a commercial scale, including two South Dakota-based firms making presentations at this hearing; VeraSun Energy and Poet Energy (formerly the Broin Companies). It is also fitting that today's field hearing is being held at South Dakota State University (SDSU) and that Kevin Kephart, Vice President of Research for SDSU, is offering testimony on the promising research being conducted at this land-grant university to help make ethanol from biomass and cellulose technically feasible.

A fundamental transformation is taking place in rural America; agriculture is becoming an integral part of energy. Ethanol from corn is already the most prominent example of how agriculture can help meet the nation's food, fiber, and fuel needs. The progress of the ethanol industry has been extraordinary. Consider the vital statistics of the U.S. ethanol industry today:

- 118 ethanol plants are in operation, capable of producing 5.5 billion gallons of ethanol. 12 plants are in operation in South Dakota, making 600 million gallons of ethanol.
- 76 ethanol plants are under construction in the U.S., and 5 facilities are under construction in South Dakota. U.S. ethanol production capacity will exceed 7 billion gallons in 2007.
- Ethanol is blended with nearly 50 percent of the nation's fuel supply, and ACE estimates that in South Dakota, nearly three-fourths of the fuel contains ethanol.

- Last year, ethanol created a high-value market destination for 2 billion bushels of corn, 20 percent of the U.S. corn supply, and more than half of South Dakota's corn production was used to produce ethanol – a higher percentage than in any other state.

Based on the Prospective Plantings Report released by the United States Department of Agriculture (USDA) on March 30, farmers intend to plant 90.5 million acres of corn in 2007, 15 percent more acreage than a year ago and the largest corn crop in the U.S. in nearly 65 years. Virtually all of the ethanol produced in the U.S. at present is distilled from corn and sorghum, though smaller amounts are also being made from cheese whey, beer, and beverage waste. Nevertheless, we recognize there are limits on how much corn we can and should use for ethanol in the U.S. This is one of several factors why ACE members, government agencies, land-grant universities, and others are aggressively working to make cellulosic ethanol a commercial success.

The Benefits of Growing the Ethanol Industry with Grain and Cellulosic Feedstocks

To calculate the potential of cellulosic ethanol, researchers at the University of Tennessee evaluated a bipartisan proposal introduced in the U.S. Senate to create a Renewable Fuels Standard (RFS) of 10 billion gallons of biofuels per year by 2010, 30 billion gallons per year by 2020, and 60 billion gallons per year by 2030. The figure below illustrates the grain and biomass feedstocks that could be used to reach 60 billion gallons per year of biofuels production in the U.S. (Ugarte et al. 2006).

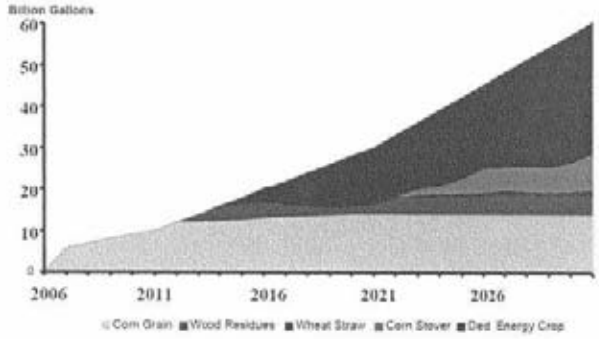

Figure 10. Ethanol Quantities from Selected Feedstock Under the ETH60 Scenario.

The University of Tennessee study also evaluated the feasibility of achieving these targets and estimated the associated economic benefits. Its findings were impressive:

- The U.S. can meet its food and feed demands and produce 60 billion gallons of renewable fuel per year, enough to displace more than 20 percent of the nation's gasoline consumption;
- Between 2007 and 2030, roughly $368 billion in additional economic activity and 2.4 million jobs would be created;

- Between 2007 and 2030, net farm income would increase by a total of $210 billion, while federal farm payment outlays would decline by as much as $150 billion;
- Due to the widespread geographic distribution of biofuel feedstocks, economic gains would accrue to most parts of the country, with the Midwest producing cellulosic ethanol primarily from agricultural residues, the South and Southeast producing considerable quantities of ethanol from dedicated energy crops, and the West, Southeast, and Northeast producing ethanol primarily from wood waste.
- Savings associated with reduced federal farm program payments likely would exceed $100 billion over the 25 year period;
- The biofuels industry would generate $45 billion in additional federal and state tax revenue.

The benefits of expanding ethanol production in the U.S. to include both grain-based and cellulosic feedstocks are compelling, but, it is instructive for the subcommittee to recognize that hurdles and challenges stand in the way to making biomass ethanol a commercial success story. Given the role ethanol plays in our nation's energy strategy and its clean air and economic development benefits, ACE believes it is appropriate for the federal government, through the Farm Bill and other legislative vehicles, to help make cellulosic ethanol technically and commercially feasible.

Let me highlight four overriding challenges to making cellulosic ethanol a reality today:

1. The cost and complexity of converting biomass feedstocks into ethanol.

2. Overcoming the capital costs of financing and constructing cellulosic biorefineries.

3. Feedstock challenges; including how and where to grow sufficient supplies of dedicated biomass energy crops, and how to harvest, collect, transport, and store biomass.

4. Sustainability challenges; respecting the need to protect soil quality, wildlife habitat, and land conservation practices while using biomass resources for ethanol production.

The USDA Office of the Chief Economist has developed the following table comparing the production of ethanol from corn and cellulosic feedstocks, reinforcing some of the challenges that we have highlighted about cellulosic ethanol and feedstocks:

	Corn Feedstock	Cellulosic Feedstock
Capital Costs	$1.25-$1.50/gal	$4.30-$5.50/gal
Ethanol Yield	98 gal/ton	70-80 gal/ton
Conversion Process	Simple	Complex
Enzyme Cost	$0.03/gal	$0.30-$0.50/gal
Alcohol Content	14-20%	4%
Transport Costs	Low	High

Cellulosic Ethanol Production Technology is Ripe for Commercial Deployment

Despite the challenges confronting the commercialization of cellulosic ethanol, the technology has been proven in laboratories and pilot facilities around the globe. Converting cellulosic feedstocks such as corn stover, wheat and rice straw, dedicated biomass energy crops, and wood and wood residues can be accomplished using acids, enzymes, and gasification techniques. Of the basic conversion pathways being pursued, some experts believe projects that rely on enzymatic processes to break down cellulose appear closer to commercial-scale development than those based on gasification. Nonetheless, it is likely that a variety of technologies will be successfully employed in the future to produce ethanol from biomass. These technologies exist today and companies that own them are attempting to make the transition from pilot-scale plants to commercial-scale facilities. In fact, six companies were recently awarded up to $385 million in funding from the U.S. Department of Energy to help bring cellulosic ethanol to market and revolutionize the industry. I have listed a selection of these projects which are being developed by ACE-member companies.

- Poet Energy (formerly the Broin Companies), Novozymes, Dupont, and other partners are working to integrate and process 842 tons per day of corn fiber and corn stover in a bio-chemical process at an existing corn-based dry mill ethanol facility near Emmetsburg, Iowa. The biorefinery will produce 125 million gallons of ethanol per year, with approximately 25 percent from lignocellulosic feedstocks. Construction of the project is set to begin in calendar year 2007.
- Range Fuels (formerly Kergy, Inc.) and its partners are working to convert 1200 tons per day of wood residues and woody energy crops into 40 million gallons of cellulosic ethanol and 9 million gallons of methanol in a thermo-chemical conversion process at a facility to be located near Soperton, Georgia. Construction of this project will begin in 2007.
- BlueFire Ethanol, Inc. and its partners are working to convert 700 tons per day of sorted green waste and wood waste from landfills into cellulosic ethanol with concentrated acid processing. The company intends to begin construction of a 19 million-gallon-per-year facility in Southern California in 2008.
- Iogen Corporation, and partners Royal Dutch Shell and Goldman Sachs are working to convert agricultural residues, including wheat, barley, and rice straw, corn stover, and switchgrass in a biochemical process to cellulosic ethanol. Their first plant is expected to produce 18 million gallons per year and construction will begin on it in 2008.

Two other ACE ethanol producers are working on other innovative biomass-related projects.

- ***Chippewa Valley Ethanol Company (CVEC),*** a cooperatively-owned ethanol plant near Benson, Minnesota, entered into a research and development agreement with Frontline BioEnergy to build and integrate a biomass gasification system to create process heat and steam to operate the plant. Recognized for its innovation, CVEC intends to initially displace up to 20 percent of its natural gas usage and has future plans to displace virtually all natural gas use at the plant.
- ***E3 BioFuels*** is ready to commence operation of the nation's first closed-loop ethanol biorefinery. Located adjacent to a 30,000 head cattle feedlot near Mead, Nebraska, the company will create a biogas from the anaerobic digestion of cattle manure to produce the thermal energy needed to operate the ethanol facility. Wet cake produced at the plant will be included in rations for the cattle feedlot. It is estimated this closed-loop technology will reduce 95 percent or more of the natural gas used in a typical ethanol facility. The following link will detail more about this promising technology www.e3biofuels.com/technology/.

Financial Barriers to Commercial-Scale Biomass Ethanol Production can be Overcome

Some of the most serious barriers to the commercial deployment of cellulosic ethanol are financial. According to USDA data, it costs about 4-5 times as much to finance and build a cellulosic ethanol plant as an existing dry mill facility. An aggressive public-private partnership needs to help reduce technology costs, while federal assistance in the form of grants and loan guarantees will need to be provided to generate the capital necessary to finance, construct and operate these biorefineries. Eight separate programs designed to promote cellulosic ethanol, primarily focused on providing loan guarantees, are housed in three federal agencies (EPA, DOE, and USDA). ACE believes a more rational configuring of these critically important programs would be helpful. In particular, as Congress writes the 2007 Farm Bill, it should consider increasing funding for these programs and consolidating all of them at USDA, which has considerable experience in administering loan guarantees and the will to ensure that the national objective of developing a vibrant cellulosic ethanol industry is achieved.

Promoting Cellulosic Feedstock Production and Handling in the Farm Bill

While emphasis is appropriately being placed on ways to drive down the technology conversion and capital costs for cellulosic biorefineries, resources must also be invested to help ensure farmers have the tools and information they need to plant and market biomass feedstocks for cellulosic ethanol production. If we neglect biomass feedstock production and handling challenges, instead investing all our resources on technology and capital costs, we will find ourselves altogether unprepared to launch a new trajectory for ethanol production based on cellulose. ACE is supportive of developing a common-sense program in the Farm Bill to enable farmers to receive incentives to grow dedicated biomass crops for ethanol production, but we acknowledge this must be done in a fashion that balances the priorities of sustainability, conservation, and wildlife habitat as well.

There has been some recent discussion of whether it is appropriate to allow Conservation Reserve Program (CRP) acreage to be used for producing dedicated biomass energy crops such as switchgrass. Many conservation and wildlife organizations have opposed this approach. The way in which the CRP program currently is implemented may preclude its use for this purpose, since the criteria for accepting acres into the program is inconsistent with selecting lands based on proximity to fuel production and processing facilities. Moreover, most CRP lands are considered marginal for crop production and may not be capable of producing desired yields for biomass crops. An alternative approach, therefore, may be to promote the use of non-CRP lands for cellulosic feedstocks. We look forward to working with Congress to enable the Farm Bill to offer programs which provide meaningful incentives for farmers to grow dedicated energy crops on working lands. It may also be instructive for the Farm Bill to contemplate tools, including credit programs, that assist farmers and cellulosic producers in overcoming the harvest, transportation, and storage challenges associated with bulky biomass feedstocks.

Promoting Energy Efficient Ethanol Production in the Farm Bill

As energy costs continue to increase in the U.S. and Congress gets more serious about considering mandatory limits on greenhouse gases, producers of energy-efficient, low-carbon renewable fuels, such as ethanol, and particularly cellulosic ethanol, can benefit. Hundreds of new biofuels plants are in the construction and/or planning stages currently and are expected to be operating in the next few years. To what extent these plants will benefit from the establishment of carbon limits will

depend to a large extent on what energy source—coal, natural gas, or biomass—is used to fuel the feedstock-to-ethanol conversion process.

The Farm Bill can be used to help the U.S. ethanol industry prepare for potential future greenhouse gas emission restrictions by providing incentives to install low-carbon processing and conversion technologies, and to research, develop, and deploy technologies for harvesting, storage, handling, and transportation of cellulosic feedstocks. Moreover, the Farm Bill can fund research into the appropriate amount and timing of harvesting cellulosic feedstocks, so that we can prevent soil erosion, provide wildlife habitat, respect nesting seasons and meet other policy objectives.

Intersection of the E10 Market and Limits on Corn-Based Ethanol – A Larger RFS is Needed

There is an intersection between what we refer to as the "blend market," where E10 comprises virtually every gallon of motor fuel in the U.S., and the upward limitations of how much corn we can distill into fuel ethanol, reinforcing the need to make cellulosic ethanol a reality if we are to achieve a more meaningful reduction in fossil fuel use.

The rapid expansion of the ethanol industry and our progress in creating market access has led some to conclude that the current E10 blend market of approximately 12-14 billion gallons in annual ethanol demand nationwide may be satisfied as soon as the 2010-2011 timeframe. It is expected that this market demand will be met almost entirely with corn-based ethanol. While the marketplace will ultimately make the determination on how much corn can be used to make ethanol, most expert analysts forecast that the production of corn-based ethanol is limited to around 5 billion bushels of corn making approximately 15 billion gallons of ethanol. Therefore, producing ethanol at levels exceeding 15 billion gallons per year to satisfy demands beyond the E10 blend market will require a wide array of cellulosic feedstocks to compliment the corn-based ethanol industry.

ACE believes it is critical to create a public policy framework now that will help establish market access for ethanol, derived from cellulosic-feedstock and grains, beyond the E10 marketplace. Ethanol producers do not have the luxury of marketing their product directly to motorists. Instead, they rely upon oil companies to make ethanol-blended fuel available at the retail level. While ethanol has gained greater acceptance by oil companies in recent years, it remains a fact that left to their own devices, oil companies would rather not use ethanol because it displaces one of their own products - gasoline. We rely upon public policies to help create market access for ethanol, so that motorists may have a choice between clean-burning ethanol and fossil-fuel based gasoline. It is evident that in order to achieve a meaningful reduction in our nation's risky and expensive dependence on foreign oil, we need ethanol to comprise more than simply 10 percent of the fuel supply, more than the so-called "blend market." Therefore, ACE believes it is imperative for Congress to take steps soon to ensure the future growth in ethanol demand beyond the E10 blend market by adjusting the Renewable Fuels Standard (RFS) schedule upwards. This will help create a reliable and sustainable future market for both corn-based and cellulosic ethanol.

