

# RENEWABLE ENERGY AND THE RURAL ECONOMY

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## HEARING

BEFORE THE

SUBCOMMITTEE ON DEPARTMENT OPERATIONS,  
OVERSIGHT, NUTRITION, AND FORESTRY

OF THE

COMMITTEE ON AGRICULTURE  
HOUSE OF REPRESENTATIVES

ONE HUNDRED EIGHTH CONGRESS

SECOND SESSION

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## **RENEWABLE ENERGY AND THE RURAL ECONOMY**

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**MONDAY, MARCH 15, 2004**

HOUSE OF REPRESENTATIVES,  
SUBCOMMITTEE ON DEPARTMENT OPERATIONS,  
OVERSIGHT, NUTRITION, AND FORESTRY,  
COMMITTEE ON AGRICULTURE,  
*Rochester, MN.*

The subcommittee met, pursuant to call, at 1:00 p.m., in the Rochester Government Center, Rochester, MN, Hon. Gil Gutknecht (chairman of the subcommittee) presiding.

Present: Representatives Smith and Dooley.

Staff present: Sam Diehl, subcommittee staff director; Joshua A. Maxwell, Janet Nuzum, and John P. Riley.

### **OPENING STATEMENT OF HON. GIL GUTKNECHT, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF MINNESOTA**

Mr. GUTKNECHT. Good afternoon. The hearing of the Department of Operations, Oversight, Nutrition and Forestry Subcommittee will come to order. It's a long title, but the reason we're here today is to talk about renewable fuels. This subcommittee also has the oversight responsibility of renewable fuels as it relates to the Department of Agriculture.

The purpose of today's hearing is to discuss the opportunities, the challenges, and the benefits of renewable energy, particularly those benefits it provides to rural America. Last year, more than 62 percent of America's oil supply was imported from places like Venezuela and the Middle East. This summer, there are some experts who are predicting that gasoline will surpass \$2 a gallon. Our Nation's electric power grid is stretched to capacity. It remains virtually impossible to construct new generating facilities and transmission lines. Last summer we saw our Nation's largest blackout, ever.

When President Bush was elected, many of us were worried whether a Texan would understand the benefits of renewable energy. Much to our pleasure, our concerns were unfounded. This administration has sought to promote renewable energy on many different fronts, from signing into law the first ever energy title for a farm bill, to promoting comprehensive energy policy through the energy bill that embraces a renewable future. While some of the provisions in the energy bill have proved contentious, and we have been unable to get a bill passed in the Senate, I'm hopeful that more Americans will begin to understand the need for long-term

energy decision making. I'm hopeful that as more Americans, and as more Members of Congress carefully consider the need for a long-term energy strategy, we can move the strategy and the energy bill forward.

As many of us, particularly those from here in Minnesota have recognized, no long-term energy strategy can be effective without including renewable energy. I decided to bring the subcommittee and witnesses to Minnesota to help them better understand what we in Minnesota have known for a long time. Renewable energy is good for the environment, good for our economy, adds value to agricultural crops, and provides jobs and investment to areas of our country that need it most.

Many of Minnesota's rural areas have difficulty attracting jobs, investment and maintaining the infrastructure such as schools, hospitals and other things that make our rural lives so vital. Many of our young people don't see opportunities for them to remain in rural areas where they grew up. Renewable energy can play an important role in rural economic development.

Minnesota's 14 ethanol plants generate nearly \$400 million for our economy. These plants consume 130 million bushels of corn and nearly all of our plants are farmer owned. This industry provides more than 2,500 jobs. But ethanol is only one of many renewable energy sources utilized here in Minnesota. Minnesota has hundreds of wind turbines, which over the last decade have sprouted up all across the State, especially here in the First Congressional District. More of our dairy farmers are utilizing anaerobic digesters to add value to their facilities. Our biodiesel industry is just taking off. In fact, today marks the second anniversary of legislation passed in Minnesota to promote biodiesel. This week, in Brewster, MN, they will break ground on a new facility to produce 30 million gallons of biodiesel annually.

I'm pleased to hear testimony today from distinguished witnesses from around the country. I want to say, though, that there are many more witnesses I would liked to have called today. There are so many examples of renewable energy investments and entrepreneurs here in Minnesota, but I could only pick just a handful.

Our witness panel represents the highest level of State and Federal leadership on renewable energy, and I'm pleased that they were able to join us today.

Today's witnesses have worked very hard to make a difference in the way we conduct America's energy policy and I applaud them for their efforts.

I also want to thank my colleagues, Representative Cal Dooley, from the State of California and Representative Nick Smith, from the State of Michigan, for taking time out of their very busy schedules to travel to warm and sunny Minnesota. With that, I will close and recognize our distinguished ranking member for any opening remarks that he may have. Mr. Dooley.

**OPENING STATEMENT OF HON. CALVIN M. DOOLEY, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA**

Mr. DOOLEY. Thank you, Congressman Gutknecht, and I'm delighted to be joining you here on what is a very important hearing

in terms of trying to assess the progress we have made in the development of biofuels, as well as renewable energy sources, and I want to commend you, as well as the entire State of Minnesota, for the progress that they have made in developing a viable renewable fuel industry.

As we hear from the witnesses, I think that we'll hear a lot of good work is continuing to do, but I think as policy makers we have to continue to focus on trying to define what is the appropriate role of government in the development of alternative fuel sources. Clearly, there is, I think, an appropriate role for us to provide for the incentives and the development of fledgling industries that can develop additional fuel sources that can be competitive with some of our traditional fossil fuel sources.

But, I also think we have to understand, too, that one of our longer term objectives is, is that we have to transition this research, and this development of new energy sources into sustaining and competitive energy sources. I am oftentimes concerned that when we look at the history of government and the establishment of programs, that sometimes those which are temporary end up being long-term. In fact, we can only look back at Henry Wallace, who was Secretary of Agriculture in the Roosevelt administration, I believe it was, when they embarked upon the creation of our farm programs that he, at a press conference, referred to those as temporary solutions to deal with an emergency. Well, over 70 years later, we're still dealing with the rough form of these temporary solutions, and I question whether or not we have the same emergency.

So while we have provided significant taxpayer subsidies for the development of an ethanol industry, and why we are looking at appropriate investments to encourage the development of other renewable energy sources, I think we also have to recognize that we have to be committed to seeing the transition of these programs into self-sustaining and economically competitive energy sources to the future.

So, once again, I commend you for having this hearing, and also the leadership that you have shown on this issue, certainly, throughout your tenure in Congress.

Mr. GUTKNECHT. Thank you. Now, Nick Smith from the State of Michigan.

**OPENING STATEMENT OF HON. NICK SMITH, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF MICHIGAN**

Mr. SMITH. An important meeting, an important State as far as renewable energies. I served with Chairman Gutknecht on both the Science Committee and the Subcommittee on Research, as well as the Agriculture Committee, and I suspect, to say a nice thing, Mr. Chairman, that maybe the reason Minnesota is one of the leading States in the Nation on this kind of effort to solve some of our energy problems is because a lot of people in Minnesota might be like you that are creative thinkers and planners. But I appreciate the opportunity to be here.

The expanding use of renewable energies is just so very important as we meet the challenge of countries, now, like China that are going to start being a greater demand for available energy re-

sources, as well as the growing industrial part of the rest of the world. We now import one quarter of the world's supply of petroleum energy, and when you compare that to the fact that we're only 5 percent of world's population, it just can't continue that way. So, our efforts and investment in developing alternative resources for energy are just so very important.

I think few realize how accidental our heavy dependence on oil is. I'm from Michigan, and Henry Ford, when he first started developing the automobile, had plans that would run on ethanol energy, and then the price of petroleum energy went way down, and, gradually, there was a transfer from that kind of research and development into petroleum energy that we became very dependent on.

In the 1970's, the cost of our oil dependence rose during the Arab oil embargo. When I was Director of Energy for the U.S. Department of Agriculture, I became a member of the President's Oil Policy Committee. We met with Energy Czar, Bill Simon, every morning at 6:30 at the White House, trying to figure out how this country was going to get by when we were importing almost 50 percent of our petroleum energy. We started conserving, we started coming up with extra research. But the expanded demand, and use of energy, now leads us to a situation where our dependence on imported petroleum wheels is even more important.

Let me just finish off by suggesting that the 1990 Clean Air Act provided a boost to bio fuels by mandating the use of oxygenated fuels, and ethanol, and MTBEs became a prime supplier of that need, and now we're looking at ethanol even becoming a greater need. Can we continue do it with the corn, and it's going to be, I think, even more challenging as we need to look for other sources to develop our renewable fuels.