ACE Policy Recommendations

While not all of these policy options fall within the jurisdiction of the Agriculture Committee or the Farm Bill, we nevertheless encourage Congress to consider the following public policy framework to help create certainty for cellulosic and corn-based ethanol in the future:

- Expand and extend the RFS to reach 10 billion gallons of biofuels per year by 2010, 30 billion gallons per year by 2020, and 60 billion gallons per year by 2030, as proposed in bipartisan legislation introduced in the U.S. Senate. Congress may want to carve out a significant portion of the RFS for cellulosic ethanol to provide the market certainty needed to attract financing for new cellulosic ethanol biorefineries. Ethanol production is likely to exceed the current RFS demand floor by at least 1 billion gallons in 2007, it is critical to act now to adjust the RFS schedule to better correspond with actual production trends.

- Promote the use of higher blends of ethanol in the existing fleet of automobiles by instructing EPA to conduct analysis of the viability of various high blends (for example, E15, E20, E30, etc). ACE is exploring the use of higher blends of ethanol in gasoline and is eager to work with Congress and EPA to make higher blends a reality. Furthermore, we believe it is important to provide incentives to retailers to purchase and install infrastructure today, such as blender pumps, which will dispense the biofuels that motorists are likely to use in the future, such as E20, E30, etc. Recent bipartisan legislation creates a new 40 percent tax credit for such blender pumps to dispense these higher blends of ethanol, and ACE encourages the adoption of this incentive program.

- Increase funding for and consolidating federal cellulosic biofuels loan guarantee programs into a single program at USDA. Implementing many existing loan guarantee programs through three separate federal agencies is largely unworkable and creates unnecessary red tape. USDA has considerable experience in implementing loan guarantee programs and expertise in evaluating biofuels projects through its Office of Energy.

- Establish a pilot cellulosic biofuels feedstock program. Congress should consider establishing a new program to encourage the cultivation and harvesting of cellulosic feedstocks. The Farm Bill should also provide a meaningful payment to landowners who convert existing cropland to grow cellulosic biofuel feedstocks for nearby cellulosic Biofuels plants in ways that improve wildlife habitat, reduce soil erosion, and protect water quality.

- Require automakers to ensure that 100 percent of the cars sold in the U.S. be flexible-fuel and require the installation of E85 and/or blender pumps at all gas stations affiliated with major oil companies. It also may be instructive for Congress to examine how to better achieve energy conservation through revising CAFE standards.

- Establish a cost-share program under Title IX of the Farm Bill to provide cost-share assistance to ethanol plants for the installation of low-carbon processing and conversion technologies.

- Extend the VEETC blenders' credit for ethanol beyond 2010, and retain the existing secondary import tariff offset on imported ethanol, so that American taxpayers do not subsidize imports to the detriment of the emerging domestic cellulosic ethanol industry, exchanging dependence on one source of foreign energy for another.

The widespread development of biomass-based biofuel production in the U.S. has the potential to dramatically reshape American agriculture and farm policy in the decades ahead. Senator Thune, thank you for the opportunity to offer our views today, and, on behalf of the members of ACE, I commend your leadership on ethanol issues. Thank you.

WRITTEN TESTIMONY OF THE
ASSOCIATION OF FISH AND WILDLIFE AGENCIES

SUBMITTED TO THE

SUBCOMMITTEE ON ENERGY, SCIENCE AND TECHNOLOGY OF THE

SENATE COMMITTEE ON AGRICULTURE, NUTRITION, AND FORESTRY

CONCERNING:
THE NEXT GENERATION OF BIOFUELS:
CELLULOSIC ETHANOL AND THE 2007 FARM BILL

FIELD HEARING HELD
APRIL 4, 2007
BROOKINGS, SD

The Association of Fish and Wildlife Agencies (Association) thanks you for the opportunity to share with this committee our thoughts on the opportunity and challenges that biofuels, and specifically cellulosic ethanol, provide our nation. The Association represents all 50 state fish and wildlife agencies and their interest in the professional management of the nation's fish and wildlife resources.

The accelerated development of cellulose-based biofuel is clearly needed to help meet our national goal of displacing 30% of our transportation fuels by 2030. Ethanol and other biofuels are part of the larger solution, including increased conservation and efficiency, for meeting our transportation fuel needs and increasing our nation's energy security.

America's farm and ranchlands, including non-industrial private forestland, traditionally having been recognized for food and fiber production, are now being looked to as a source of energy in the national quest for energy security. National focus continues for the use of cleaner, renewable energy fuels in homes, businesses and transportation.

Renewable energy sources that could be produced on America's farm and ranchlands, including non-industrial forest lands, include wind power, solar power, and biofuels. The use of biomass to produce cellulosic ethanol brings potential opportunities for truly "green" fuels processed from perennial feedstocks that could protect soil and water quality, improve fish and wildlife habitat, and sequester carbon. Much of the broad public support for cellulosic fuels is the promise of energy sources that are renewable, sustainable, and provide additional environmental benefits and services. From this perspective, proactive and purposeful development of biofuels opportunties will be critical to public support for developing and using cellulosic fuels. The 2007 Farm Bill provides an opportunity to encourage the further development cellulosic fuels to provide and balance multiple public services, in terms of both producing energy and providing valuable environmental services (i.e., soil and water quality, fish and wildlife habitat, carbon sequestration).

However, scientific information is currently lacking on how biofuels feedstock production can be balanced with environmental services. This information is critically needed if we are to facilitate the next generation of renewable fuels without jeopardizing the nations' fish and wildlife, soil, water, and air quality conservation needs and objectives. In general, scientific research should be conducted in conjunction with all biofuels initiatives in the 2007 Farm Bill to provide insight for future decisions that maximize conservation and renewable energy opportunities. Scientific research and information is of particular importance should biomass feedstocks become integrated into the Conservation Title of the Farm Bill as suggested in USDA's 2007 Farm Bill Proposals. For the Conservation Reserve Program (CRP) and other Farm Bill conservation programs, the rush to develop biofuel crops should not have unintended consequences that sacrifice the natural resource conservation gains achieved over the past two decades. Protecting and enhancing the conservation benefits for fish and wildlife, soil, and water should be the starting point for discussion about future cellulosic biofuels programs.

Specifically, the following elements will be important in developing biofuels programs that balance biomass production and environmental services, including fish and wildlife habitat:

- Stand composition: Perennial vegetation appropriate for the location (grasses/legumes in areas that were historically prairie and woody species in areas historically forested) should be used. Perennial crops offer greater environmental benefits for fish and wildlife, soil, and water conservation when compared to annual plant crops. In addition, perennial crops such as deep-rooted native warm season grasses offer benefits including carbon sequestration important to offset global warming. Mixed stands of grasses and forbs provide more valuable habitat for multiple species, whereas monocultures of any grass are very limited in providing wildlife habitat. For example, switchgrass grows in bunches and adding additional species of grasses and forbs can dramatically improve benefits for reducing soil erosion, improving water quality, and improving fish and wildlife habitat. Plants with invasive properties (those that may displace native plant species and communities) should not be used for producing biomass.
- Harvest strategies: Annual harvest and short stubble heights will result in fewer soil, water and fish and wildlife habitat benefits. Annual harvest will also affect grass vigor and require additional inputs (fertilizer and reseeding over time). To promote sustainability with the fewest inputs and to promote soil, water, and fish and wildlife benefits, we suggest that no more than 50% of a field should be harvested in a given year. Additionally, harvest should be done in the fall and a stubble height of 12 inches minimum should be left to capture snow, improve soil moisture retention, reduce soil erosion, and to provide some residual cover for the next spring for ground nesting birds.
- "Sodsaver" or non-cropland conversion: Any land that does not meet the definition of cropland, as determined by the USDA/Farm Service Agency, converted from non-cropland status to cropland should be made ineligible for any federal benefit, including but not limited to price and income support payments, crop insurance, disaster payments, conservation program enrollment, and FSA farm loan benefits. Remaining prairies provide tremendously valuable fish and wildlife habitat and should not be converted for commodity crop or biofuel production.
- Sustainable use of forest resources: Woody biomass from non-industrial private forestland, as well as from public forestlands, must be harvested and managed under a sustainable management plan that balances biomass production with forest health, soil and water quality, and fish and wildlife habitat.
- Research and development: Research and development funding should be authorized and promote the next generation of biofuels and renewable energy technology that can produce biofuels in addition to providing fish, wildlife, soil, nutrient management, air quality and water conservation. Such research should include life cycle analyses of green house gasses (GHG's), energy, and carbon sequestration from biomass feedstocks, as well as the impacts on soil quality, water quality and quantity, and fish and wildlife habitat. Conservation benefits from farm bill conservation programs should not be sacrificed or diminished for the production of biofuels.

There are currently pressures in Farm Bill deliberations to select "winners" in the emerging world of biofuels feedstocks. Unfortunately, the lack of information, as well as the quickly changing technologies on producing energy from biomass, precludes predictions that are much more than speculation and opinion. The 2007 Farm Bill provides an opportunity to develop a pilot program (or programs) to provide incentives for new and environmentally friendly biomass feedstocks, and to provide dedicated research funding to evaluate the potential for both energy production and environmental services from these feedstocks.

The Association looks forward to your leadership in proactively addressing the needs for both fish and wildlife conservation and biofuels production from America's agricultural lands. By working together, we can develop biofuel energy sources that are truly a win-win for our nation's security and natural resources. The Association looks forward to being part of the continuing dialogue on how we can creatively address our nation's energy and natural resource needs.

Dakota Rural Action
PO Box 549 Brookings SD 57006
(605) 697-5204 (605) 697-6230 (fax)
Email: action@dakotarural.org

April 4, 2007

Dear Senator Thune,

On behalf of our membership and activists we urge you to support sustainably produced bioenergy as a key component of a comprehensive strategy to reduce America's dangerous dependence on oil and to help solve global warming. Done right, bioenergy holds great potential to advance essential environmental and energy security goals. Pursued without adequate guidelines, however, bioenergy production carries grave risk to our lands, forests, water, wildlife, public health and climate. We therefore urge you to support the energy efficiency policies and performance standards that will ensure bioenergy meets its promise while avoiding collateral environmental damage.

The starting point for any constructive bioenergy policy, from increasing the size of the renewable fuel standard to enhanced biofuels programs in the Farm Bill, has to be much greater end-use efficiency. Efficiency policies such as raising Corporate Average Fuel Economy standards for vehicles and promoting smart growth in our cities are essential to reduce oil demand and ensure that our lands are not put under excessive pressure to produce biofuels feedstocks.

If not carefully managed, increased production of biofuels has the potential to cause widespread environmental devastation. Accelerated corn cultivation for ethanol, for example, threatens to deplete water tables, magnify contamination by fertilizers, pesticides, and herbicides, and undermine vital conservation programs like the Conservation Reserve Program. On farms and in forests across the country and abroad, imprudent biomass harvesting would cause soil erosion, water pollution and habitat destruction, while also substantially reducing the carbon uptake of land. Advancing a biofuels policy that leads to conversion of land into a type that lowers its carbon uptake potential is a particularly perverse result for a policy that is intended to reduce global warming pollution.

Fortunately, we can manage and mitigate these bioenergy impacts through thoughtful legislation. Developing a sustainable bioenergy industry will require low carbon and other environmental performance standards.

New policies are also needed to accelerate the transition to bioenergy produced from feedstocks such as cellulosic crops grown in sustainable systems. These policies include research and development on feedstocks such as native perennials, incentives for bioenergy production facilities with a preference for local ownership, and programs that help farmers make the transition to growing feedstocks in sustainable agronomic systems.

Again, bioenergy holds great promise as a tool for reducing global warming pollution, breaking our dangerous oil addiction, and revitalizing rural economies as long as we shape the nascent bioenergy industry to provide these benefits in a sound and truly sustainable fashion. We look forward to working with you on this important and challenging issue.
Sincerely,

James Buchloz, Chair, Dakota Rural Action

Bioenergy Feedstock Guiding Principles

- *The use of bioenergy must reduce greenhouse gas emissions.* Depending on how it is produced, bioenergy can significantly lower or increase greenhouse gasses. Key factors include the amount and sources of energy used to produce biofuels, and the potential direct or indirect conversion of carbon-sequestering forests and grasslands to lower carbon bioenergy feedstocks. To assure benefits, new incentives and requirements fro increased use of biofuels need to be tied to significant reductions in the greenhouse gas intensity of these fuels. Practices that negate the greenhouse gas benefits of biofuels include conversion of native grasslands to produce biofuels feedstocks, loss of old growth forests, intensified tillage, and use of coal to power ethanol plants.
- *Biomass used for bioenergy has to be renewable.* Biomass must be regrown on site, recapturing its released carbon, so that it is genuinely sustainable-unless it is the by-product of activity with independent, over riding social utility (like removal of vegetation immediately around wild land-interface homes).
- *Bioenergy feedstocks must not be grown on environmentally sensitive lands.* Such lands include: old growth forests; wilderness study areas; road less areas on national forests; native grasslands; important wildlife habitat; ecosystems that are intact, rare, high in species richness or endemism, or exhibit rare ecological phenomena.
- *Conversion of natural ecosystems must be avoided.* Habitat loss from the conversion of natural ecosystems represents the primary driving force in the loss of biological diversity worldwide. Activities to be avoided include those that alter the native habitat to such an extent that it no longer supports most characteristic native species and ecological processes.
- *Exemptions and waivers from environmental rules must not be used to promote biomass production or utilization.* Trading one serious environmental harm for another is poor policy. Our environmental laws and regulations act as a fundamental system of checks and balances to guard against just such collateral damage and the promotion of bioenergy production and utilization must in no way be exempted.
- *Conservation and Wetland Reserve Programs supported by the Farm Bill must be managed for their conservation benefits.* These programs protect marginal lands, water quality, soil and wildlife habitat. Enrolled lands need to be managed principally for these important values, not bioenergy feedstocks.
- *Independent certification, market incentives, and minimum performance requirements are necessary to ensure that bioenergy feedstocks are produced using sustainable practices.* Certification standards for biomass from private lands must address key environmental and social objectives, such as protection of wildlife habitat, prevention of erosion, conservation of soil and water resources, nutrient management, selection of appropriate feedstock species, and biologically-integrated pest management. New policies are needed to ensure that producers, refiners and distributors adhere to minimum performance requirements and have incentives to maximize environmental performance at each step.
- *Stringent safeguards must be established for bioenergy production from feedstock derived from federal land.* Federal lands, including wildlife refuges, BLM lands, national forests and grasslands, are held subject to the public's interest in their non-commodity values. They are not appropriate for large-scale, sustained biomass sourcing.

WRITTEN TESTIMONY OF DUCKS UNLIMITED, INC.

BEFORE THE:

U.S. SENATE, COMMITTEE ON AGRICULTURE

SUBCOMMITTEE ON ENERGY

CONCERNING:
THE NEXT GENERATION OF BIOFUELS: CELLULOSIC ETHANOL AND THE 2007 FARM BILL

APRIL 4, 2007
BROOKINGS, SD

Ducks Unlimited was founded in 1937 by concerned and farsighted sportsmen and conservationists. It has grown from a handful of people to an organization of over 1,000,000 supporters who now make up the largest wetlands and waterfowl conservation organization in the world. DU has conserved over 12 million acres of wildlife habitat in the U.S., Canada, and Mexico. We pride ourselves on our cooperative work with private landowners, assisting them in meeting their economic and production goals while providing high quality habitat for the wildlife that depend on their land for survival.

We are pleased to have the opportunity to share with the committee our views on biofuels and particularly cellulosic ethanol. Most experts agree that accelerated development of cellulose-based biofuel will be needed if we are going to meet our national goal of displacing 30% of our transportation fuels by 2030. We, like all Americans, see the utility of using ethanol and other biofuels in lowering the nation's dependency on foreign oil. However, we are also very concerned about what the increased pressure to grow corn, in the rush to produce biofuels, is having on native prairie and Conservation Reserve Program (CRP) grasslands across the Prairie Pothole Region (PPR) (Fig. 1). For the most part, these lands are generally inappropriate for crop-based biofuels production.

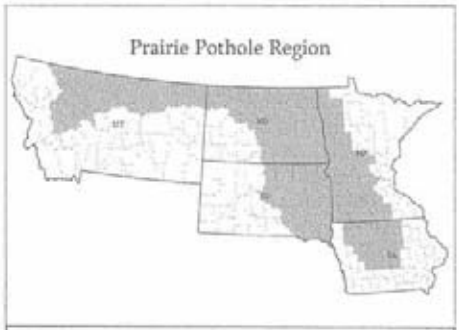

Figure 1. The Prairie Pothole Region

We are concerned because these native prairie and CRP grasslands, along with millions of wetlands, form the backbone of breeding habitat for many species of North American waterfowl. To many, this region is better known as the "duck factory". DU has focused considerable time and effort on gaining a better understanding of the biofuels industry and its potential impacts on our soil, water and wildlife resources, particularly in the eastern Dakotas and the rest of the PPR. These efforts have positioned us as a national leader within the wildlife community on this issue. We have been invited as speakers at several national meetings related to cellulosic ethanol, including the Cellulosic Ethanol Summit held in Washington, DC last fall. We represent wildlife interests on many national, regional and state biofuels working groups and have been involved with the regional feedstock workshops associated with the joint DOE/USDA study "*Biomass as Feedstock for a Bioenergy and Bioproducts Industry: The Technical Feasibility of a Billion-Ton Annual Supply*". We have built strong relationships with several industry representatives, including Iogen Corporation and Ceres, Inc., a member of the panel presenting testimony at today's hearing. We are developing, in close coordination with Ceres, Inc., a project in eastern South Dakota and North Dakota that involves significant research aimed at addressing the myriad of questions related to establishment, harvest, yields, transportation, storage and wildlife impacts that surround commercial-scale cellulosic ethanol production based on switchgrass. Answers to these and

many other questions are needed within the next few years, and should be substantially funded through the 2007 Farm Bill in order to set the stage for full-scale commercial development of cellulosic ethanol. We envision rapid commercial development as part of the 2012 Farm Bill, setting the stage for meeting the goals laid out by the President earlier this year.

The 2007 Farm Bill provides a unique opportunity to promote the next generation of renewable energy. In doing so, care must be taken to ensure the conservation of soil, water and wildlife resources while maintaining the substantial environmental gains made under USDA conservation programs. Funding should be focused on research and development that promotes the next generation of biofuels technology; a technology based on perennial crops that are managed to provide co-benefits to society, including wildlife conservation, cleaner water, healthy soils and carbon sequestration. This approach is consistent with the "green" image desired by this emerging industry, and will also provide a stream of alternative income sources for American farmers. Science, resource and market-based analyses of where and how cellulosic fuel production will be most beneficial, cost effective and sensitive to environmental limitations are not complete. However, it is becoming evident that our more environmentally sensitive lands, including those currently in native prairie grasslands or enrolled in conservation programs such as CRP, do not represent a viable land base for crop-based biofuels production. To further highlight our concerns over the use of native prairie and/or CRP for intensive biofuels production, we have created a document entitled ***Science and Viewpoints Related to Perennial Biomass Crops in the Northern Great Plains*** that is attached as part of our testimony.

Figure 2. Native prairie destruction and subsequent erosion, Stanley County, South Dakota, March 2007.

In summary, Ducks Unlimited looks forward to engaging in a joint effort with production agricultural and conservation interests, especially as we develop policy for the 2007 Farm Bill, to constructively craft a balanced and effective agricultural energy policy that lessens U.S. dependence on foreign oil while providing sound environmental and wildlife benefits. We strongly believe that agricultural energy policy should discourage the

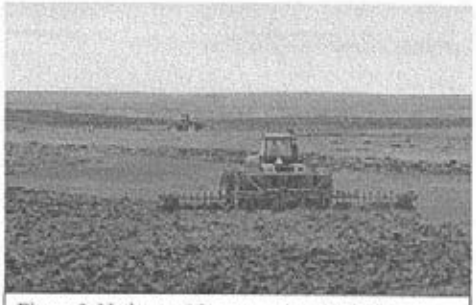

Figure 3. Native prairie conversion, Hyde County, South Dakota.

continuing destruction of native prairie across the PPR, which unfortunately, is occurring at an alarming rate, particularly in South Dakota (Figure 2 and 3). We urge the committee to strongly consider a path to energy independence that advocates a thoughtful, science-based approach to targeting and managing biomass crops in a manner that benefits the agricultural producers, industry, citizens, wildlife and natural resources of this nation.

Ducks Unlimited thanks the committee for the opportunity to provide our viewpoints on this important issue. We look forward to continuing our contributions toward an "energy solution" while respectfully offering our wildlife, habitat restoration, technical expertise, and strong science to inform future discussions and policy decisions having impact on how and where a sustainable biofuel and ethanol industry should be developed.

DUCKS UNLIMITED

Science and Viewpoints Related to Perennial Biomass Crops in the Northern Great Plains

Ducks Unlimited, Inc. -- September 2006

As the country searches for ways to meet our national energy demands, attention has been focused on the potential of the Northern Great Plains (NGP) to produce energy from perennial plants like switchgrass. Shortly after scientists and policymakers began considering this opportunity, attention quickly shifted to using existing grasslands – native prairie and Conservation Reserve Program (CRP) lands – as the source of feedstock. An important part of this discussion must be the potential wildlife, conservation, and environmental impacts of such a policy. The purpose of this document is to highlight existing scientific information and offer viewpoints in an effort to better inform the debate and discussion about perennial biomass crops. Here, our comments emphasize cellulosic production of ethanol, since it appears that this is the technology which is closest to implementation on a commercial scale.

The Importance of Native Prairie

Decades of research reinforce the overwhelming importance of native prairie (often called pasture or rangeland) to the wildlife and environment of the NGP. This 10,000-year-old climax community has biotic and genetic diversity that is unrivaled by any other habitat type in the NGP, except perhaps prairie pothole wetlands. Native prairie is also a community that has been greatly impacted by cropland agriculture, and which continues to be lost at rates ranging from 0.5% - 2%/year. Endemic landbirds and migratory shorebirds are particularly dependent on native prairie for their habitat requirements. Many species will not nest in any other habitat. Perhaps for this reason, populations of grassland songbirds are declining at a faster rate than any other guild of birds. Even "the best" (i.e., the most unfragmented and floristically diverse) CRP does not compare to the habitat provided by native prairie. Once it's lost, most scientists agree that it is impossible to restore prairie to the full compliment of flora and fauna that existed in the native state.

As the opportunity for perennial energy crops unfolds, DU is very concerned that existing native prairie is not destroyed to produce energy crops. If future technology allows the use of diverse, native grass and forb species as feedstock for bioenergy production, care must be taken not to negatively impact the many values afforded by native prairie as this biomass is harvested. Moreover, caution must be used so that aggressive, perennial "biomass" plants do not invade and supplant native prairie, as has already happened in many places with Kentucky bluegrass and smooth brome infestations.

Maintaining the Values and Intent of CRP

The Conservation Reserve Program was established to benefit soil, water, and wildlife conservation. By any measure, those objectives have been met or exceeded in the NGP. Of particular significance (and surprise) to conservationists is the extent to which wildlife benefits have exceeded original expectations. For example, CRP in the Prairie Pothole Region is credited with adding an additional 2.1 million ducks/year to the fall flight, and entire "pheasant economies" have emerged as populations of the popular game species have exploded due to CRP habitat. Substantial wildlife benefits were expected but certainly not at the magnitude observed. Several studies have also documented the benefits of CRP to other grassland birds and mammals.

The most important aspect of CRP is the degree to which it increased the total amount of grassland habitat present at a landscape scale. Several studies have documented the importance of grassland dominated landscapes to high reproductive success for a diversity of bird species. CRP fields filled in gaps and provided complementary grassland nesting habitat to the existing base of native prairie and hayland. Changes in the landscape level of grassland are thought to have altered predator communities and thus reduced predation rates on ground-nesting birds.

Studies have also indicated that the idled nature of the cover (i.e., relatively high, dense grow with underlying residual vegetation), rather than the species composition of the CRP planting, has also provided unique benefits. This is reinforced by recent research comparing duck nesting density and success in CP-1 (tame grass mix) versus CP-2 (native grass mix) CRP planting, which revealed no significant differences among the cover practices. In contrast, undisturbed grassland appears to compliment existing cropland, grazed pastures, and hayed meadows. Undisturbed grass is, in effect, a rare habitat type that affords birds and other wildlife an attractive option for secure breeding and refuge.

Proponents of using existing CRP as a feedstock for biomass energy often overlook the value of idled cover and its attractiveness to grassland wildlife. CRP subjected to comprehensive, annual harvest will not retain the same wildlife values as idled CRP which receives partial, periodic harvest (i.e. management). Because 23% of the nations CRP is in the NGP (8.3 million acres across ND, SD and MT alone), even small, incremental reductions in wildlife benefits in

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this region will have significant, continental impacts on some wildlife populations.

There are social and economic reasons for not using CRP as a platform for biomass energy feedstock. Since its inception, CRP has served as an emergency haying and grazing reserve during times of drought. In such times, the forage provided by CRP has been instrumental in helping the livestock industry weather tough times. This is the very industry that is the economic driver for retaining native pasture. Without a healthy livestock industry, land use will transition from pasture (native prairie) to cropland (a habitat with far fewer environmental and conservation benefits).

Acres enrolled in CRP also may not make a good starting point for launching a biomass energy industry simply because CRP is widely dispersed over the NGP, and proximity of feedstock to ethanol plants is such an overwhelming economic factor in the profitability of this industry. This topic of proximity and transportation costs is discussed further below. In addition, enzymes that are able to efficiently breakdown species mixtures of grass have yet to be developed, and most existing CRP acres are composed of such mixtures of two or more grasses and forbs. As mentioned earlier, droughts are a regular occurrence on the Northern Great Plains and available biomass in CRP fields is substantially reduced during these events. Therefore, most CRP would not be considered a reliable feedstock for the industry during many years.

If not CRP, then What?

Ducks Unlimited suggests a **CRP-like** program (i.e., an Energy Reserve Program) within the Farm Bill that is authorized, funded, and includes an acreage cap. Like CRP, the energy program could provide appropriate, annual payments to producers for growing biomass energy crops, particularly during the initial establishment period. It should also have criteria for enrollment, and that criteria should include a tight geographic focus around a location where a biomass energy plan will be – or is being – constructed.

The economics of biomass energy are dominated by three drivers: the conversion efficiency of the plant/technology, the per-acre biomass yield, and the transportation distance from farm to plant. To the latter point, it will do little good to have biomass energy acres widely dispersed over the landscape of the NGP. The area is too vast, and transportation costs too high. Instead, an energy reserve program should be designed so there is a synergy between industry and public policy that creates a positive dynamic between producers and local communities. For example, consider the merits of a program that qualifies producers for switchgrass commodity support if – and only if – they are located within a 50-mile radius of a new or proposed cellulosic ethanol plant. The local municipality will be motivated to retain/obtain the plant; growers will be assured that their crop is within a viable, economic transportation radius of the plant (hence they will have a market for their switchgrass crop); plant owners will be encouraged that there will be a ready supply of feedstock close by; and the government will not waste commodity support payments on fields that are widely dispersed and too far away from a plant to be of any use.

Switchgrass as a Commodity

As inferred above, it makes sense that switchgrass and other dedicated biomass energy crops should be considered commodity crops, not conservation program byproducts. This is important for several reasons. The first is to maintain clarity as to federal resources devoted to conservation versus commodity production. The U.S. taxpayer has shown a willingness to invest in both, but they (we) deserve clear accountability as to the magnitude of investment in each. Second, use of conservation programs to produce commodity products may set a dangerous precedent for other programs besides CRP. For example, if CRP can be used to grow energy crops, why shouldn't landowners be allowed to pump irrigation water out of wetlands enrolled in the Wetlands Reserve Program? Conceivably, the benefits of all USDA conservation programs could be undermined if we blur the distinction between conservation benefits and commodity production.