Corn based ethanol, we're building a plant in my congressional district that will accommodate an estimated increase in demand for corn by 10 percent. The 2002 farm bill added momentum to the use of biofuels by encouraging use and supporting development of bio refineries. Let me just say, Mr. Chairman, we have schools now in Michigan that have been using biodiesel for years, and the statistics that they have in terms of reduced maintenance on their engines using biofuels means that it ends up being very cost effective in terms compared to other use of fuels.

Gil and I put language in our agriculture bill, as well as our National Science Foundation Bill, that would add additional research efforts to nitrogen fixation. Legumes, the alfalfa, and the clovers now can fix nitrogen in the soil. Considering the fact that the production of nitrogen for agriculture uses up almost 6 percent of our natural gas, it's a worthwhile effort.

But here again, Minnesota, along with Oklahoma, and Arizona, are the three States that are most aggressive in working on trying to develop that kind of research to reduce our dependency on the fuel of choice.

Mr. Chairman, thank you very much. I appreciate being here.

Mr. GUTKNECHT. Well, thank you, Representative Smith, and Representative Dooley, we appreciate you coming to Minnesota today to hear from some of these experts. Without objection, any additional written comments that you'd like to have submitted to

the record will be made a part of the permanent record, and I would apply that, as well, to the witnesses, that if you have written documents that you want part of the permanent testimony to this hearing, we will gladly add those to the written record.

With that, I'd like to call our first witness, the Honorable Tim Pawlenty, the Governor of the State of Minnesota. I'd like to thank Governor Pawlenty for taking time to be with us today, and I would also like to thank him, publicly, for his support for renewable energy. Governor Pawlenty was recently elected vice chair of the Governors' Ethanol Coalition, I think a clear indication of not only his commitment, but the recognition by his peers of his work on renewable fuels, and particularly as it relates to ethanol.

Governor Pawlenty, thank you very much for joining us. You can begin when you're ready.

**STATEMENT OF HON. TIM PAWLENTY, GOVERNOR, STATE OF MINNESOTA**

Governor PAWLENTY. Chairman Gutknecht, thank you very much for the opportunity to be here, and bringing this important hearing to southeastern Minnesota, and Representatives Dooley and Smith, a warm welcome to Minnesota and to southeastern Minnesota in particular.

As you may know, you are in a midwestern, an American boom town, Rochester, MN, annually viewed as one of the most liveable and highest quality of life cities in the Nation. Obviously, a real center of health care and technology excellence and surrounded by a lot of very important cities and communities, and particularly the emphasis on agriculture as well. So, welcome to you, to Minnesota, and we're glad that you're here.

Agriculture, as you all know, has gone through an amazing transformation in recent times. We're here today to talk about one of the most exciting and promising of those developments, and that is energy.

More specifically, renewable energy. There has been an often commented connection between agriculture, and energy, and with that the promise for future job creation. The 2002 farm bill, Mr. Chairman, was very helpful in advancing these issues and advancing this cause, and I want to publicly thank you for your continued leadership in these areas. You've been a real champion for agriculture and renewable energy and its connection to economic development.

It is particularly important that the subcommittee has come to Minnesota today because we're a champion for these issues, not just as in an aspirational champion, but I think we're a reigning champion on so much of these issues that we've been talking about and that we'll talk about today. Our focus on renewable energy is helping us meet a variety of goals, including reducing pollution per megawatt of electricity generating consumed. These issues and our emphasis on renewable energy at a State and Federal level are not only good agricultural policy, it's good energy policy, it's good economic development policy, and it's certainly good foreign policy, as well.

In the brief time that I have today, I'm going to focus on three areas where Minnesota has been a particular leader with respect to



renewable energy development. That includes wind, ethanol, E-85, and biobased renewable energy technologies.

With respect to wind, Minnesota ranks third in the Nation behind the super-sized States of California and Texas in terms of wind energy capacity. Last year, Minnesota installed more new wind power capacity than any other State in the Nation. New wind generation technology makes it feasible to develop wind farms in areas that were unfeasible just 5 years ago such as southeast and south central Minnesota.

During our last State legislative session, we took action to encourage and support the expansion of wind energy by increasing our cap on wind energy production incentives, and that has already stimulated further interest in the development of wind energy production in Minnesota. We also have a whole range of property tax exemptions, a sales tax exemption, and wind energy rebates that help spur and encourage this important energy industry in Minnesota.

Unlike conventional power plants, as I said, wind farms are spread out, which means the economic impact of their presence can be felt widely, and particularly in rural areas.

I would also like to comment on ethanol and E-85. I know the subcommittee is very familiar with these issues, but just by way of emphasis, I'm pleased to be the incoming vice chair of the Governors' Ethanol Coalition. That gives us another voice for Minnesota on national issues, or a national perspective on these issues. Part of the dream of ethanol is not just energy policy, but it's also economic development, particularly as distributed to the small producers and not just the larger organizations who can benefit from this economic opportunity. I think it's fair to say there's no State in the Nation where that dream has been realized better than in Minnesota.

Minnesota remains the only State in the Nation that mandates that all fuel sold in our State contains at least 10 percent ethanol, and that's year-round. That creates an instant market for millions of gallons of ethanol each year. I believe we have the Nation's strongest and most aggressive farmer owned ethanol production system, and incentives. At present, we have a program that supports producers of ethanol at 13 cents per gallon.

Minnesota produces 400 million gallons of ethanol, or 20 percent of the total ethanol production in the Nation. In addition, we've been a national leader in developing the infrastructure and production capacity for E-85, a gasoline that is 85 percent ethanol. We're able to do that through a variety of means, including the fact that we have a substantial number of fueling stations distributed around Minnesota that encourage the use of E-85.

As you know, President Bush has also announced and unveiled the hydrogen initiative. At the University of Minnesota, we are following that initiative, and most recently there's been an exciting announcement where a new technology has been discovered, and it's going to be deployed, and it's going to allow us to have an inexpensive method to produce renewable hydrogen from ethanol. Yet a whole new use for ethanol for America.

So we intend to make the hydrogen revolution a priority just as we have ethanol. Lastly, on biobased renewables, and quickly,

we're the first State in the Nation to pass a requirement that all diesel fuel sold in Minnesota contain 2 percent biodiesel to meet Federal Clean Air requirements. The law is not triggered until certain production capacity abilities are met. We are hoping to be on track for that to take place next year.

There are many, many other examples throughout Minnesota of renewable energy innovation taking place. There's a farm near Elk River, the Haubenschild farm, that was one of the first in the Nation to have sophisticated methane digester technology that's promising. In Little Falls, MN, there's a biomass gasification project that will use waste from an ethanol plant to power lumber mills and some other facilities.

In short, and in closing, Mr. Chairman, all of this happens because of a partnership between the Federal Government, State government, the private sector investments, the agriculture community, and many others. Working together we've been able to incentivize and ignite production in new technologies that have benefited us not only economically, but for all the other reasons we've talked about, as well.

We have an ambitious renewable energy goal in Minnesota, and that is, our goal is to have 10 percent of our energy come from renewable forms by 2015, which is just a little over 10 years from now. I know the Federal Government, Mr. Chairman, has been generous and aggressive in trying to promote these fuels and these industries, as well, through the Department of Ag, and the Department of Energy, and many others, and I just would like to close by saying, I urge you to reauthorize the Federal production tax credit for wind energy. It's important. With the expiration of this tax credit, we have seen a slowing down of wind energy expansion in Minnesota, and growing concern about the expiration of that credit. I know, Congressman Gutknecht, you have been working particularly hard on this issue, and we just encourage you and support you in those efforts.

I want to sincerely thank you for being here.

Thank you for the chance to share a few thoughts about Minnesota's renewable energy, present and future, and, Mr. Chairman, that completes my remarks.

[The prepared statement of Governor Pawlenty appears at the conclusion of the hearing.]

Mr. GUTKNECHT. Thank you, Governor. I know that you're on your way to a very important announcement later this afternoon. Can you stick with us and answer a couple of questions?

Governor PAWLENTY. Certainly, Mr. Chairman.

Mr. GUTKNECHT. As the chairman, I will take just a real brief moment to sort of outline one of the concerns. A mutual friend of ours, a former colleague, LeRoy Koppendray, was out to see me last week. He told me something that I already knew, but he actually reinforced the point, and that is, that we have actually been very fortunate here in the State of Minnesota, the upper Midwest, the United States, in general, over the last several years we've had relatively warm winters. Now, Nick and I both serve on the Science Committee, and we both represent northern States, and every time the issue of global warming comes up we always say, "If there be such a thing as global warming, we say let there be more of it."