Third, producers who emerge to support the fledging biomass energy industry will likely need the same financial safety nets as those afforded other crop producers (subsidy, disaster, and insurance payments). Most of those payments originate from the Commodity Credit Corporation through an elaborate system administered by the Farm Services Agency. It just makes sense that support for perennial energy crops would be best accomplished by considering them a commodity from the outset.

Harvest Date and Stubble Height

With respect to switchgrass, it appears that a post-growing-season harvest will be the norm and that the switchgrass field will remain largely undisturbed during the spring through mid-summer nesting season. Under these circumstances, switchgrass can provide significant waterfowl and wildlife benefits provided that adequate stubble height is available for nesting birds the following spring. A minimum stubble height of 18 inches is recommended. Although we are not aware of empirical data to support the claim, in the arid NGP most crops do best when stubble height is sufficient to capture winter snowpack that provides for spring moisture. Thus, it may well be the case that the relatively small amount of biomass left unharvested to provide beneficial stubble height may be more than offset by improved moisture conditions and subsequent greater biomass yield the following year. Hence,

maintaining robust stubble height may make economic sense in addition to benefiting wildlife.

The Interaction of Yield and Location

Because of relatively fixed input costs (relative to yield) to establish and maintain switchgrass and the implications of rapidly increasing transportation cost with increasing distance from field to factory, switchgrass yield (tons/acre) has emerged as a critical metric. At the farm scale, one implication is that energy farmers would do well to take advantage of high-yield varieties of switchgrass grown in a monoculture as a regular part of their farming and crop rotation. They might opt to grow switchgrass on fields with the poorest soil types on their farm, but nonetheless on soils that are more fertile and productive than their highly erodible lands now enrolled in CRP or being used as pasture.

On a larger scale, the best regions of the NGP to grow switchgrass may not be those landscapes that tend to have poor soils – landscapes now dominated by native prairie or with large enrollments in CRP (i.e., the Missouri Coteau in the Dakotas). Conversely, the landscapes with the deepest, richest soils in high rainfall regions (i.e., the Red River Valley in the Dakotas) may continue to be best suited to growing high value crops for food, and biomass crops may simply not compete economically. This suggests that the "sweet spot" for energy crops may be in areas with moderately good soils, moderate land values, and moderate moisture regimes (i.e., the Drift Plain region of the Dakotas). This notion seems to be born out by economic models developed by Oak Ridge National Laboratory and others. Establishment of perennial energy crops such as switchgrass is also likely to be more successful and lead to higher yields on current cropland rather than existing CRP lands that may be converted to monocultures of dedicated energy crops. Existing cropland has been subjected to regular herbicide treatments, substantially reducing the seedbank for most annual weeds and providing an environment that optimizes timely establishment of switchgrass seedlings.

Integrating Ecological Goods and Services

Switchgrass and other perennial energy crops have already been linked to an important ecological service: carbon sequestration. Indeed, the opportunity to combine aboveground energy production with belowground carbon sequestration is significant and worth pursuing, but there are many other ecological goods and services that have been overlooked. These include fish and wildlife habitat enhancement, water quality improvement, sedimentation and nutrient loading reduction, attenuation of flood events, groundwater recharge, biological diversity conservation, and increased opportunities for education, research, and recreation. In "the new economy", these services are acquiring a value as commodities, sometimes in the global market. As these become marketable commodities, the ecological goods and services associated with biomass energy crops might effectively "buy down" the cost of energy production by providing additional revenue from the land. If the combination of income streams is sufficient the break-even price for the biomass product may be lower, thereby improving the economic climate under which investors decide to locate an ethanol plant.

Conclusion

As the opportunities for switchgrass and other perennial biomass crops evolve, Ducks Unlimited looks forward to informing the discussion and encouraging industry in a way that provides new energy sources that are complimentary to wildlife and the environment.

For more information contact:

Scott McLeod at 701.355.3541 or smcleod@ducks.org
Jim Ringelman at 701.355.3511 or
jringelman@ducks.org

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WRITTEN TESTIMONY
Izaak Walton League of America

Before the:
U.S. SENATE, COMMITTEE ON AGRICULTURE
SUBCOMMITTEE ON ENERGY

The Next Generation Of Biofuels: Cellulosic Ethanol and the 2007 Farm Bill
April 4, 2007
Brookings, SD

The Izaak Walton League is a private, non-profit conservation organization that for 85 years has supported strong federal conservation policies on private lands, especially agricultural lands. The Farm Bill is perhaps the single most important piece of legislation for the lands, waters and wildlife of our country. And its impact on the lives of individual farmers and their communities is profound.

The Izaak Walton League of America is pleased to provide the following testimony.

Agricultural Energy

Energy independence, strong rural economies, and the need to find solutions for global warming are spurring intense interest in domestic agricultural resources for energy production. Biofuels, such as ethanol and biodiesel, are the leading agents to displace dependence on foreign oil and decrease emissions of heat-trapping gases.

Ethanol and biodiesel are currently made from corn and soybeans. Intensive production practices that may be used with these row crops can have negative ecological impacts on the landscape. In terms of impact on fuel consumption, corn (sugar-based ethanol) can

only displace a small percentage of U.S. gasoline use.[1] The U.S. Department of Energy has therefore been looking toward the next generation of biofuels production. The new sources could be either corn stalks or perennial crops such as native grasses and woody crops such as short rotation poplar (cellulosic-based ethanol).[2] Moreover, new research has documented that the most productive source is multiple-species grass mixes that produced "238% more bioenergy" than single species.[3] In looking ahead to the future of biofuels, using perennials would afford benefits both to clean energy production and conservation.

Perennials have the potential to meet a much larger percentage of the nation's energy needs because they can grow on a variety of landscapes. They can also play a much larger role in achieving a balance between production goals for the new biofuels market and conservation goals. Real conservation advantages exist with planting of perennials, including reduced sedimentation, reduced nutrient and pollutant runoff, improved soil quality, additional carbon sequestration, and improved wildlife cover year round. However, the conversion technology to process a diverse set of grasses and other perennials is still in the development stage, set to be commercial in the next 5 to 10 years.

Presently, the majority of existing ethanol plants are corn-based facilities fired by natural gas. As natural gas prices fluctuate and rise, many facilities are beginning to use wood and coal as alternatives. The use of coal in ethanol facilities has raised concerns due to mercury impacts and impacts to wildlife sensitive areas. Corn ethanol derived from coal can have approximately the same global warming emissions as using gasoline—a possible zero reduction in global warming gases.[4] While the energy balance of corn ethanol has been shown to be positive,[5] the corn ethanol conversion process can be very water intensive. Approximately four gallons of water are needed for every one gallon of ethanol produced (concern must also be given to the cellulosic ethanol conversion process that could potentially be similarly water intensive).[6]

Cellulosic energy crops are poised to be a significant part of agriculture's future and have great potential to further conservation goals. The new bioenergy economy should be developed within a conservation framework. If not, the threat is that the detrimental impacts on wildlife, water, and soil from existing intensive agricultural systems will be

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[1] Congressional Research Service. 2006. *Agriculture-Based Renewable Energy Production.* Available at: http://ncseonline.org/NLE/CRSreports/06jun/RL32712.pdf. "If the entire 2005 U.S. corn production of 11.1 billion bushels were dedicated to ethanol production, the resultant 30 billion gallons of ethanol (20.2 billion GEG) would represent about 14.5% of projected national gasoline use of 139.1 billion gallons."

[2] U.S. Department of Energy Biomass Program. Available at: http://www1.eere.energy.gov/biomass/.

[3] Tilman, D., Hill, J. and Lehman, C. 2006. *Carbon-Negative Biofuels from Low-Input High Diversity Grassland Biomass.* Available at: http://www.sciencemag.org/cgi/content/full/314/5805/1598.

[4] Alexander E. Farrell, et al. 2006. *Ethanol Can Contribute to Energy and Environmental Goals.* Available at: http://www.sciencemag.org/cgi/content/full/312/5781/1748b. This analysis and review of ethanol studies also states that current understanding of greenhouse gas emissions from ethanol production is incomplete, with more analysis required.

[5] Natural Resources Defense Council and Climate Solutions. 2006. *Ethanol: Energy Well Spent, A survey of Studies Published since 1990.* Available at: http://www.nrdc.org/air/transportation/ethanol/ethanol.pdf.

[6] Institute for Agriculture and Trade Policy. 2006. *Water Use by Ethanol Plants: Potential Challenges.* Available at: http://www.agobservatory.org/library.cfm?refid=89449.

compounded. This threat is greatest for Conservation Reserve Program acreage and other protected sensitive lands being moved into row-crop production for ethanol.

USDA's Chief Economist, Dr. Keith Collins, has already promoted production on fragile lands. In congressional testimony, he explained that the expanding ethanol industry is raising the corn price and that more corn acreage is needed to counteract the price increase:

> The Conservation Reserve Program (CRP) … may provide a source of additional crop acreage …. The CRP will likely be examined as part of the 2007 Farm Bill process. The extent to which producers voluntarily exit the CRP, or changes in CRP policy, could reduce the effects of rapid ethanol expansion on corn prices noted [previously].
>
> Key factors that could ease the market adjustment are corn yield increases and acreage withdrawals from the CRP.[7]

Carefully conducted, there are great benefits from transitioning our transportation fuel system to a domestic source low in global warming emissions. Those benefits would be lost in a shortsighted rush to exploit sensitive land for a resource-intensive, first-generation system. The agricultural sector has much more to gain economically by meeting national energy needs and embracing the next generation of energy crops such as perennial native grasses.

Create Conservation-based Agricultural Energy

The U.S. is moving toward energy independence by "growing" energy across the landscape. It is imperative that ecological stewardship is prioritized so that the promise of biofuels as a clean alternative can truly be achieved.

Enact reforms during strong market
Recent expansion of corn ethanol production has resulted in increased market prices for corn. In September of 2006 USDA's Chief Economist Keith Collins testified to Congress that, "As ethanol production expands over the next several years, corn prices appear likely to set new records."[8] Additionally, corn ethanol expansion is credited with increasing prices for other crops such as soybeans and wheat due to potential acreage losses to corn planting. These higher prices confirm farmers' success in creating a new market and increasing their profits for producing corn and other crops.

Higher prices for program crops demonstrate the design and function of the "safety-net" purpose of commodity title programs. In times of low prices, commodity programs

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[7] Collins, K. 2006. *Testimony to U.S. Senate Committee on Environment and Public Works*. Available at: http://epw.senate.gov/hearing_statements.cfm?id=262516.
[8] Collins, K. 2006. *Testimony to U.S. Senate Committee on Environment and Public Works*. Available at: http://epw.senate.gov/hearing_statements.cfm?id=262516.

provide price supports for producers. When prices are higher than the loan rates and target prices guaranteed in commodity programs, no payments are made.

Ethanol-driven strong prices for corn and other crops serve to create a prime environment for closing the commodity title loopholes (the three-entity rule and unlimited commodity loan certificate and forfeiture gains). With no safety-net payments being made, no loopholes will be exploited. Farm operations structured to avoid payment limits may use the period of strong market prices to re-conform their business models. Additionally, the savings in commodity title spending may be used to fully fund conservation program commitments.

Establish energy crop standards
In order to ensure that biofuels retain their environmental attributes, perennial energy crop development should be on a parallel track with sustainability standards for growing, harvesting, and processing those crops. If stewardship criteria are not integrated, the threat exists that energy crop production will fall under an industrial extraction model, with all of its negative environmental impacts.

Native energy crops produced for biofuels should not be genetically modified to increase yields. Monoculture plantings should be avoided. No intensive pesticide use that will result in water pollution should take place. Standards should be established that verify that crops being produced for biofuels production are sustainable on our landscape and that management and harvesting of those crops is not adversely impacting critical natural resources.

Research conservation-based energy crop production
Perennial energy crops, such as switchgrass, have the potential to provide productive wildlife habitat in areas that are currently in row crops. Furthermore, a mix of grass types not only increases the wildlife benefits of perennial grasslands, but also increases energy yields.[9] However, no gold standards or best management practices currently exist for energy crop production and harvesting.

Research should be conducted to identify those management practices that would optimize energy crop production in line with conservation benchmarks. By conducting this on-the-ground research today and establishing sustainability standards in the coming years, the agricultural sector will be ready when the technology becomes commercial for processing perennial energy crops.

Research should be focused on growing and harvesting perennials as well as the development of sustainability standards. Research should also be focused on energy conversion processes that are able to accept mixed grasses (technologies such as gasifiers and enzymes that can break down variable cellulosic materials).[10] Among other

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[9] Tilman, D., Hill, J. and Lehman, C. 2006. *Carbon-Negative Biofuels from Low-Input High Diversity Grassland Biomass*. Available at: http://www.sciencemag.org/cgi/content/full/314/5805/1598.
[10] See U.S. Department of Energy Biomass Program for more information on technologies: http://www1.eere.energy.gov/biomass/sugar_platform.html

considerations, growing and harvesting guidelines should address water use, frequency and timing of harvesting, impact on breeding and rearing seasons, and soil quality.

Emphasize efficiency in bioenergy facilities
Planning for bioenergy facility locations must be done at a landscape level. Plans should take into consideration water availability, closed energy loops, and sensitive wildlife areas and habitat. There will be some land areas that will be well suited for intense production. Other areas will be marginally good. And some areas, such as highly erodible or ecologically sensitive lands, will be ill suited for any type of production.

The potential for closing the loop of biofuels facilities' energy needs should be prioritized. As ethanol facilities have a large thermal heat load, possibilities for co-locating next to power plants with considerable waste heat should be evaluated. Clean energy sources should be utilized wherever possible to meet this thermal need. Energy-efficiency within biofuels facilities should be maximized to reduce energy use.

Use Conservation Security Program for energy crop development
Bioenergy crop production should be integrated into the Conservation Security Program in the 2007 Farm Bill. We also note Sen. Thune's role during the 2002 Farm Bill process as House sponsor of the Conservation Security Program. The bioenergy crop integration should maximize benefit to both clean energy production and ecological stewardship. Investing in perennial energy crops within the CSP allows for conservation and sustainability standards to be infused into the future of biofuels production.

The integration of bioenergy crop development within CSP must not be to the detriment of other conservation programs. Instead it should serve to protect the purpose and funding of other conservation programs—the Conservation Reserve Program in particular—from encroaching bioenergy interests.

Some discussion has already focused on utilizing land enrolled in CRP contracts for energy crop production. However, CRP is designed to be a land-idling program and has an established record of conservation results for soil, water, and wildlife. Unlike CRP, the CSP is designed to support conservation-based production and is the appropriate and available program for developing perennial energy crop production. Its structure enables a broad coalition of support among energy and conservation interests for meeting the goal of planning for our energy and agricultural future in a sustainable way.

CSP and bioenergy integration should include:

- Implement Perennial Energy Crop Pilot Projects within CSP to research impacts on soil and wildlife. Standards for growing and harvesting should be developed that outline best management practices that meet both production and wildlife/conservation goals.
- Utilize CSP incentives for transitioning land currently in row crop production to perennial bioenergy crop production. Prioritize perennial production within CSP as a mitigating step on land from expired conservation reserve contracts that will not be re-enrolled.

The benefits from reducing global warming emissions may be lost if bioenergy development does not proceed with care. The 2007 Farm Bill has the opportunity to lay the foundation for an agricultural energy future that values conservation from the start. A farm and energy merger will only be sustainable if it strengthens rather than depletes the resources upon which it depends. This includes preserving the soil that energy crops use, conserving the water that energy-processing facilities need, and promoting the prosperity rural America requires.

SUMMARY: IWLA Policy Priorities for Biofuels in the 2007 Farm Bill

Agricultural Energy Proposals

- Develop research programs and projects for bioenergy development that will establish sustainability standards to optimize energy crop production in line with conservation benchmarks (*see "Conservation Security Program" below*).
- Prioritize wildlife, energy efficiency, and resource conservation in bioenergy production standards and facility development.

Conservation Security Program (CSP)

- Retain CSP as the primary stewardship incentives program to reward superior conservation systems on land in agricultural production.
- Ensure an adequate and protected funding supply to enable voluntary enrollment for eligible participants nationwide.
- Use fish and wildlife professionals to enhance fish and wildlife elements of the program in keeping with local characteristics and concerns.
- Integrate a conservation-based energy crop production component to establish perennial crops, sustainability standards, and wildlife protection in bioenergy production.

Thank you for the opportunity to submit this written testimony. The Izaak Walton League of America supports Farm Bill legislation based on the values that farming should be profitable, natural resources should be protected and federal funding should be distributed fairly.

Please contact Brad Redlin, Director, Agricultural Programs, if you have questions on these comments or other issues.

Brad Redlin
Director, Agricultural Programs
Izaak Walton League of America
1619 Dayton Avenue, Suite 202
St. Paul, Minnesota 55104
bredlin@iwla.org
Phone: 651.649.1446
Fax: 651.649.1494

KL Process Design Group

Bio-Fuels Engineering & Project Development

Testimony in Support of the 2007 Farm Bill
Presented to the Subcommittee on Energy, Science and Technology of the Senate Committee on
Agriculture, Nutrition and Forestry

April 4, 2007

We would like to thank Senator Thune and his staff for inviting written testimony from KL Process Design Group on evolving technology surrounding cellulose-to-ethanol processes. KL, located in Rapid City, is a leader in energy efficiency improvement of traditional corn-to-to ethanol plant technology. KL is also a leader in research of ethanol conversion processes from cellulose.

KL is the first company in South Dakota, and other traditional corn-to-ethanol technology providers, to design and construct a demonstration plant capable of commercial operations using ponderosa pine wood waste from Western South Dakota and Eastern Wyoming. The plant began start-up operations on March 2007 and is expected to improve and perfect the process through the spring.

The technology used in the Upton, Wyoming plant was developed through jointly-funded research between KL Process Design Group and the South Dakota School of Mines and Technology. This technology is capable of processing most types of cellulose material to include soft and hard woods, as well as switchgrass.

Through business planning, yield calculations, and pro forma financial projections, we believe the best scenario for locating a cellulose ethanol plant is near activities that produce cellulose as a by-product. Examples of this would include commercial timberland operations, forest thinning operations, sawmills, paper mills and other manufacturing facilities that struggle with the logistics of waste material.

The next best scenario is to obtain cellulose from hay land, or switchgrass, as ranchers are already equipped to harvest and move the material from the field to the plant. The drawback for this type of feedstock is its reliance on the logistics and cost of transportation to the plant.

The least desirable scenario is feedstock from corn stover or the like as row crop producers are not equipped to harvest and move this material to the plant. The ramification of supplying a corn stover plant will likely result in a structured refit of harvest equipment, which is not likely to occur in the near future as corn profit margins and corn-to-ethanol yields are at the highest they've ever been. Furthermore, corn stover is a necessary "give-back" to the soil that helps maintain soil nutrients needed for high-starch yields the ethanol industry has come to enjoy. Convincing each corn producer to deviate from this farming practice will be a difficult.

2693 C Commerce Road Rapid City, South Dakota 57702 605.718.0372 Fax 605.718.1372
www.klprocess.com

KL Process Design Group, Inc.

While the above scenarios are not the only feedstock supply designs available, we certainly believe that they are the most realistic given current farming and forestry practices.

With regards to the initial draft of the 2007 Farm Bill, we believe that the Commodity Credit Corporation's Bio-Energy Program has had a direct and profound effect on the ethanol industry that will allow the industry to grow to a level of national recognition while meeting the supply demands needed to convince bio-fuels skeptics. Reinstating this program to reflect the state of advancements in KL's cellulose-to-ethanol technology is timely. The CCC's model also reduces the criticisms of the industry: that it is heavily subsidized.

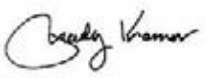
The CCC Bio-Energy program proved this. Once it had served the purpose of advancing corn-to-ethanol production, the program was suspended.

While we welcome the opportunity to provide testimony, it is not without frustration. Since 2001, KL has been denied funding from USDA SBIR grants in 2001 and 2002; USDA Woody Biomass grants in 2003 and 2006; Section 9006 NOFA in 2005; and the USDA Guaranteed Loan Program in 2006. Yet, KL continued to develop its cellulose ethanol technology with private and sweat equity. This research and development resulted in a demonstration platform at Western Biomass Energy. While the USDA and DOE were well-aware of KL's advancements to the demonstration stage, KL was not part of the recent DOE effort to distribute over $300 million in federal dollars to fund cellulose ethanol. However, two foreign firms, based in Canada and Spain, were part of the grant recipients. When KL tried to research the basis for proposal in these recent awards, DOE would not return our calls. Even the Clean Fuels Development Coalition (CFDC) was not aware of the solicitation.

Finally, recent talks within the Administration and the World Bank to move the United States to an "ethanol-OPEC" with Brazil to potentially make up for bio-fuels shortages in the US, are misguided. We believe the Administration's efforts should be redirected to the 2007 Farm Bill that funds cellulose-to-ethanol technology that could completely outrun Brazilian ethanol production capability.

Thank you for considering this testimony. We stand ready to offer tours of the Western Biomass Energy facility to substantiate our claim to the advancement of this technology.

Respectfully submitted,



Randy Kramer
President

Dave Litzen
Vice-President

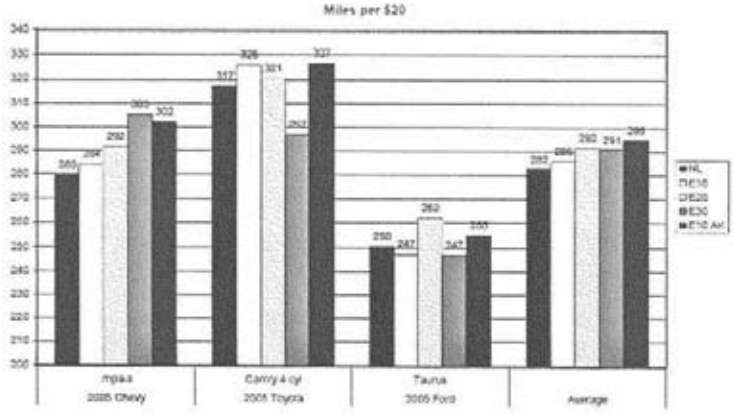
2693 C Commerce Road Rapid City, South Dakota 57702 605.718.0372 Fax 605.718.1372
www.klprocess.com

LAKE AREA TECHNICAL INSTITUTE
ENERGY SUBCOMMITTEE HEARING
4 April 2007

Senator Thune, distinguished committee members, ladies and gentlemen, I am Mike Cartney, the Vice President of Lake Area Technical Institute in Watertown, South Dakota. I am joined today by instructors from our Automotive, Diesel and Aviation technology program – a group of our very own bio-fuel myth-busters. Lake Area Technical Institute's involvement in examining concerns about ethanol and other bio-fuels started in the 1980's – not from the sanitized laboratory with control group, theoretical perspective. But, from the practical use, rubber meets the road so to speak, technician's perspective.

Myth #1: Ethanol will not work in small engines. When ethanol first appeared on the scene, many said it could not be used in small engines, such as lawn mowers. So Lake Area Technical Institute (LATI) used ethanol fuel in a multitude of small engines, noted performance, and then disassembled and examined the engines – dispelling the myth that the fuel would not work in these engines.

Myth #2: Ethanol does not perform well in vehicles. LATI was approached by the American Coalition of Ethanol (ACE) with a request to test automotive performance with various blends of ethanol (E10, E20, E30). LATI conducted the tests using three different vehicles (Camry, Monte Carlo, and Taurus) with surprisingly positive results supporting E20 and E30 usage. The following chart shows our results from using $20 worth of each type of fuel in three different types of cars – Ethanol was less costly per mile on average – with E30 performing the best in the Camry, and E20 performing the best on average – with the exception of Allan Kasperson's special blend (E10 AK) which included other chemical additives and biofuels.



Myth #3: Ethanol will damage engine components. LATI has assisted in Ethanol studies analyzing horsepower, fuel consumption, costs to operate, etc. In the early 1990's, Lake

Area Technical Institute studied ethanol performance in passenger cars for South Dakota Corn Growers and South Dakota Corn Utilization Council. After an extended period of normal usage, the engines were disassembled and examined – no observed abnormal wear.

Today, study continues by ACE and Fagen Inc. on a 2000 Chevrolet Tahoe using E85, even though the vehicle was "non-E85" compatible. At 100,000 miles, LATI completely disassembled the engine and examined it for any unusual wear and tear. There were no out of specifications items found, and the engine was in outstanding condition. In fact, some fuel system components appeared in better condition than components from a comparable non-E85 vehicle. Today, the Tahoe is being reassembled and will be returned for use in our fleet. A video documenting this effort and the findings is available on our website: www.lakeareatech.edu or at www.ethanol.org.

Myth #4: Ethanol cannot be used in piston powered aircraft engines. On the Aviation technology front, Lake Area Technical Institute had the good fortune of working with South Dakota State University, University of North Dakota, South Dakota Corn Utilization Council, and Texas Skyways Inc. on the only FAA approved flex-fuel general aviation aircraft. This aircraft can operate on **any** mix of standard, leaded aviation gasoline and Aviation Grade Ethanol after a simple, inexpensive aircraft conversion. In addition, Aviation Grade Ethanol (AGE) performance exceeds standard FAA requirements, shows no known adverse corrosion or maintenance issues, and, in fact, showed lower wear of engine components. This is important because it currently is the only fuel to meet the Federal mandate to replace leaded aviation fuel for piston aircraft. AGE is a viable replacement for leaded aviation gasoline, representing a 400 million gallon potential market. AGE has safer handling and distribution properties, is capable of producing more horsepower, runs cooler, and is environmentally friendly.

Finally, it is important to mention the work we are doing with other alternative fuel sources. Our Diesel Technology program has done exciting work with VeraSun Energy Corporation on a corn oil based biodiesel derived from refining ethanol by-products. VeraSun contacted the LATI Diesel Technology department in October 2005. Their goal was to obtain basic information on a new, corn based biodiesel, experimentally developed by VeraSun through further refining ethanol by-product. Lake Area Technical Institute provided a real world, diesel technician's perspective on the experimental fuel performance. VeraSun was looking for a practical versus strictly controlled environment theoretical perspective. Lake Area Technical Institute's Basic Diesel Engines course performed basic operational tests in the spring 2006. They found that engines operated within normal limits. Then, our Diesel Engine Overhaul course disassembled and inspected the engines in fall 2006. These trained technicians found the engines display normal wear and tear. Given this information, from a technician's perspective, VeraSun's biodiesel worked well in practical applications.

It has been my pleasure to showcase Lake Area Technical Institute's work in the area of alternative fuels, and introduce you to our version of Ethanol Myth-busters. We look forward to remaining one of the Nation's leaders in energy technology and strong advocates for alternative fuel.

WRITTEN TESTIMONY OF THE NEBRASKA GAME AND PARKS COMMISSION

BEFORE THE:

U.S. SENATE, COMMITTEE ON AGRICULTURE

SUBCOMMITTEE ON ENERGY

CONCERNING:
THE NEXT GENERATION OF BIOFUELS: CELLULOSIC ETHANOL AND THE 2007 FARM BILL

APRIL 4, 2007
BROOKINGS, SD

Mr. Chairman and members of the Committee, I am Rex Amack, Director of the Nebraska Game and Parks Commission.

Today, we stand at a crossroads for energy development in our nation. While research in alternative energy production has existed for decades, recent record prices for crude oil, instability in the Middle East and concern over carbon dioxide emissions have intensified research in alternative energy. Biofuels are especially attractive because they could be produced in rural America, and provide income and jobs.

Biofuel development offers both challenges and opportunities for wildlife management. Much of the current biofuel development centers on the production of ethanol production from corn. While the current technology favors ethanol production from corn, it also increases pressure to grow more corn on environmentally sensitive land like native grasslands, wetlands and expired CRP acres. With increased interest in biofuels during the last two years, discussions related to producing biofuels has entered into the 2007 Farm Bill debate.

Farm Bill Conservation programs are important to Nebraska's economy, particularly in rural communities. Wildlife-associated recreation in Nebraska has an annual economic impact of over $500 million. Farm Bill Conservation programs provide financial assistance to landowners and create environmental benefits (e.g. wildlife habitat) that draw individuals (hunters) to rural communities, diversifying and benefiting local economies. In Nebraska, CRP has been the most successful wildlife habitat program in our state's history. Thus, we feel it is paramount that Farm Bill policy takes a balanced, informed approach when attempts are made to integrating the next generation of biofuels, cellulosic ethanol from perennial feedstocks into existing programs, and that new programs for biofuels protect against unintended consequences for resource conservation on private agricultural lands.