But, we have been blessed, in the last 3 years, to have relatively warm winters. But, he was quite concerned, and I'm quite concerned, about natural gas, and where we are in terms of the supply of it, and what will happen if we have a particularly long and cold winter.

This does begin to bring into focus the need for other sources of energy to make certain that people in places like Minnesota can, at least, stay warm during the winter. Is there something we can do together to help deal with this issue, and it's brought about in part because more and more of the electrical generating is done in the United States with these peak units that are being built along the natural gas pipelines, and as a result we're not storing as much gas as we used to.

That's a very long question, a long statement to sort of get to the question, are there things that we can do at the Federal level to work with people such as yourself, and governors in other, particularly, northern States, to sort of move up the time table to get more of these renewable fuels online so that we're not quite as dependent as we have been in the past on natural gas.

Governor PAWLENTY. Mr. Chairman, that is a great question, and I think what's happening in Minnesota is probably predictive of what's going to happen around the rest of the country. There's greater and greater emphasis about moving away from old technologies, old-style planning, increasing emphasis in use and demand for natural gas, not only domestically, but with the continued industrialization of the rest of the world there's going to be even more pressure on those markets.

As we know, natural gas prices, and markets, are volatile, and the prospect of a particularly cold winter would place a disproportionate burden on northern States, for all of the reasons that you have suggested, Mr. Chairman. So, for all of those reasons, I think that two areas of emphasis would be helpful, and I think important to our country.

That is, with respect to natural gas, we should do all that we can to develop more production and supply in a safe and reasonable and appropriate way. There are a variety of proposals to do that. I think looking at liquefied natural gas has some potential, as an aside. But in addition, diversifying our energy supply and moving away from or supplementing natural gas with renewable energy is critically important, Mr. Chairman, and that's why anything you can do by way of incentives, continuing that wind tax credit, dovetailing with what we're doing on the State level to promote, encourage, incentivize renewable energy production is in our long-term best interest and will help diversify our reliance on coal, and natural gas, and other traditional supplies.

Mr. GUTKNECHT. Mr. Smith.

Mr. SMITH. As chairman of the National Governors' Association's effort in looking into renewable energy sources, do you see any possibility, Governor, of some kind of consensus of the Governors' Association to encourage some kind of resolution between MTBEs' liability question, and ethanol, and come to a position where you might influence the legislation to move ahead?

Governor PAWLENTY. I think so. That has been a subject of a fair amount of discussion amongst governors, and even at our formal

sessions. And, I suspect, like the Congress, there's a divide on the issue. But, I think the increased importance of getting the issue resolved and moving ahead is starting to percolate in governor circles, and in the Association in a way, but I think it's teed up for some sort of consensus position to take place. I would say, perhaps, as quickly as our next meeting. But I am heartened by the fact that it's, at least, on the radar screen and it's the subject of discussion.

Mr. SMITH. Right.

Governor PAWLENTY. At the moment, there isn't an across the Nation consensus. But I think we're moving in that direction.

Mr. SMITH. Thank you.

Governor PAWLENTY. I know how much you appreciate the input of governors.

Mr. GUTKNECHT. Well, I always remind my colleagues that the Federal Government was created by the States and not the other way around, and so we need to remind them of that. But you could be helpful.

In terms of passing a comprehensive energy bill, I think there are two major concerns. One is this whole issue of whether or not people should be liable for potential damage from MTBE. That's a big issue. Frankly, I can see both sides of it. On the other hand, I think we have to be careful not to protect the MTBE, because in some respects—even in California with no—I don't want to get into a fight with my friend from California who has come a long ways to be at this hearing—I mean, there is a real heated discussion in terms of whether or not we should move forward with more ethanol or should we should try to protect the MTBE. I think that debate has pretty well ended.

The other part of the discussion is the overall cost of the energy bill. Now, as a member of the Budget Committee, I'm not certain we have to spend 33 billion of our taxpayers' dollars to do some of the things that I think need to be done. But we do need to have an energy bill, and I think if the governors can help to break the log jams both on the MTBE liability side, and, second, on coming up with a number that both the taxpayers and those who need some help to get some of these industries off the ground, if we can come up with a number that we can all live with, I, at least, have some reason to be optimistic that we may get a bill passed this year.

Governor PAWLENTY. Mr. Chairman, I'll take that message back to my fellow governors, formally and informally, and I know you know this, but it's important from a national, and certainly from a State perspective, to have not only an energy bill, but let's put in a plug for that transportation bill, too, that if you can get that done this year, it would be appreciated.

Mr. GUTKNECHT. Well, thank you, Governor, and we would sure love to have you stick around. We have got some great testimony from some of the top experts in the country about renewable fuels, but we understand you have got a very important announcement to make later today and—

Governor PAWLENTY. Well, certainly not as important as some other issues. I would put it in the proper context, Mr. Chairman. It relates to the never ending stadium debates in Minnesota for our

professional sports teams. Certainly, not as important as some other issues, but it is something that has to be addressed, nonetheless, and so I do have to go back for that.

Thank you so much for the chance to here today.

Mr. GUTKNECHT. Thank you, Governor.

Governor PAWLENTY. I appreciate it.

Mr. GUTKNECHT. Thank you. Our next panel, and as they come up, we're going to put name tags in front of them. We're delighted to have the Honorable Jim Moseley, who is the Deputy Secretary for the U.S. Department of Agriculture, responsible for some of the programs we're talking about.

Mr. David K. Garman, who is the Assistant Secretary for Renewable Energy and Energy Efficiency at the U.S. Department of Energy from Washington, DC.

These are two of the most important people as it relates to Federal policy and renewable energy, and so we're delighted that you would take time out of your schedule to come out here and be with us and present to us a little bit about your perspectives relative to renewable energy and what's appearing at the Department of Agriculture and what's happening at the Department of Energy and what, perhaps, we in Congress can do to make your jobs a little easier.

Mr. MOSELEY. Thank you.

Mr. GUTKNECHT. Mr. Moseley.

**STATEMENT OF JAMES MOSELEY, DEPUTY SECRETARY, U.S.  
DEPARTMENT OF AGRICULTURE**

Mr. MOSELEY. thank you, Mr. Chairman. And, before I start, I want to just make a comment that I really appreciate your invitation to come to Minnesota. As I prepared for this hearing, I began to get a better understanding about what's happening in this State in terms of renewable energy, and quite frankly, coming here and seeing it firsthand has helped me, in a major way, to understand that there's been some real leadership in this State, and it has moved the issue forward. And from a farmer's perspective, it's gratifying to me to see so much involvement with the farming community here in terms of this renewable energy, and as we toured the ethanol plant this morning and find that there were over 300 some farmers involved in that investment activity. That, I think, is indicative of the kind of thing that we're doing this for, and that's for our farmers and our rural communities.

I appreciate this opportunity to discuss USDA's efforts to advance this renewable energy concept, which on its own is a major step, but, also, to highlight the impact of that work on rural economy and the energy security of our Nation. I'll briefly summarize my longer statement, which, with your permission, I would like to submit for the record, Mr. Chairman.

Mr. GUTKNECHT. Without objection, it will be added to the record.

Mr. MOSELEY. My remarks, today, focus largely on the economic benefits of renewable energy followed by a discussion of the USDA programs that promote renewable energy. And I want to emphasize, at the outset, an underlying theme of today's discussions is

the importance of strategic thinking in renewable energy production.

I think it's been well-documented that the Bush administration strongly supports developing renewable energy as a part of a portfolio of domestic energy supplies to meet America's growing demand for energy.

The President laid out his interest in a national energy strategy in the first days of his administration. And our goal at USDA is to accomplish this by increasing the volume of renewable energy, and to realize benefits for rural communities, and the Nation, namely, to create jobs, reduce dependence on foreign oil, and reduce environment pollution as a result.

Our programs at USDA are broad ranging from supporting the production of renewable energy, to conducting research and development, and pre-commercial work, from monitoring energy markets, to conducting economic analysis to identify new investment opportunities. This is a clear commitment to provide our part of the renewable energy equation.

As we start down the path of this discussion, I think we have to begin with an issue that has been on the minds of farmers like myself for many years.

Finally, I can say, with credibility, ethanol is a renewable energy success story. U.S. total production capacity is just over 3 billion gallons a year. It will increase to 3.47 billion gallons within the next. More than 1 billion bushels of corn and sorghum were converted to ethanol last year. 32 percent over the 2002 production levels. We project steady increases this year and into the future. Up to 5 billion gallons by 2012. I would add, if the energy bill is passed, and the Renewable Fuels Standard implemented.