We thank you for the opportunity to share with this committee our thoughts on the opportunities and challenges that biofuels, and specifically cellulosic ethanol provide our nation. The accelerated development of cellulose-based biofuel is clearly needed to help meet our national goal of displacing 30% of our transportation fuels by 2030. Ethanol and other biofuels are part of the larger solution, including increased conservation and efficiency, for meeting our transportation fuel needs and reducing our nation's dependency on foreign oil.

America's farms and ranchlands—including non-industrial private forestland—traditionally having been recognized for food and fiber production, are now being looked to as a source of energy in the national quest for energy independence. National focus continues for the use of cleaner, renewable energy fuels in homes, businesses and transportation. Energy Conservation?

Renewable energy sources that could be produced on America's farm and ranchlands, including non-industrial forest lands, include wind power, solar power, and biofuels. The use of biomass to produce cellulosic ethanol brings potential opportunities for truly "green" fuels processed from perennial feedstocks that could protect soil and water quality, improve wildlife habitat, and sequester carbon. Much of the broad public support for cellulosic fuels is the promise of energy sources that are renewable, sustainable, and provide additional environmental services. From this perspective, proactive and purposeful development of biofuels will be critical to public

support for developing and using cellulosic fuels. The 2007 Farm Bill provides an opportunity to encourage the further development cellulosic fuels to provide and balance multiple public services, in terms of both producing energy and providing valuable environmental services (soil and water quality, wildlife habitat, carbon sequestration).

However, scientific information is currently lacking on how biofuels feedstock production can be balanced with environmental services. This information is critically needed if biomass feedstocks are to be integrated into the Conservation Title of the Farm Bill, as has been suggested in USDA's 2007 Farm Bill Proposals. For the CRP and other Farm Bill conservation programs, the rush to develop biofuel crops should not have unintended consequences that sacrifice the resource conservation gains achieved over the past two decades. Protecting and enhancing the conservation benefits for soil, water, and wildlife should be the starting point for discussion about future cellulosic biofuels programs. We should establish a "do no harm" mentality for rolling out new approaches.

Specifically, the following elements will be important in developing biofuels that balance biomass production and environmental services, including wildlife habitat:

- Stand composition: Perennial vegetation appropriate for the location (grasses/legumes in areas that were historically prairie and woody species in areas historically forested) should be used. Perennial crops offer greater environmental benefits for soil, water, and wildlife conservation when compared to annually plants crops. In addition, perennial crops such as deep-rooted native warm season grasses offer benefits including carbon sequestration important to offset global warming. Mixed stands of grasses and forbs provide more valuable habitat for multiple species, whereas monocultures of any grass (or any species for that matter) are very limited in providing wildlife habitat. For example, switchgrass grows in bunches and adding additional species of grasses and forbs can dramatically improve benefits for soil erosion, water quality, and wildlife habitat. Plants with invasive properties (those that may displace native plant communities) should not be used for producing biomass.
- Harvest strategies: Annual harvest and short stubble heights will result in fewer soil, water and wildlife habitat benefits. Annual harvest will also affect grass vigor and require additional inputs (fertilizer and reseeding and perhaps irrigation over time). To promote sustainability with the fewest inputs and to promote soil, water and wildlife benefits, we suggest that no more than 50% of a field being harvested in a given year. Additionally, harvest should be done in the fall and leave a stubble height of 12 inches minimum to capture snow, improve soil moisture retention, and to provide some residual cover for the next spring for ground nesting birds.
- "Sodsaver" or non-cropland conversion: Any land that does not meet the definition of cropland, as determined by the USDA/Farm Service Agency, converted from non cropland status to cropland should be made ineligible for any federal benefit, including but not limited to price and income support payments, crop insurance, disaster payments, conservation program enrollment, and FSA farm loan benefits. Remaining prairies are extremely valuable wildlife habitat and should not be converted for commodity crop or biofuel production.
- Sustainable use of forest resources: Woody biomass from non-industrial private forestland, as well as from public forestlands, must be harvested and managed under a sustainable

management plan that balances biomass production with forest health, soil and water quality, and fish and wildlife habitat.

- Research and development: Research and development funding should promote the next generation of biofuels and renewable energy technology that can produce biofuels in addition to improving fish, wildlife, soil, nutrient management, and water conservation. Such research should include life cycle analyses of green house gasses (GHG's), energy, and carbon sequestration from biomass feedstocks, as well as the impacts on soil quality, water quality and quantity, and fish and wildlife habitat. Conservation benefits from farm bill conservation programs should not be sacrificed or diminished for the production of biofuels.

There are currently pressures in Farm Bill deliberations to select "winners" in the emerging world of biofuels feedstocks. Unfortunately, the lack of information—as well as the quickly changing technologies for producing energy from biomass—means that most opinions are speculative at best. The 2007 Farm Bill provides an opportunity to develop a pilot program (or programs) to provide incentives for new and environmentally friendly biomass feedstocks, and to provide dedicated research funding to evaluate the potential for both energy production and environmental services from these feedstocks. The Farm Bill is an appropriate vehicle because of the dramatic impacts these activities may have on the future of American farming.

We look forward to your leadership in proactively addressing the needs for biofuels production from America's agricultural lands. By working together, we can develop biofuel energy sources that are truly a win-win for our nation's security and natural resources. The Commission looks forward to being part of the continuing dialogue on how we can creatively address our nation's energy and natural resource needs.

Sincerely,

Rex Amack

Rex Amack

Northern Great Plains Working Group

April 10, 2007

The Honorable John Thune
United States Senate
Washington, DC 20510

RE: April 4, 2007, Energy Subcommittee Hearing of the Senate Agriculture Committee – Submitted Testimony

Dear Senator Thune:

The Northern Great Plains Working Group (NGPWG) wishes to submit written testimony for the official hearing of the Energy Subcommittee hearing of the Senate Agriculture Committee held in Brookings, South Dakota, on April 4, 2007. The NGPWG is a coalition of several organizations and agencies committed to the continuance of wildlife benefits of Farm Bill initiatives in the Dakotas and Montana, with special interest for the Prairie Pothole Region.

We are submitting to you as written testimony the component of our Farm Bill position document titled "Positions and Recommendations of the Northern Great Plains Working Group for Conservation Compliance and Incentive Programs in the 2007 Farm Bill" that deals with Biomass for Cellulosic Ethanol Production.

The NGPWG supports the concept of renewable energy production from cellulosic biomass produced on agricultural lands. We offer our support, scientific expertise and collaborative spirit to work with all partners to ensure renewable energy opportunities also translate into sound natural resource management for the northern great plains region. With proper planning, research and input from diverse stakeholders, we are confident that acres planted to dedicated biomass energy crops may serve the dual purpose of providing energy feedstocks and provide multiple conservation benefits such as fish and wildlife habitat, reduced soil erosion and flood water retention.

The NGPWG, like most conservation groups across the country, is concerned about bioenergy production occurring on lands currently enrolled in existing farm bill conservation programs including the CRP, GRP, or WRP. Existing conservation programs, most notably the CRP, which provide undisturbed cover for wildlife, forage and pasture reserves to livestock producers

The Northern Great Plains Working Group is a local coalition of organizations and agencies committed to the continuance of the wildlife benefits of Farm Bill initiatives in the Dakotas and Montana. The group includes representatives of Ducks Unlimited, Inc., Delta Waterfowl Foundation, Pheasants Forever, Audubon Society, Central Flyway Council, North Dakota Natural Resources Trust, Northern Great Plains Joint Venture, North Dakota Game and Fish Department, South Dakota Game, Fish and Parks, the North Dakota Chapter of The Wildlife Society, the South Dakota Chapter of The Wildlife Society, the North Dakota Wildlife Federation, and representatives of the U.S. Fish and Wildlife Service who provide wildlife and habitat resource data, and consultation relative to Farm Bill statutes, regulations, and programs. The views and positions of the Northern Great Plains Working Group may not represent the official policy of individual organizations and agencies. For more information, please write the Northern Great Plains Working Group, 1605 E. Capitol Ave., Suite 101, Bismarck, ND 58501-2102.

in times of drought or flood emergency, and a host of societal benefits, has already proven themselves successful and cost effective. They not only provide landscape benefits, but also save tax dollars on lands that would otherwise be recipients of various agricultural support programs. Current farm bill conservation programs have proven to be a "good deal" for production agriculture and society in general.

We advocate that the 2007 farm bill incorporate a well thought out research and development process for the production, transportation and conversion of biomass for energy production, especially keying on the effect of biomass harvest on wildlife populations, wildlife habitat and aggregate soil health by experimenting with different stubble heights, harvest timing, harvest frequency and field harvest patterns.

The Northern Great Plains Working Group appreciates the opportunity to provide you our recommendations for renewable energy issues in the 2007 Farm Bill. We look forward to supporting you and your staff in any way possible in the development of a strong and sustainable farm bill that takes full advantage of the potential to produce renewable energy from agricultural products.

Sincerely,

Keith Trego

Encl.
cc: Senator Byron Dorgan
Senator Kent Conrad
Representative Earl Pomeroy

April 4, 2007

United States Senate
Agriculture Committee
Subcommittee on Energy Field Hearing

Dear Committee Members:

Thank you for the opportunity to submit comments on behalf of the South Dakota Cattlemen's Association (SDCA) regarding Cellulosic Ethanol and the 2007 Farm Bill. SDCA is a membership-based organization representing 1000 cattle and beef producers throughout South Dakota. We are also an affiliate of the National Cattlemen's Beef Association (NCBA).

SDCA has identified goals for the 2007 Farm Bill that include: supporting a reduction of the federal deficit while assuring funding for Farm Bill priorities, minimizing direct federal involvement in agricultural production methods, preserving the individual's right to manage resources, providing an opportunity to compete in foreign markets, and supporting equitable farm policy.

SDCA is a strong proponent of producing livestock in an environmentally and scientifically sound manner and likewise recognizes and appreciates the value and growth of the renewable energy industry. As biofuels production expands, we will continue to monitor the potential impacts on the agricultural marketplace as well as our natural resources and the profitability of livestock producers.

Though cellulosic ethanol appears to hold much potential for the expansion and efficiency of biofuels, we urge caution in the belief that cellulosic ethanol will provide long-term relief for livestock producers in the feed vs. fuel debate. SDCA is concerned the rapid expansion of the cellulosic ethanol industry will provide additional competition for feedstock production on acres currently used for production of livestock forage. Additionally, the cellulosic ethanol production process doesn't provide a by-product that can be used as a livestock feed source, which potentially means even greater pressure on feed availability and price and, ultimately, the value of land currently devoted to livestock production. Furthermore, livestock producers who produce livestock on rangeland in more arid climates will most likely be unable to efficiently capitalize on opportunities to raise cellulosic feed-stocks for ethanol production and, therefore have no way to offset increased forage and land costs. ***The success of the biofuels industry should not come at the expense of the livestock industry.***

We reiterate our support of renewable energy and other alternative energy sources to reduce dependence on foreign energy, but we also believe that national energy policy should include environmentally friendly conventional energy exploration within the United States. Our national security can not be assured without safe and abundant domestic food production that can be achieved in a cost-effective manner, and livestock producers are an integral part of that equation.

On behalf of the South Dakota Cattlemen's Association, thanks again for the opportunity to submit comments regarding Farm Bill policy. We appreciate your commitment to South Dakota's cattle and beef producers.

Best regards,

Scott Jones

Scott Jones
President, South Dakota Cattlemen's Association

cc: Senator John Thune
Senator Tim Johnson
Representative Stephanie Herseth Sandlin

TESTIMONY OF JEFFREY R. VONK
SECRETARY, SOUTH DAKOTA DEPARTMENT OF GAME, FISH AND PARKS

BEFORE THE:

SENATE AG. COMMITTEE, ENERGY SUBCOMMITTEE

CONCERNING:
THE NEXT GENERATION OF BIOFUELS: CELLULOSIC ETHANOL AND THE 2007 FARM BILL

April 4, 2007
Volstorff Ballroom, University Student Union
SOUTH DAKOTA STATE UNIVERSITY, BROOKINGS, SD

I am Jeffrey Vonk, Secretary, South Dakota Department of Game, Fish and Parks. I am also the chair of Agriculture Conservation Committee of the Association of Fish and Wildlife Agencies. I appreciate the opportunity to offer written comments regarding the "The Next Generation of biofuels: Cellulosic Ethanol and the 2007 Farm Bill."

Hunting, fishing and outdoor recreation are important to the quality of life in South Dakota. Many of us have fond memories of learning to hunt, fish and camp with members of our families and hope to keep passing that tradition on to our children and grandchildren. Hunting and fishing also contributes significantly to the economics of South Dakota. According to the *2001 National Survey of Fishing, Hunting and Wildlife-Associated Recreation* conducted by the U.S. Fish and Wildlife Service, 214,000 anglers fished annually in South Dakota, respectively. Nearly as many hunters took to the field annually, with 209,000 hunters in South Dakota, respectively. Hunting and fishing generated significant income in South Dakota, with hunters spending $223 million annually and anglers spending $182 million annually in 2001, with much of this activity occurring in rural areas. Pheasant hunting alone accounted for $153.1 million dollars in 2005.

Hunting and fishing has been good in South Dakota, in large part, due to good habitat conditions. Farmers and ranchers in the region are model stewards of the land, with private land providing most of the habitat used by fish and wildlife species. Conservation programs of the Farm Bill have played an integral role in providing farmers and ranchers with the financial and technical tools to enhance soil quality, water quantity and quality and wildlife habitat. Conservation programs of the Farm Bill are also very popular with landowners, because they are voluntary, incentive-base alternatives that promote partnerships among government, private interest and agricultural producers. Landowner demand for conservation programs like CRP, WRP, EQIP, CSP, WHIP, etc is far greater than the dollars or acres available.

In the last two years, discussion on producing biofuels has entered into the 2007 Farm Bill debate. While research in alternative energy production has existed for decades, recent record prices for crude oil, instability in the Middle East and concern over carbon dioxide emissions have intensified research in alternative energy. Biofuels are especially attractive because it could be produced in rural America, and provide income and jobs.

Biofuel development offers both challenges and opportunities for wildlife management. Much of the current biofuel development centers on the production of ethanol from corn. While the current technology favors ethanol production from corn, it also increases pressure to grow more corn on environmentally sensitive land like native grasslands, wetlands and CRP acres. Many industry experts predict that ethanol produced from cellulose will eventually surpass corn and other starch-based ethanol. These experts also predict that the next Farm Bill will play an important role in guiding cellulosic ethanol development.

During the past 12 months, there have been many proposals circulated regarding possible feedstocks for cellulosic ethanol, including using land enrolled in the Conservation Reserve Program (CRP) as a feedstock source. Using CRP as a fuelstock is premature because there is little research on how feedstock production can be balanced with the current benefits to soil, water and wildlife habitat that CRP provides. Within the conservation community, there are

concerns that if CRP is managed as a biofuels program, then the soil, water and wildlife benefits will be severely reduced.

I also believe that the development of cellulosic ethanol can be done in a manner that would be beneficial to soil, water, wildlife habitat and industry by creating new programs outside of CRP that focus on producing biofuel feedstock as a specialty crop on the existing 377 million acres of cropland in the United States. By focusing on existing cropland, I believe that biofuel production can be done in a manner that results in "no net loss" of existing habitat and helps promote soil, water and wildlife benefits. Possible strategies for producing biofuels on existing cropland should include the following elements:

- Stand composition: Perennial vegetation appropriate for the location (grasses/legumes in areas that were historically prairie and woody species in areas historically forested) should be used. Plants without invasive properties (those that may displace native plant communities) should be used. Mixed stands of grasses and forbs would be the most desirable for maximum benefits.
- Harvest strategies: Annual harvest and short stubble heights will result in fewer soil, water and wildlife habitat benefits. Annual harvest will also affect grass vigor and require additional inputs (fertilizer and reseeding over time). To promote sustainability with the fewest inputs and to promote soil, water and wildlife benefits, we suggest that no more than 50% of a field being harvested in a given year. Additionally, harvest should be done in the fall and leave a stubble height of 12 inches minimum to capture snow and to provide some residual cover for the next spring for ground nesting birds.
- Protection of noncropplands: We are greatly concerned over the conversion of native rangeland to cropland within South Dakota. According to research conducted by Ducks Unlimited, the overall average loss of native rangeland in the Missouri Coteau of North and South Dakota has been approximately 0.5 percent per year, with some areas approaching nearly 2 percent per year since 1984. According to their research, an annual rate of 2 percent loss per year translates into a loss of one-half the remaining rangeland in 34 years. Even more disturbing is that this trend in conversion has accelerated since 2000. From 2002 to 2006 almost 300,000 acres of native prairie was converted to cropland in South Dakota. The conversion of rangeland to cropland has been catalyzed by improvements in agricultural technology, programs in the Commodity Title of the Farm Bill and crop insurance. For these reasons, we recommend that a Sodsaver provision that would make any land not previously cropped be made ineligible for any federal benefits (price and income support payments, crop insurance, disaster payments, conservation programs, energy programs, farm loans, etc) be included in the 2007 Farm Bill. Biofuel production should not be done on lands without a cropping history.

Significant conservation planning must be undertaken to avoid substantial environmental impacts from uncontrolled cropping. While agriculture policy is a complex issue involving many different points of view, I believe it can be boiled down to the matter of balance. As we begin to formulate agricultural policy for the future, we will have to do our best to balance the need for sound production agricultural policy and the public's desire for stable food, fiber, fuel AND clean water, healthy soil and wildlife habitat. While achieving this balance will not be easy,

future generations will be counting on us to make the right decisions now because they will be dealing with the good, bad and unanticipated outcomes of our actions for the next 5 years.

In summary, outdoor recreation on healthy lands and waters is important to the quality of life in South Dakota. The outdoor recreational opportunities we have in the plains states are a direct result of the conservation provisions of the 2002 Farm Bill. Future economic pressures will likely make it hard to maintain the current outdoor recreation values and quality of life we currently enjoy. However, as in other farm policy issues, biofuel development will require significant negotiation and study to balance the wide variety of regional and national needs.

Thank you for the opportunity to provide comments as you make recommendations on agriculture policy.

SOUTH DAKOTA FARMERS UNION

U.S. Senate Subcommittee on Energy, Science and Technology of the Senate committee on Agriculture, Nutrition and Forestry

Field Hearing Brookings, Wednesday, April 4, 2007 - 10:00 AM - Volstorff Ballroom, SDSU Campus

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This testimony has been prepared by Doug Sombke, President of the South Dakota Farmers Union (SDFU), an organization dedicated to preserving and advocating for family farms and ranches. Sombke, a fourth generation farmer, has lived and farmed in Brown County, SD his entire life. He began his own operation as a senior in high school with 38 acres. Currently he works with his three sons, who will eventually take over the farm, on their 3,500 acres of land, 900 head of cattle and 240 head of stock cows.

Along with serving as President and Vice-President of SDFU, Sombke has been a board member at his local coop since 1991. After winning the 2005 SDFU presidential election, he has taken positions on the National Farmers Union Pension Committee, Farmers Union Service Association, National Farmers Union Education Cooperative Committee, National Farmers Union Service Association and the Farmers Union Enterprises Board of Directors this past year. He also was active on the Brown County Weed Board, serving as President of that organization in 1999. Sombke is committed to farm education, being active in not only the SDFU education program, but 4-H as well. He also is a member of the National Soybeans Producers Association.

Below, please find highlights of Sombke's comments given to the subcommittee.

For over 30 years rural America has been on the cutting edge of renewable fuels, from the onset of gasohol to the booming ethanol industry that we see today. These great strides have come from a combination of farming entrepreneurship and good government policies; it has been a partnership that has brought us to the point of fulfilling the goal of President Bush by ending our addiction to foreign oil. This process is now set to take another step forward, with the coming of cellulose ethanol, a fuel source that will take crops such as corn stover, sawdust, and switchgrass and turn them into the fuels that will power America. The time has come in this country for another great industry to emerge. Much like the dawn of the automobile and the home computer, cellulose ethanol has the potential to not only secure our fuel source, but also to create a great new industry for America.

Not only is cellulose ethanol a boost to our economy, it is also significantly better for the environment. The two most prominent methods for production of cellulosic ethanol are hydrolysis followed by fermentation of the generated free sugars, and synthesis gas fermentation or catalysis (the Fischer-Tropsch process). Neither process generates toxic emissions when it produces ethanol. In addition it may also provide a boost to the already successful Carbon Credit Exchange (CCX) program, through the growing of crops such as switchgrass. This crop can be harvested two to three years after planting and twice a year as a cash crop for 10 years with conventional mowers and balers before it needs to be replanted. As a crop which need not be replanted but for every 10 years, this sort of crop requires minimal tilling of the land, thereby enabling producers to take significant advantage of the CCX program. Additionally, it has been shown that this no-tillage crop helps to slow agricultural runoff and also acts as a carbon sequester.

The benefits of cellulose ethanol are numerous, but so are the challenges. The area in which a partnership with the government would most benefit this industry would be in the areas of research, transportation infrastructure, and market access. Within the research component of the puzzle, research is needed to find the right cocktail of enzymes to effectively break down the woody matter and create the ethanol. In its current form cellulose ethanol costs roughly $2.25 to produce a gallon; we need to work together to find the best technologies to get this price down, and to make it a cost efficient product. It also benefits the industry to have a uniform process to create cellulose ethanol, so there is a uniform product at the pump. Research commitments from the government now will mean a better product down the line.

Transportation is another area in which we need a partnership., Right now ethanol is largely a phenomenon of the mid-west, but the true potential of ethanol will only be seen when it is as common at the pump in Boston and New York as it is in Brookings and Aberdeen. We need to look at innovative mechanisms to get ethanol from the source to major cities on the coast. One way in which we could accomplish this is by investing in an upgrade and expansion of the US rail system. This is a problem that cannot wait. We need to be able to get the current corn-based ethanol into these markets so when cellulose ethanol is commercialized, it will be an easy transition.

Along the lines of transportation is market access and public education. South Dakota Farmers Union has long had a commitment to educating people on the benefits and potential of ethanol. We were there from the start hauling a still around to local Farmers Union meetings to demonstrate its potential. We created an E85 action team to help develop our education policies, and have spent a great deal of time out in the state promoting the use of ethanol. With education comes market access.

We as the agriculture community need to do more to reach out to urban areas and educate people on the benefits of using ethanol. Coupled with this is good policy like we have seen in Minnesota and Iowa, who have create renewable fuel standards which have expanded the use of ethanol and instilled more confidence in the product. We need to continue to expand this partnership and reach out to more people.

The benefits and potential of cellulose ethanol are vast, as long as we take the necessary steps to create a successful market and industry. The government does have a role to play in this, but they cannot do it all. We need to make sure there is a solid partnership between rural America and our government, with the emphasis on us. The cellulose ethanol industry is ours, and it is our responsibility to make sure that it grows and flourishes. At this point, the technology for commercial-scale production of cellulosic ethanol is not yet up to par and necessitates the continuation of production of ethanol from corn. We are currently moving into the conversion process in which we can develop ethanol from both types of sources, but we must continue to emphasize research and development of this growing source that is cellulosic while still maintaining an emphasis on utilizing corn.

Just as ethanol production from corn has enabled family farmers to invest in their local economies, so too will production of cellulosic ethanol. Rural economic development is enhanced through the expansion of additional sources of renewable fuels because the same ethanol plants, which use corn, are being converted into plants which can take other sorts of feedstocks. Additionally, as the technology for this sort of production becomes more viable, family farmers will continue to have the opportunities to invest in the development of new production plants.

We feel the real advantage of cellulostic ethanol will be in regions of the United States where the use of corn based ethanol is not feasible but where the abundance of cellulosic sources are plentiful, such as the wooded regions of the northeast and northwest. Cellulosic ethanol will also be important where the possibility of grwoin switch grass is plentiful, suc as in the south and southeast regions fo the United States.

One must keep in mind that research and development of cellulosic ethanol is something we must pursue as our nation continues to wean itself from dependence on foreign energy. But as producers of ethanol, we must never forget the marketing of such renewable energy is still the key to prosperity and self-preservation. Otherwise, all we have done as producers is created another commodity to flood the market.

What we need to keep in mind is that ethanol, whether corn or cellulose based, is not the total answer, neither is it simply an additive to oxygenate fuel. We need to begin looking at ethanol as the key that stretches out our current oil needs, until such time as we can dramatically lower our importation of oil from countries that mean us harm. Ethanol is our best option for lowering our need for foreign oil, while we look at replacement fueling methods, such as hydrogen. To accomplish this the next Farm Bill needs to include incentives for auto makers to develop cars that run more efficiently on ethanol, and expand demand for flex fuel vehicles. We need to forge a partnership where the government is working with Detroit to develop a new fleet of vehicles, while Farmers Union and other agriculture groups work to promote the usage of ethanol, while touting it's numerous benefits.

Another key component of the next Farm Bill must be helping in the development of the ethanol market. According to the RFA the ethanol industry, only utilizing the E10 blend, will hit a ceiling with 12 billion gallons in production. This is a ceiling that we are rapidly approaching. We need to develop the ethanol market, and make it more palatable to the consumer. Right now 5 communities Britton, Wilmot, Watertown, Webster and at my Coop in Ferney are using blender pumps with 3 other communities Frederick, Stratford and Gregory looking at installing blender pumps. The blender pump allows consumers to chose from ethanol blends of E10, E20, E40, and E85. The future of the ethanol industry is going to be in higher blends, and the blender pump is one of the best market tools that we have. What we need from Washington is help in getting the UL to sign off on blender pumps, and to approve the E85 pumps that we currently have in use. Right now UL approves every single component of E85 pumps, but for some reason will not sign off on all of those pieces together, this is exactly the kind of red tape that we need help breaking through.

We cannot look at E10 and hope that this product sustains the industry, it won't. E10 assumes that ethanol is an additive, but E10 does not work to lessen our dependence on foreign oil in the long run, nor does it help this new industry in America, it simply is taking us down the road of ethanol becoming another commodity. We need to take steps to boost the usage of E85 and blender pumps in this country, ethanol as an additive is not the solution, the solution is ethanol as a fuel.

"Farming is easy when you are 1,000 miles from the nearest field and your plow is a pencil." – President Dwight Eisenhower

Thanks to this subcommittee and other ag leaders for inviting me to testify on behalf of SDFU and its 12,000 members. The family producer is the backbone of America, and it behooves us to work together to make that backbone stronger.

For more information about the South Dakota Farmers Union or Doug Sombke's presentation, please contact the SDFU at (605) 352-6761.

SOUTH DAKOTA SOYBEAN ASSOCIATION

April 6, 2007

The Honorable John Thune
United States Senate
Washington, DC 20510

Dear Senator Thune:

The South Dakota Soybean Association (SDSA) appreciates the opportunity to provide written testimony expressing the views of our producer board and membership on the 2007 Farm Bill as they relate to biodiesel in the Energy Title for the official record of the Senate Agriculture Committee.

Biodiesel Tax Incentive: SDSA supports extending the biodiesel tax incentive beyond its scheduled expiration.

Renewable Diesel: SDSA supports tightening the definition of Renewable Diesel to prevent petroleum companies from qualifying for a $1 per gallon tax incentive by simply adding bio-based feedstocks into their normal oil refining process. Allowing oil companies to qualify for the $1 per gallon tax incentive would not add to refinery capacity, would not create jobs, and could cost taxpayers billions of dollars.

Conservation Programs: SDSA supports adjusting the Environment Benefit Index and rental rates under the Conservation Reserve Program (CRP) to encourage non-environmentally sensitive land to return to production. Demand for ethanol is driving soybean acreage into corn production, and the U.S. needs soybean acreage to remain competitive in foreign export markets as well as in providing soybean oil as a feedstock for biodiesel production. Additional acres for corn production (without sacrificing soybean acres) are needed to meet demand from both the livestock and ethanol industries.

We will email this correspondence to Brendon_Plack@thune.senate.gov. Thank you for the invitation to submit this written testimony.

Sincerely,

Craig Johnson
SDSA President

Testimony for the Senate Sub-Committee on Energy

Science and Technology

The Next Frontier in Bio-Fuels Production

South Dakota State University

April 4, 2007

Brookings, South Dakota

Thank you for the opportunity to present written testimony to the sub-committee on Energy, Science and Technology.