New plants are being built, U.S. jobs are being created, and farmers are finding this a viable market for their crops. And, it can grow. Demand for ethanol increased significantly last year with a corresponding rise in prices. This resulted when California, New York and Connecticut replaced MTBE in their gasoline with ethanol. And, of course, we have 17 States, now, that ban MTBE in their gasoline. So we expect this mandate to continue to rise.

Corn still remains the most important ingredient, accounting for about 95 percent of the feedstock used.

It also is the greatest cost of producing ethanol, with natural gas being the second. Ethanol producers are facing higher prices for both inputs this year.

However, ethanol prices are related to other energy costs because they serve as substitutes, so as other energy costs rise, so does the value of ethanol. And, of course, we must remember, one of the important reasons for using corn as a feedstock was to increase its demand and value in the marketplace to begin with.

In the past, much has been alleged about the energy cost of making ethanol. So let's just address that question for a second. Though certainly it takes energy to make energy, like it takes money to make money, USDA's analysis shows there's far more energy in a gallon of ethanol than the total energy required to make it. This is important because it means that producing ethanol from corn is a positive net contributor to our Nation's energy security. In numeric values, our current analysis shows that the energy con-

tent of ethanol is 67 percent greater than the energy input necessary to grow, harvest, and transport corn, and to produce and distribute that ethanol. That's a large increase from 22 percent in '95, due largely to the greater efficiencies that we are squeezing out of the energy conversion equation much like we saw at the ethanol plant we were at today.

There are several factors at work here, but mainly it's because ethanol yield per bushel has improved and ethanol plants are rapidly adopting innovations that reduce the energy input necessary for the conversion process. This is a direct result of the USDA research that has been targeted in developing new technologies for lowering both feedstock, and production costs, and the willingness of producers to adopt them.

Of course, when we talk about renewable fuels like ethanol, we can also put biodiesel in the same sentence. Biodiesel produced from soybeans, as well as other agricultural fats and oils has come of age, and the fuels mixed offers better environmental performance from combustion. They offer the opportunity to replace petroleum derivatives, to bring farmers into higher volume markets, the urban transit system, for example. Because agricultural oils are very energy efficient to convert to energy, we can claim the added benefit of reduced greenhouse gas emissions much lower than using the petroleum based fuel.

Again, as with ethanol, we've been aggressive at directing USDA's research program towards lowering production costs and developing technology for conversion and use in the biodiesel market.

Turning to other sources of renewable energy, we're beginning to see a strong interest in wind power. The kind of thing we all saw, were able to view this morning. And, again, with advances in technology, the cost of wind power from electricity has dropped 80 percent in the past 20 years. Biomass crops also have the potential to become important feedstocks for electric power, liquid fuel and chemical production. Unlike fossil fuels, the energy they produce does not place additional greenhouse gas in the atmosphere. Our analysis shows an aggressive research program aimed at boosting production yields via new technologies can potentially, longer term, make biomass competitive with fossil fuels. It's an area however, where we still have some significant research to accomplish that objective.

I want to conclude my remarks by sharing some of our renewable energy programs and focus on several sections of the energy title in the 2002 farm bill. One new program we are enthusiastic about at USDA is the Federal Bio-Base Procurement Program. This requires all Federal agencies to increase their use of biobased industrial projects contributing to the development of broad range of new products. I personally opened several seminars at Purdue on this particular topic.

They have been exceptionally well attended, and I can tell you that there's a lot of enthusiasm for that program.

Another farm bill program is the CCC Bio-Energy Program, which makes \$150 million available, this year, to help expand bio-energy production and support new production capacity. And I have also mentioned research several times, because it's essential

to the capacity building process. We're proposing 92 million from discretionary spending on biobased products and bio-energy research in our fiscal 2005 budget request to Congress. We have a two-fold goal: To overcome technical barriers to developing renewable energy, and to achieve this through strong government, private sector academic coordination.

Taken together, these programs and our direction and focus on results will help advance agriculture's key role and realize its potential in meeting the demand for clean, affordable, domestically produced renewable energy. It is our conviction that this process will contribute both to the vitality of rural communities and the energy independence of our Nation.

I would be remiss, as I conclude, Mr. Chairman, if I didn't mention the value that our farmers provide in making sure that all of this happens. First, we must have a dependable supply of feedstocks to support energy production, because without that certainty renewable energy production just simply wouldn't happen. And, second, someone has to take the risk and invest in the energy production process to help make it become a reality. And our farmers have come forth on both fronts. Without that commitment of their own financial resources, and their production capability to assure a dependable feedstock supply, renewable energy in this country simply would not happen.

So, I think it's important that we recognize that contribution and give them credit where it is due. The USDA, and the administration wants to put on record our support for our farmers' accomplishments. The country is clearly more energy secure because of it.

That completes my statement, Mr. Chairman, and I'll be pleased to respond to your questions.

[The prepared statement of Mr. Moseley appears at the conclusion of the hearing.]

Mr. GUTKNECHT. Thank you, Mr. Moseley. I think we'll go ahead and hear from Mr. Garman, and then we'll take questions. Mr. Garman, welcome.

**STATEMENT OF DAVID K. GARMAN, ASSISTANT SECRETARY,  
RENEWABLE ENERGY AND ENERGY EFFICIENCY, U.S. DEPARTMENT OF ENERGY**

Mr. GARMAN. Thank you, Mr. Chairman. I would echo the words of Deputy Secretary Moseley in expressing our appreciation in being able to come to Minnesota and see what you're doing here. It's always good to get grounded among real people, doing real things, and we appreciate that. And I also appreciate this opportunity to testify with Deputy Secretary Moseley, because I think it's fair to say that the Department of Energy and the Department of Agriculture are working better together, today, on these problems than I think it ever has before. I think it's, in large part, because of your leadership, sir, and I want to thank you for that.

For the past 3 years, this administration has invested nearly a billion dollars in research and development, administration and deployment of renewable energy technologies, and we're very proud of that. And that investment is paying off. The next slide. This is our projection of how renewable energy is growing, and how it will



grow as a consequence of our R&D portfolio, which is shown by the line, EERE, Energy Efficiency Renewable Energy portfolio. We think that that growth is going to happen as a consequence of this work that Congress is providing us the opportunity to do.

Next slide. Of course, hydropower is our largest, most mature renewable energy technology. It's producing about 78,000 megawatts, or it has that installed capacity today, about half split between Federal Government ownership and private projects. We are doing some R&D work in that area, mainly on improving the efficiency of turbines and lowering their environmental impact, their impact on fish, downstream levels of total dissolved oxygen, and that sort of thing.

Next slide, please. Geothermal is another very important renewable energy resource, particularly out West where the heat source is hot enough to actually generate electricity and steam. However, across the country, and even here in Minnesota we have lots of examples of ground source heat pumps being used to allow the inherent latent heat of the ground to both cool in the summertime and warm in the wintertime, and there are some half million units installed of ground source heat pumps around the country, and about 35,000 a year are being installed today.

Next slide, please. Wind energy, of course, is, perhaps, our fastest growing renewable. The installed capacity in wind has more than doubled in the last 3 years. Minnesota has 560 megawatts, or thereabouts. Nationwide, we're over 6,100 megawatts of installed capacity.

Next slide. Solar is comparatively expensive today, but can make sense in rural areas, particularly off the grid. But one day, as you can see with our R&D targets there, we hope to make solar competitive with grid supplied electricity, and that's something we're looking forward to as a consequence of the work at our National Renewable Energy Lab and other places, and we'll hear from them today, as well.

The next slide, please. Biomass. We often think of biomass only in terms of ethanol and biodiesel, but it is our number two renewable power resource. And that's often overlooked. But in addition to liquid fuels and power, biomass can also be used to develop a whole range of high value products that are currently made from oil and gas feedstocks.

Next slide, please. And this slide illustrates our R&D approach toward the integrated biorefinery, and this is work that we're doing in very close concert with the Department of Agriculture. We find that is very difficult to do liquid fuels from biomass, or power from biomass, or products from biomass independently and make it economically competitive. But when you bring all three together in an integrated fashion and take advantage of the synergistic benefits of using the same infrastructure for multiple purposes, you come much closer to an economic and competitive situation. And, this is one area, in particular, where the Department of Agriculture and the Department of Energy have worked in very close collaboration, actually doing joint solicitations, joint funding projects, and joint research in this area.

Next slide, please. Of course, all of these renewables tie into what we call the hydrogen future, and, of course, it's been indicated

before, the President, during his State of the Union address in 2003, laid forth this challenge where we could displace large amounts of the imported petroleum we currently use for transportation in this country and use, instead, hydrogen.

The next slide. Why hydrogen? The interesting thing about hydrogen is that it is a common fuel, a common energy carrier that can be produced from a wide variety of abundant, domestic, primary energy resources, including the renewables, you can produce it using fossil sources, or nuclear, but all of these sources can be used to make a common fuel that can be used both in stationary and mobile applications.

The next slide. Of course, our ultimate goal is a future where hydrogen and electricity are the clean, premium fuels that power our economy.

Next slide. And, they are produced from a variety of domestic energy resources, many in rural America and done so with zero, or near zero emissions. Of course, as Deputy Secretary Moseley indicated, we continue to strongly support comprehensive energy legislation, incentives for renewable energy, production tax credit, the Renewable Fuel Standard, and dare I say it, and forget this, but a variety of energy efficiency standards at the outset. We have to continuously make sure we use the energy we have from all resources as efficiently as we can.

With that, Mr. Chairman, you have my prepared statement for the record, and I will be happy to entertain any questions either today, or in the future, that you might have. Thank you.

[The prepared statement of Mr. Garman appears at the conclusion of the hearing.]

Mr. GUTKNECHT. Well, thank you very much Secretary Garman and Secretary Moseley. Again, we appreciate you being here. Part of my objective was, and you both alluded to, and some of the people here in the audience participated this morning in our little tour that we led, and had some discussions with folks who are actually on the ground producing renewable energy in various different ways.

I'm a big believer in research, because at the end of the day we have got to drive the cost of all of these new forms of clean energy, we've got to drive the cost down. That, is the bottom line. I have been very interested in what's being done at the National Renewable Energy Labs and at some of the universities, including here at the University of Minnesota. I leaned over to mention to Nick that it's a pretty interesting thing that they've actually made some announcements already, and, hopefully, more will be coming out about the ability for a much simpler, and, we hope, a very cost effective way to convert ethanol into hydrogen. And, that research is ongoing, but they've made a tremendous amount of progress at the University of Minnesota.

Based on what you have seen today, are there things that we could be doing from a congressional perspective, other than passing an energy bill—if we don't pass an energy bill, can we back off and take another look at what we can do just on the renewable energy side?

One of the provisions of the comprehensive bill that are very, very important are the production. As you say, these are new technologies.

They tend to be priced a little higher than conventional technologies. The production tax credit for wind, we believe, is critical. And if it is seen that a comprehensive energy bill is not possible, then I would certainly hope the Congress would find a way to extend tax credits for renewable energy. We think that's extremely important.

There are always things that folks can do at State and local levels to help integrate more renewable energy technology onto the grid, and I say that because most electricity regulation occurs at State and local levels. And, States can be incredibly powerful at adopting technologies that make it easier to integrate renewable power technologies into the grid. And it's not just something that the Federal Government needs to do, many States are doing a great deal, and, in fact, taking a lead in promoting these technologies, and it runs the gamut from net metering, the way intra-state allocations of transmission are taken care of, and a whole host of other interconnection standards and other things are very, very important in this regard.

Mr. GUTKNECHT. Mr. Moseley.

Mr. MOSELEY. Well, first of all, I think it is important for us to get an energy bill if at all possible if for no other reason it sets forward that we have a strategy. That it sets the tone for what is to come. And I think we've learned very clearly this morning that we have some issues in this energy area that's not going to go away for some extended period of time. Particularly, as we look at the natural gas issue.

The Federal Government, and to a lesser extent the States, State governments, working together, really have the responsibility in the research area, I think, to help define some of the questions, and, also, then, of course, to answer some of those questions. And one of the issues, of course, that we have is budget issues are always on the table. But, the encouragement by Congress, both on itself and towards the Department of Agriculture and the Department of Energy to stay focused on where we're going here in terms of energy in terms of our research agenda, is very important, and I think you know, Congressmen, that we have a number of earmarks that we get in the research area every year. And, I would just ask that we think very carefully through those issues and make sure that they are priority issues.

And, then, of course, second of all, what we can do as an administration, and within the authorities that you have handed to us, is to make sure that we get over those little bumps in the road that are going to happen, naturally, as you start to develop any kind of a process or a system towards commercializing, and I think that's a legitimate role, quite frankly, of the public sector to help with some seed money, some grants, and some loans early on, and that's the reason why both Energy and the Department of Agriculture working together to provide those grants, and significant amount of loan dollars, now, for many of these early stage energy projects.

Mr. GUTKNECHT. Well, my time has expired. Maybe I can go back to one other point I want to make. Representative Dooley.

Mr. DOOLEY. Yes. Thank you, Gil. Secretary Moseley, would you consider ethanol an early stage energy?

Mr. MOSELEY. Well, I think we're in the point of maturing. If you put it in terms of life processes, I don't think we're an adult yet, but we're going through adolescence. It's not in its infancy as biodiesel, for example, is.

Mr. DOOLEY. My line of thinking, I have a couple of daughters that are in college, and as they get older you start cutting back on them, especially when they leave in college, I'm interested in terms of the amount of money that we're effectively investing in ethanol through the benefits and the exemption from the excise tax is having an impact, a significant impact on the Highway Trust Fund, as well as the general fund dollars, which might amount 52 cents a gallon.

In your testimony you said there's something like 73 ethanol plants that are currently operating. There's an additional 20, I believe, or not quite 20, excuse me, 15 that are being constructed today. Would those be constructed, do you think, if it wasn't for that 52 cent a gallon exemption from excise taxes?

Mr. MOSELEY. I think at the current level income potential, and the current level of technology we have, and that is improving, as we talked this morning at the plant, they're, all the time, looking for new technologies to squeeze a little bit more efficiency out. But I think at the current level of production, no, that tax credit is very important, still. And I think it will be for some period of time. But at the same time we also have biodiesel, for example, that is really needing a shot in the arm, and I think that's where we need to make sure that we provide, likewise, the same kind of incentives there as we have for the ethanol product.

Mr. DOOLEY. I would like to think we could do that, too, but I found it was interesting, when you were going through your testimony, if you compare the amount of money that we're investing in wind and solar from the Federal perspective, versus what we've done with ethanol, we've made a major commitment that we want this one to work. My concern comes back to even to the figures that you said, that you're generating ethanol, now, with current technology, produces 67 percent more energy than what is used to—

Mr. MOSELEY. Correct.

Mr. DOOLEY. That's an interesting figure, but I'd be more interested in terms of the cost of production is because you could probably find even other sources of energy that could even actually have greater efficiency standards, but those figures are pretty irrelevant if we're not creating that energy in a cost effective manner. Has the Department done an analysis in terms of what would be the cost of corn and the cost of natural gas that you would do your trend lines on to where it got to the point where you don't really need the 52 cents as also correlated to what is the price of oil. How much do we have to pay for a barrel of oil that would then render that 52 cent a gallon subsidy that we're providing that we wouldn't need it. Because right now it seems like it doesn't matter what the price of oil is, which I think Deputy Secretary Moseley identified as a substitute product, so ethanol is going to be priced accordingly, very little to do with actual inputs, but at some point, if you get

the price of oil high enough, why aren't we reducing the subsidy for ethanol?

Mr. GARMAN. I don't have any specific numbers to share with you, but I think that the decision by Congress in the past, and a decision has been embraced by the administration to recognize the public benefits inherent in ethanol by waiving the excise tax on ethanol. It is a recognition of the fact that there are public benefits, ethanol displacing farm petroleum is U.S. dollars that are not imported abroad. Ethanol displacing farm petroleum results in clean air benefits that are not necessarily monetized in the market place, but nevertheless are there. We think at this point, and we do that with a great many energy resources, not the least, of which, is nuclear energy, which is a very important energy resource for the country, 20 percent of our electricity, but we provide a blanket liability protection in the form of a large government subsidy to Price Anderson as we do with many energy resources. So, most of our energy sources are subsidized one way or another in recognition of public benefits and other policy realities that we face.

Mr. DOOLEY. Just a follow-up question on that.

Just say, theoretically, if we saw the doubling of the price per barrel of oil, which could happen. If you look at projections 10 years ago, everyone thought was going to happen. It didn't.

Do you think the subsidy, the current subsidy that we're providing to ethanol is still justified if we were having oil at \$52 a barrel versus the 26 or whatever it is today?