South Dakota Wheat Inc is a member organization who strives to advance the wheat industry through research, promotion, biotechnology, and now biomass cellulosic ethanol. It should be noted that South Dakota Wheat Inc's national affiliate, the National Association of Wheat Growers, just this month, passed a by-law change allowing our National Association to become actively involved in biomass/biofuels policy issues.

The future for the biofuel industry is bright but there are some interesting challenges facing biomass cellulosic ethanol.

First of all, research dollars will be needed to create a fermentation process that addresses multiple biomass products. (i.e. corn stover, wheat straw, switchgrass/native grasses, animal waste)

Secondly, production practices will need to be examined. Let us review some production practices that our producers will need to decide upon.

- For over fifty year the wheat industry has been using what is called "semi-dwarf wheat". Semi-dwarf wheat is wheat that is purposely bred to be shorter in height to better withstand South Dakota climates. A general rule of thumb is seven to twelve years of breeding wheat plants before an acceptable variety is produced.

A question that needs to be taken into account is, "If a wheat plant can be bred to be two inches taller, how many biomass tons of wheat straw would that two inch increase produce?"

No-till (also minimum till) and crop rotations are two very significant production practices in South Dakota.

- No-Till as a practice has established itself by restoring soil texture to a healthier condition by increasing moisture retention in the soil and increasing microbial activity. **No-till as a practice leaves the residue of the crop in the field.**

- Crop rotation is the practice of planting different crops on the same field in different years. An example of a three way rotation would be:

Year 1	Corn
Year 2	Soybeans
Year 3	Wheat

  In year four the rotation would be repeated. This practice takes advantage of economic opportunities with the use of fertilizer and chemicals, and assists in the breaking up of different crop disease cycles.

The challenge for biomass lies in production. There is good biomass production in corn stover, (year 1) almost no biomass production in soybeans, (year 2) and fairly good biomass production in wheat. (year 3)

An additional challenge facing agriculture production in the above scenario is this: Corn planted into wheat stubble in normal years produces higher corn yields. Corn as a plant has the greatest need for additional inputs. Corn uses more fertilizer and requires more moisture than other crops. Wheat stubble left over winter collects snow creating additional moisture in the soil for the next crop. **Producers will be slow to adapt change in certain practices that are already considered proven and profitable.**

The third challenge is the Conservation Reserve Program. South Dakota Wheat Inc thought process is to review the conservation program. Land is a resource and resources should not be retired or put into reserves. **An incentive program for landowners to withdraw land from the conservation reserve program and enroll into an "energy development program" with criteria established to maintain proper environmental and wildlife benefits will be needed, if biomass production is to meet the needs of biofuel refineries.**

Last, but probably the most important, the need for transportation logistics is paramount. Transporting millions of TONS of biomass to biofuels refineries will demand the proper transportation infrastructure to be in place. And that is just in South Dakota, whether we are talking about five large biofuel refineries or twenty smaller biofuel refineries the need for transportation infrastructure improvements is apparent. The biofuel industry will demand transportation changes for the biofuel industry to be successful.

South Dakota Wheat Inc would like to thank the committee for this opportunity to present our thoughts and idea's in this new and exciting world of agriculture biofuels.

**Pump Games: Fill Up With Ethanol? One Obstacle Is Big Oil —
Rules Keep a Key Fuel Out of Some Stations; Car Makers Push Back**

Source: The Wall Street Journal
Date: 04/02/2007
By Laura Meckler

President Bush, domestic auto makers, farmers and others tout ethanol as a home-grown alternative to imported oil. Across the Midwest, plants that make the fuel out of corn are multiplying at a torrid pace. Yet so far, only a tiny fraction of U.S. service stations let a driver fill up with ethanol. There are a number of reasons, but one big one is resistance from oil companies.

Although some oil executives voice enthusiasm for alternative fuels, oil-company policies make it harder for many service stations to stock a fuel called E85, a blend of 85% ethanol and 15% gasoline.

These policies are hardly the only barrier to wider use of the ethanol fuel. Demand is limited by the small number of vehicles that can burn it -- only about 5% of those on the road in America. It can be slightly costlier to burn E85, even though it costs less per gallon, because a car doesn't go as far on a gallon of the ethanol fuel as on gasoline. These demand restraints would limit service-station owners' enthusiasm for spending on the equipment needed to offer E85 even if the policies of the oil companies were not a factor.

But those policies add a significant extra obstacle. Oil companies lose sales every time a driver chooses E85, and they employ a variety of tactics that help keep the fuel out of stations that bear the company name. For instance, franchises sometimes are required to purchase all the fuel they sell from the oil company. Since oil companies generally don't sell E85, the stations can't either, unless the company grants an exception and lets them buy from another supplier.

Contracts sometimes limit advertising of E85 and restrict the use of credit cards to pay for it. Some require that any E85 pump be on a separate island, not under the main canopy.

Oil companies say they will allow stations to sell E85, but they must have certain rules for the protection of customers and protection of their brand. They call the restrictions reasonable and in some cases necessary to make sure drivers don't fill up with E85 if their vehicle can't burn it.

Most of the U.S.'s 170,000 fuel stations aren't owned by oil companies but are either franchised from them or independent. Less than 1% stock E85. Some experts say that to really take hold and be seen as a viable alternative to gasoline, the fuel would have to be available at, roughly, 10% of stations.

Those pushing for ethanol are targeting two very different types of fuel stations: those run by big retailers like Kroger Co. and Wal-Mart Stores Inc., and independent ones owned by small businesses. These represent the biggest and smallest of businesses, but have one thing in common: They aren't under the thumb of the oil industry.

Nearly half of the gasoline sold in the U.S. does have some ethanol in it. Oil companies routinely use it as an additive, typically at 10% ethanol to 90% gasoline, because the corn-based fuel burns cleaner. The blending enables companies to meet government smog-reduction rules. They also add ethanol because of a federal mandate on the industry as a whole, requiring that it use a certain amount of "renewable" fuels in its products.

Among those pressing for wider use of E85 are domestic auto makers, especially Ford Motor Co. and General Motors Corp. Ethanol is one energy initiative where they're out in front of Japanese car makers. While Toyota Motor Corp. and Honda Motor Co. are known for their gasoline-electric hybrids, Detroit, which has been heavily criticized for its sales of gas guzzlers, is far ahead in making "flexible-fuel" vehicles that can burn either gasoline or ethanol.

In Dwight, Ill., Becker's BP on Interstate 55 is one of just a few dozen major-brand gasoline retailers in the U.S. that sell E85. Owner Phil Becker says the governor wanted the state's vehicles to use E85 and targeted his station as a popular stop for state workers. He says BP PLC let him get the fuel from a non-BP supplier, and the Illinois Corn Growers Association gave him $100,000 for new tanks and pumps that BP required.

"Because I've got E85 and we've advertised it, we've had four or five farmers that traded their trucks to get E85 vehicles," Mr. Becker says.

Exxon Mobil Corp.'s standard contract with Exxon stations bars them from buying fuel from anybody but itself, and it doesn't sell E85. A spokeswoman for Exxon Mobil says it makes exceptions case by case.

Even if one is granted, the station must follow rules including one that says E85 must be dispensed from its own unit, not part of an existing multihose dispenser. "This minimizes customer confusion around vehicle compatibility issues and maintains product quality integrity," says the spokeswoman, Prem Nair.

A ConocoPhillips memo to franchisees says the company doesn't allow E85 sales on the primary island, under the covered canopy where gasoline is sold. Stations must find another spot. As a result, it isn't quite as simple for a driver to decide on the spur of the moment to fill up with E85. ConocoPhillips declines to comment.

A Chevron Corp. agreement with franchisees also appears to discourage selling E85 under the main canopy. It says dealers offering alternative fuels cannot "deceive the public as to the source of the product," a phrase that some gas-station interests interpret to mean that E85 can't be sold under the main canopy. Chevron says it recommends, but doesn't require, that E85 pumps be outside the canopy.

Chevron says it requires Chevron- and Texaco-branded stations to keep "E85" off their primary signs listing fuel prices. To show the fuel's price, and alert approaching drivers that E85 is for sale, the stations have to erect a separate sign.

Another Chevron recommendation makes it much more expensive for a station to offer E85 at all. Stations usually have three tanks, for the three gasoline grades, regular, mid-grade and premium. The easiest way to offer E85 in addition to these three is to convert the mid-grade tank to E85. Such a station can still offer mid-grade gasoline, because a "blender pump" can mix some regular with some premium, and mid-grade will come out of the hose.

But Chevron's agreement with station owners recommends they install new pumps and tanks at their own expense if they want to stock E85. Doing so can cost more than $200,000 per station, according to a fuel-station trade group in Washington state called Automotive United Trades Organization. Chevron says it requires special tanks only if they're needed for safety.

Oil companies also require stations to stock all three grades, meaning stations may not simply replace a low-selling mid-grade with E85.

At BP, guidelines for stations that carry the company name bar any mention of E85 on signs on gasoline dispensers, perimeter signs or light poles. The stations also can't let buyers use pay-at-the-pump credit-card machines. Selling E85 is "not impossible -- it's just that they really kind of hassle you to not put it in," says Ron Lamberty, who owns two stations in South Dakota, one a BP station. Mr. Lamberty doesn't sell E85, even though he is director of market development for the American Coalition for Ethanol. He says he is looking into adding the fuel to his BP station in Sioux Falls.

Mr. Lamberty mocks BP's "Beyond Petroleum" slogan: "It's 'beyond petroleum' but not so far beyond petroleum that it would contain anything but petroleum," he says.

BP says its guidelines are in place so customers realize the mostly ethanol fuel isn't a BP product. The company also bars stations from selling it under another brand name, such as VE85, the brand of a maker in Brookings, S.D., called VeraSun Energy Corp.

A BP spokesman, Scott Dean, says, "When you've got 97% of your customers unable to use the product, you want to be very, very sure it is very clearly advertised." He says BP bought 718 million gallons of ethanol last year to blend into U.S. gasoline in small amounts. "BP is one of the largest if not the largest purveyor of biofuels in the U.S. and the world," Mr. Dean says.

E85 also faces barriers having nothing to do with Big Oil, like the limited number of cars that can burn it. Domestic auto makers have vowed to double production of flex-fuel vehicles to about two million a year by 2010 and to make half of their new vehicles sold in America E85-capable by 2012.

While the fuel usually costs less, it can be costlier to drivers because they get about 25% fewer miles per gallon from ethanol than from gasoline. At a pro-ethanol group called the Iowa Renewable Fuels Association, Executive Director Monte Shaw estimates that E85 has to be at least 20 to 30 cents a gallon cheaper to compete with gasoline on price.

Iowa statewide average prices on a recent day were $2.18 a gallon for regular gasoline and $1.97 for E85, according to a Department of Energy Web site. Because E85 is less energy-intensive, the site said, it would cost the average owner of a big Chevy Tahoe SUV about $2,364 a year to fuel it with E85, and $1,935 to fuel it with regular gasoline.

The price of ethanol has risen in the past year, partly because of demand from oil companies that want it for an additive. This usage creates something of a conflict for big ethanol producers like Archer-Daniels-Midland Co. Their main ethanol customers are the oil companies. Customers for E85 are far smaller and more fragmented.

ADM, whose yearly output of 1.1 billion gallons is more than 20% of the domestic ethanol market, says it is happy to sell E85 if someone wants it, but that is a "very small" part of its business. "Near term, we have focused more attention on the" additive side, says an ADM executive, Edward Harjehausen.

Even the main ethanol lobbying group in Washington, the Renewable Fuels Association, has focused mostly on developing the market for the fuel as additive an. "If you have a pump that sells E85 but you don't have customers pulling up to that pump, why do you want to bother?" says Bob Deneen, its chief lobbyist.

A few smaller producers do actively promote E85, such as VeraSun, which seeks to establish a branded E85. But even the smaller producers sell the bulk of their output for blending as a gasoline additive.

Because ethanol is more corrosive than gasoline, there's some concern it could leak out of a standard dispensing system and spark a fire. No E85 dispensing system -- nozzles, hoses, pumps -- has been certified by Underwriters Laboratories, the organization that tests the safety of products.

In October, UL suspended certification of parts that had been certified for use in E85 systems. Though there hadn't been any reports of problems, UL said it decided it needed to do its own safety research. Results aren't expected until late this year.

Among those trying to overcome obstacles to E85 are the domestic auto makers. They have built flex-fuel vehicles for years because doing so gives them "credits" in their efforts to meet federal fuel-economy standards. Without the credits, Ford and GM wouldn't have met mileage goals for light trucks in 2003, 2004 and 2005 and would have owed fines. The mileage goals pose a bigger challenge to Detroit because of its heavy reliance on large, thirsty vehicles. Foreign makers generally haven't resorted to building flex-fuel cars to meet the mileage goals.

For Detroit, the credits applied even if the flex-fuel cars they built never actually burned ethanol. For a long time, the auto makers said little about ethanol, and many owners of flex-fuel cars didn't know they had them. But when gasoline prices surged in 2005 and 2006, GM and Ford saw their flex-fuel cars as a way to counter their image as gas-guzzler makers.

Both began promotional campaigns, such as one in which GM gave buyers in Chicago and Minneapolis $1,000 gift cards good for E85. GM began to work with state officials to find grants to pay for installing pumping equipment. It has helped add E85 to 235 stations. Ford helped pay for installing 50 pumps so someone could drive from Chicago to Kansas City while filling up only with E85.

Among ethanol backers' recruits are two grocery chains. Kroger installed E85 at about 40 stations in Ohio and Texas. Privately held Meijer Inc. did the same in Michigan and Indiana.

Wal-Mart could provide a significant boost. It said last year it was considering selling E85 at its 388 company-owned stations but hasn't made a decision.

The U.S. tax code acts as a stimulus. Service-station owners can get a credit of up to $30,000 for their outlays to convert equipment to sell E85.

Some states have done their bit to spur the market. New York enacted a bill last year that barred oil companies from requiring stations to buy all of their fuel from the companies.

In the Albany area, station owner Christian King has begun selling E85 at one of his three Mobil outlets and plans to do so at a second. He says Mobil's restrictions still mean he can't put the price of E85 on the main sign or let drivers charge it on their Mobil credit cards.

Adding E85 "is a personal thing," Mr. King says. "I'm trying to do anything I can to reduce our dependence on foreign oil. And if this thing kicks off, I'm in a position to benefit."

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