Mr. MOSELEY. I have to confess I don't know the numbers well enough to answer that question with absolute certainty. My sense is, if you double the price of oil, that the need for that would go away. I would guess that, that our chief economist, Keith Collins, has done an in depth analysis on that, and I'd be happy to get back with you.

You asked, I think, earlier, maybe a little bit different question in terms of ethanol versus some of the other renewable energies. And, being a farmer, I have been around this for a long, long time, and we were talking about turning corn into ethanol some 20 years ago, and it, quite frankly, was a dream at that point in time. We have been at that particular part of the renewable energy equation for quite some time. Some of these others are more recently coming online. And I think that's reflected, a little bit, in terms of the volume of investment we've made, and, perhaps, the level of financial investment that we have made to that particular issue.

I will tell you that as we were setting, looking at the 2005 budget, there is recognition at the Department of Agriculture that ethanol is maturing, and that some of the other renewable energies are, A, in need of some very serious research; and, B, those that were beginning to move along in terms of research are going to have similar investments to what we made in ethanol to bring them along. And, quite frankly, biodiesel is one of those. And, again, we want to support all of these renewable fuels, and it's going to be a major challenge for us as we move ahead to put the investment dollars out there to make sure it happens, but we're committed beyond just the issue of ethanol from corn. And, of course, we can produce ethanol from a host of other feedstocks, as well, and this

concept of taking ethanol and converting it to hydrogen is a powerful thing that's setting out there for us.

Mr. GUTKNECHT. Mr. Moseley, I'll just mention this. You couldn't make it to the morning presentations, but one of the issues that was brought up by one of the gentlemen in the back of the room is that the average ethanol plant buys \$750,000 worth of natural gas every month, and as natural gas prices keep going up, and yet at the same time, if you think about it, they're sitting on a mountain of energy, and what we have to do is use new technologies, and new ideas, and some of them coming from our renewable energy labs, and some coming from private entrepreneurs, and that's about driving down the costs. And, we'll get to that in a minute. It's not my time. But part of the reason I wanted to bring some of these people together is to try and, perhaps, create some synergy, so they hear from each other about ways these issues could be resolved in a more cost effective way.

Mr. Smith.

Mr. SMITH. Mr. Chairman, just following up on your thought. Just such a tremendous potential in the genetic technology that we're looking at in terms of producing the kind of crops, whether it's corn, or whether it's some forestry product, or anything else that can contribute so greatly to the efficiency of producing alternative energy supplies.

Actually, in my opening statement when I mentioned that Henry Ford's idea was to have these cars driven by ethanol, with Henry Ford's encouragement, Standard Oil, in the mid-1920's, had a blend of gasoline and kerosene that was made up of 25 percent ethanol, and that sort of died out with distribution problems. But when we started the ethanol subsidy in 1979, I think it was, Cal, it was energy consuming to produce ethanol. The new plant that we're producing in Michigan that's going to produce 50 million gallons a year, is roughly three times more efficient than those first plants in the late 1970's and early 1980's, and I'm wondering, partially, where we're going from here, but I want you to repeat, Deputy Secretary Moseley, the statistic that you gave that suggests—because there's been a lot of debates over the last 20 years, is the development and production of ethanol, does it take more energy in the growing of those crops, and the harvesting, and the transportation, and the production of ethanol, and the distribution of that ethanol, but your figure was 60 what percent?

Mr. MOSELEY. Sixty-seven percent. In other words, you're getting two-thirds more energy than what it's taking to produce that volume of energy, however you want to evaluate that—

Mr. SMITH. Congressman Dooley's point is well taken, but, still, in terms of the competitive supplies of energy, with that efficiency, and if we can increase that efficiency, then it seems to me that there is great potential for where we go.

In terms of biofuels and biodiesels, what is the relative research and effort of incorporating those biofuels into American society? I mean, your State has been a leader by requiring 2 percent, and I guess I'm not aware that any other State does that. Do they?

Mr. GARMAN. Yes. I think North Dakota has a fuel standard, and, of course, we in the energy bill are promoting a Renewable Fuels Standard that would take us up to 5 billion gallons a year.

But I wanted to take the opportunity to mention, you talk about the research and the next frontier, is really getting beyond the corn and grains to cellulosic material that can be used. And you touched on that in the question, as well. What are the enzymes, or, perhaps, genetically modified organisms, or other things that can be brought to bear to increase the efficiency and efficacy of converting what currently has little or no value, forest wastes, or other types of agricultural wastes, into a fuel that can displace farm petroleum, and that is where a lot of our R&D effort today is going into, and, in fact, at the National Renewable Energy Lab, we do have a pilot scale plant that turns woodchips, a cellulosic material, into ethanol.

Mr. SMITH. I was going to ask some of the other witnesses, too, but in terms of the future of ethanol, as a good investment, I'm telling farmers back home that I'm guessing it's good for maybe 15 years in terms of what might come up from fusion energy, as we sophisticate and find cost effectiveness on fusion for other sources of energy, to substitutes for ethanol in one way or the other. Any guesses?

Mr. GARMAN. I think fusion is, at least, 50 years away. I think we look at it that way as a very long-term and speculative, frankly. I mean, it's kind of one of those very high risk, very high payoff propositions. Hydrogen has great potential as a transportation fuel, but that transition will take many decades. And, even so, there is a role for ethanol and other biobased fuels to play in that hydrogen future, because hydrogen can be derived from those liquid fuels.

Mr. SMITH. So you think I'm a little short on the 15 years, solid, and it should be more than that?

Mr. GARMAN. I think folks investing in ethanol are investing in a bright future.

Mr. SMITH. Thank you, Mr. Chairman.

Mr. GUTKNECHT. Thank you. And, I know that both of you have to catch planes, and so there are a couple of other questions I want to get to, but maybe we can save those for a hearing back in Washington. Again, thank you for joining us today. I hope we made, at least this morning, worth your time.

Mr. GARMAN. Thank you very much.

Mr. GUTKNECHT. I think there are an awful lot of interesting things happening here in this world, and we really wanted to afford you the opportunity to find out. I'm particularly excited about the potential of biomass, and some of the things you heard today at the earlier meeting, unfortunately not everybody here in the audience here got to hear some of those things, but those are the kinds of ideas that I wanted to have shared with you, and, again, thank you, and hopefully you'll have a safe trip back to Washington. See you there.

Mr. GARMAN. Thank you.

Mr. MOSELEY. Thank you, Mr. Chair.

Mr. GUTKNECHT. With that, I would like to call up the third panel. First we have Admiral Richard Truly, who is the Director of the National Renewable Energy Labs in Golden, CO. We have Mr. Ron Obermoller, who is the president of the Minnesota Corn Growers Association from Brewster, MN. We have Ron Jacobsen, who is the president of the Minnesota Soybean Growers Association

from Wells, MN, and Mr. Dennis Haubenschild, who is the president of Haubenschild Dairy Farms in Princeton, MN.

And, for the benefit of my colleagues, and those who may be in the audience, I am planning a trip to take as many of the members of this subcommittee, as well as members of the Science Committee, who would like to join me, on a trip out to the National Renewable Energy Labs in Golden, CO. I was out there several years ago and was most impressed with the research that's going on there, and I think at the end of the day we have to drive the technology. We have to push the technology.

We have to drive efficiencies, so that regardless of whether the price of oil is \$28 a barrel, or \$32 a barrel, that renewables will be a very important component in terms of our costs.

So, Admiral Truly, we are delighted to have you with us, and I look forward to bringing a delegation out to meet with you and get an extended tour of the facilities and meet with some of the scientists that have been working out there, sometimes without a whole lot of recognition, but, nonetheless, doing very important work for the future of our children relative to their energy future.

So, welcome, and please give us your testimony when you're ready.

#### **STATEMENT OF RICHARD H. TRULY, DIRECTOR, NATIONAL RENEWABLE ENERGY LABORATORY**

Mr. TRULY. Thank you, Mr. Chairman, and members of the committee, thank you very much for having me here today. I'm Richard Truly, Director of the National Renewable Energy Laboratory, which is known as NREL, and, Mr. Chairman, we enjoyed your visit when you were out there before, and look forward to the next one.

With your permission, I do have a prepared statement. I would like to submit that for the record, but I would like to make a few comments to the committee.

Mr. GUTKNECHT. Without objection.

Mr. TRULY. NREL is one of several DOE National Laboratories spread across the country. In the case of NREL, our sponsor at DOE headquarters is Assistant Secretary David Garman, who was just up here, and his office of Energy Efficiency and Renewable Energy and NREL is managed for the government by Midwest Research Institute and Patel.

We're located in Golden, CO, and one of the most important things about the laboratory is that our mission is extremely focused. The only science and technology that we work on is either renewable energy, which is the supply side of the clean energy equation, or energy efficiency such as advanced vehicles and well-designed buildings, which is the demand side of that same equation.

Assistant Secretary Garman listed quite a number of technologies earlier, and NREL is involved in each one of them in support of the DOE programs in science and technology and analysis.

I'd like to also point out, and to get back to one of Congressman Dooley's opening remarks, is that there's no point in NREL working on any technology that does not have the promise, or the hope,



of being eventually commercialized and put into the private sector to help our country.

Also, the other point I wanted to make was that we recognize, as much as we love science and technology, we recognize this very clearly that it's the triangle of technology and public policy and markets that will actually take these ideas of the future and make them a reality across America.

Since this hearing is focused on rural America, and farmlands, though, today I wanted to focus my remarks on the two technologies that I think have the biggest impact there. They've been mentioned before, but I'd like to talk a little bit more about them, and that is bioenergy and wind.

First of all, biomass is that organic material that's everything from plants, switch grass, woodchips, corn, stover, foods, and et cetera, including wastes.

And this is what we focus on, because it provides unique opportunities, and I might also say, enormous challenges, as we look to develop fuels that are—particularly, as we look to develop fuels that are alternative to petroleum.

Biomass is the only renewable that takes the sun's energy and captures the carbon dioxide in it that is a major greenhouse gas. It turns it into carbon based molecules and then through the technologies we develop we can use these molecules to produce fuels, or chemicals, or almost any product that a petroleum refinery produces today.

Also, there's an enormous supply of biomass, as I have defined it. It's a source of all our food, and feed, and fiber, and, therefore, we have to take great care and continually, as we move forward, address the balance of its use either in these various areas as we learn to harvest it, and use it, and substantially increase its ability to recycle the CO<sub>2</sub> through the natural biomass, slash, carbon dioxide cycle. And, some day, as has also been alluded to, some day biomass, along with the other renewables; wind, solar, et cetera, is going to be a critical source of renewable hydrogen for the future.

What we're doing today is building on today's technological and commercial success of one of the most important bioenergy technologies in the nature today, and that is corn grain ethanol. It's commercially successful and it's based on years of research and cooperation between DOE, USDA, the States, and commercial enterprises. But what we're looking at NREL and other national laboratories to the future is something that's called lignocellulosic biomass. In other words, other than the corn grain, some people describe it as "all the rest." In the case of corn, the stover, and et cetera.

This is important, because it is critical to learn how to use this biomass to make major efforts in reducing, in a large scale, our dependence on petroleum. We use different technology pathways. One, a thermal chemical pathway and another is a biological pathway using genetics to break down this biomass so that it can be fermented and made into ethanol and other products. And through this create heat, electricity, fuel, chemicals, and ethanol.

Why is this not available today? Well, the research is not done, and it costs too much, and that's what we're in the business of trying to solve. At NREL, our National Bioenergy Center works close-

ly with David Garman's office of the biomass program to play a major role in the research to learn how to do this. And we have several national goals.

By 2005, to demonstrate an integrated process for fuel production from biomass. Second, by 2007, and these are just around the corner, to complete the technology development to enable start up demonstration of a biorefinery that can produce fuels, chemicals and power. And, finally, about 2010 to help U.S. industry establish the first full-scale biorefinery in the country based on agricultural residues.

Biomass is available all over the country, and Minnesota is a great example. Plentiful resources, successful commercial companies, partnerships between the Federal Government, and the State, and private partners, this State is well-positioned to be a leader in this new area, but that's true across the country in other ways as well. For example, in my home of Colorado, the biomass that is not available to us, that we're looking at, is in the forests, in the foothills, that causes such a fire danger, and this technology call uses that, as well, to do the same thing.

I'd like to also turn, just for a moment, about wind, because it also has enormous opportunities for the future, and much is demonstrated today in rural America. Wind is the most commercially mature of the renewables that we have today. It is nose to nose competitive where wind resources are appropriate, and it is enjoying very strong growth across the Nation as we see it move. It is clean energy. Some people say that after it's installed it's the gift that keeps on giving. It also can be a new cash crop for farmers where wind resources are appropriate. For example, our studies at NREL show that lessors, people that lease the land for these new turbines, typically can receive 2 to 4 percent revenue and also can receive annual payments of \$2,000 to \$4,000 a turbine in lease costs, not to mention the important local tax revenues that come to counties, small towns, school boards and et cetera.

However, in the future there is an important opportunity to broaden the ability for the Nation to use wind resources. By developing new and more efficient turbines that can operate in lower wind regimes than current turbines can currently do in a commercial way. And these lower wind regimes, if you'll remember David Garman's plot, occur across rural America and across our Nation. And this is the underlying reason that the development of energy and the national laboratories, particularly NREL, with its National Wind Technology Center, and our industry partners, are working on what's called the Low Wind Speed Turbine Program, which he mentioned earlier, to take advantage of this opportunity.

In conclusion, and in summary, I personally believe that there are enormous opportunities for the future in national security, in economic development, and in the protection of our environment here in Minnesota and across the Nation in small towns and farmlands through research and development, and leading to the commercial development of renewable technologies, especially biomass and wind. And, further, each of these technologies, as they move into commercial operation, can help pave the way to the day where we enjoy future employment and move to the greater application

of hydrogen in our U.S. income and become much more independent of foreign energy supplies, especially petroleum.

Mr. Chairman, thank you very much, again, for allowing me to be a part of this and I look forward to any questions you might have.

[The prepared statement of Mr. Truly appears at the conclusion of the hearing.]

Mr. GUTKNECHT. Thank you, Admiral Truly, and we look forward to seeing you out in Golden, CO, here, in about a month.

Next, Mr. Obermoller, who is the president of the Minnesota Corn Growers, from Brewster, MN, and he's also on the board of one of the newest and most exciting facilities that will have a grand opening, or I'm not sure, in Brewster, what are we going to do on—

Mr. OBERMOLLER. Ground breaking on Friday, March 19.

Mr. GUTKNECHT. It looks like it's already running.

Mr. OBERMOLLER. That's the soybean processing part.

Now we have got to convert it into biodiesel.

Mr. GUTKNECHT. OK.

Mr. OBERMOLLER. We've got the crude oil, now it's the next step.

Mr. GUTKNECHT. Well, Ron, welcome, and please present your testimony.

#### **STATEMENT OF RON OBERMOLLER, PRESIDENT, MINNESOTA CORN GROWERS ASSOCIATION**

Mr. OBERMOLLER. Thank you, Congressman, for the opportunity. I'm Ronald Obermoller, president of the Minnesota Corn Growers. I'm on a fourth generation farm about 100 miles west of Rochester. We're still in the good ground over there before we run out of moisture and get too close to South Dakota. My farm consists of 675 acres. It's half soybeans and half corn, so we have interest on both the biodiesel side and the ethanol side.

I was asked to try to do 20 years of legislative work and stuff, how the ethanol got to where it is in Minnesota, and we're going to try to get that in 5 minutes, so it's a good challenge.

Minnesota farmers have a problem with location. We seem to be at the end of all the rail lines and we're a thousand miles from the New Orleans port. That gives us the widest bases and the lowest prices of any place in the United States and almost in the world. What this amounts to is the producers, the agriculture producers in this area have to pay the freight for the inputs coming in, the fertilizer, the fuels, everything. And we also have to pay the freight to get our crops out. I guess you can kind of relate it, what we're doing in Minnesota, is kind of to the moonshiners. They got tired of hauling their corn down the mountain, so if they convert it to ethanol, or in their case moonshine, they only had to haul a third of the volume. And that's a lot of what we're getting into.

It's the only logical way to turn this advantage or of lower prices into a processing that keeps the local industry in the area. This explains a lot of the success of ethanol in Minnesota. As Minnesota Corn Growers, we end up doing a lot of promotion. Our last promotion was "Ethanol, the fuel that helps our economy grow." We look at the RFS, we look at a lot of these Federal programs, the State programs almost as job buildup out in the rural areas.

The ethanol program on a State level is started mainly because of the increased production of corn.

I think the standard is one and a half to two bushels more per year. This side of production tends to depress the crops further because we do have to pay our crops—freight, getting it out of the local area. This gives us a logical area to do the ethanol production. The ethanol has helped to address a major problem just simply on the freight reasons.

In 1980, Minnesota started with a 4 cent per gallon tax for a 10 percent blend in Minnesota, and throughout the 1990 legislation has continued to encourage ethanol production. By the year 2002, Minnesota used ethanol in 98 percent of our fuel. And this is at the 10 percent level. Presently, we have 14 ethanol plants in Minnesota. Twelve of these are farmer owned. Either LLCs or new generation co-ops. The farmers supply the capital to build these plants, and they supply the corn to process in these plants. When the local residents own the plants, the profits stay in the local communities. The standard number that is used for farmers is the dollar turns over seven times in the local communities.

Producer payments by the State helped the industry establish itself. A lot of what this did is it helped the banks guarantee the loans. The banks for these 14 plants put in over \$370 million. The farmers put in \$180 million. So these State producer credits give both the banks the ability to back these loans, plus the farmers' incentive, or the confidence to invest in these ventures. Every dollar that the State invested in the ethanol industry created \$8 of economic activity in Minnesota.

The ethanol industry has created a market for 160 million bushels of Minnesota corn. That's about 17 percent of our present crop. At this time there are at least four or five new groups of farmers looking at ethanol plants to start up in the next 2 years. This has not happened in Minnesota for four or 5 years. We have not had new plants, but we've had the old ones expand.

One of the key elements for this continued growth is the energy bill and Renewable Fuels Standard. As State Corn Growers we are convinced that our politicians are going to get the right thing done in DC. With the energy bill, so they are looking to invest in the local plants.

The increased ethanol production projected by the Renewable Fuel Standard will add 16 cents a bushel to the corn price out here in the country. Right now the corn consumption for ethanol in the United States is over a billion bushels. That amounts to 10 percent of the total crop raised in the United States. This is not only a great way to increase corn usage, but also reduces the Federal farm program payments. As projected, to reduce those farm program payments, by raising the price, again by over \$10 million over the next 10 years.

One of the arguments that the oil companies try to slow ethanol development that would increase the cost of fuel at the gas pump for consumers. But in reality it has lowered the gas by 5 percent or almost 7 cents per gallon. This is due partly to the Federal excise tax on the ethanol blended fuel, but with the 10 percent blend you can actually use a little bit lower quality of fuel to make those

blends. At a 5 billion gallon RFS, Renewable Fuel Standard, it will save the consumers \$3.3 billion at the pump.

In Minnesota, the success of our ethanol program has to be credited to a unique partnership between the Minnesota Corn Growers and the Minnesota branch of the American Lung Association. This partnership has helped educate the public and the value of the ethanol program. Without first educating the public it would not have been possible to pass the legislation necessary to grow our industry. It is with this partnership that it will continue to grow.

Right now we're working closely with the Lung Association on the E-85 Pledge Fuel Program in Minnesota. Each tank of E-85 sold represents 6 bushels of corn of fuel in that tank. At a year ago we were at 1 million gallons of E-85 sold. This past year we're at 2 million gallons. We look at E-85 as one of the fuels of the future. E-85 can be the bridge to the future as we move from the gasoline engine into the fuel cells.

You're not going to just cut off one fuel system and go to the next, you're going to have all the older vehicles and everything on the road. This is where we see the long-term future for ethanol.

We go back to where we were with our ad campaign, "Ethanol is the fuel that makes our economy grow." In Minnesota, our rural communities have benefited from job creation for the next generation, a better tax base in rural Minnesota, reduces dependence on foreign oil, reduces fuel costs for consumers, reduces farm expenditures and cleaner air.

I would strongly suggest that you would work with your colleagues in Washington to pass an energy bill soon, one that includes the Renewable Fuel Standard as originally agreed. Our country will benefit from the increased investment in renewable fuels, particularly ethanol and biodiesel that's created by the RFS. Just as Minnesota has received multiple benefits from its investment in ethanol, I believe that as it spreads across the United States we would be amazed what this could do for the U.S. economy. If there are any questions, I'd be willing to answer them for you.

[The prepared statement of Mr. Obermoller appears at the conclusion of the hearing.]

Mr. GUTKNECHT. We'll hold questions until everybody is finished. Mr. Jacobsen.

#### **STATEMENT OF RON JACOBSEN, PRESIDENT, MINNESOTA SOYBEAN GROWERS ASSOCIATION**

Mr. JACOBSEN. Thank you, Mr. Chairman, members of the Committee, I would like to welcome you and thank you for coming to our region for this testimony. My name is Ron Jacobsen. I farm near Wells, MN. I'm president of the Minnesota Soybean Growers Association.

I appreciate the opportunity to talk to you about our Nation's need for renewable energy and the role that agriculture will have to play. My testimony will focus on biodiesel, an alternative to petroleum based fuels that could be made from soybean oil, animal fats, or other vegetable oils.

As you all know, the United States is extremely dependent upon foreign petroleum oil as an energy source. That tendency puts the

United States at risk and at the mercy of OPEC's production and supply whims. Current gasoline and diesel fuel prices are perfect examples.

Biodiesel is a clean fuel that reduces almost all regulatory pollutants, including carbon monoxide and particulate matter, a compound in the diesel exhaust that has caused cancer and lung disease. Beyond the human health benefits, biodiesel improves the environment by reducing noxious emissions, increases domestic security by reducing our Nation's dependence on imported oils, and provides an economic development for greater Minnesota.

I'm proud to say that Minnesota is the first State in the Nation to enact legislation requiring State petroleum diesel fuel to contain 2 percent. A key component of this important piece of legislation was a requirement that the Commissioner of Agriculture certify a plant in Minnesota has an annual capacity of 8 million gallons of biodiesel. On Friday, in Brewster, MN, Minnesota Soy Process will make ground on Minnesota's first biodiesel plant. There are also two more plants that are in the process as we speak.

Currently, biodiesel is sourced from out-of-state, but that hasn't hindered Minnesotans from using biodiesel. Minnesota already has a distinction of being the State with the most on farm use. Fifty percent of Minnesota producers use biodiesel on their farms. In addition, several fleets, including the city of Brooklyn Park, the city of Minneapolis, Hennepin County, Voyageurs National Park, Eureka Recycling, and AMS Trucking, as well as school districts, and many others, are enthusiastically using biodiesel because of its superior, cleaner fuel.

Once the biodiesel production facilities are built in Minnesota, biodiesel fuel can be sourced right here at home, made from the oil of soybeans that we grow so abundantly. Struggling rural communities need economic development and opportunities and value-added alternatives for Minnesota growing commodities. In 2002, the Department of Agriculture studied the impact of on-road diesel fuel, which consumes over 631 million gallons of diesel fuel each year. A 2 percent biodiesel blend for on-road demand alone will generate an economic impact of over \$212 million annually and create 1,120 jobs, predominantly in greater Minnesota. The study also found that there would be positive impact to soybean processing industries of over \$78 million. And a positive \$56 million impact for Minnesota soybean farmers.

Additionally, a U.S. Department of Energy study identified that when all the other markets that would be using 2 percent blend were taken into consideration, the total consumption of biodiesel blends totals 831 million gallons, thus the positive impact figures quoted earlier will increase significantly. The positive economics of the economy are only part of the picture.

The benefits to Minnesota's environment will also be significant. Burning just 2 percent biodiesel in 830-plus million gallons of diesel fuel will curtail harmful tailpipe emissions. Annually, it will reduce poisonous carbon monoxide emissions of more than 800,000 pounds, reduce ozone forming hydrocarbon emissions by 91,000 pounds. Reduce hazardous diesel particulate emissions by almost 70,000 pounds. Reduce acid-rain causing sulphur dioxide emissions by more than 70,000 pounds.

Biodiesel is unique in that it has a positive energy balance. For every one unit of energy used to produce biodiesel, 3.2 units are created. This positive energy balance reduces life cycle carbon dioxide emissions by more than 250 million pounds annually. Biodiesel also extends the fossil fuel supply almost four-fold for every gallon of diesel is replaced by biodiesel. But the environmental benefits don't end here.

As you may recall, the Bush administration approved a recommendation from the Environment Protection Agency to reduce sulphur in diesel fuel from its current level of 500 parts per million to 15 parts per million by 2006. That's a 95 percent reduction. Removing that amount of sulphur will significantly reduce lubricity. The beauty of biodiesel is that it will not only replace the loss of lubricity, it will also improve engine performance and extend engine life.

Biodiesel is agriculture based, renewable and clean burning. It has advantages to the economy, the environment, and the Nation's energy dependence. Minnesota's legislation passed because of the ground swell of support from farmers, other commodity groups, agricultural organizations, the Lung Association, clean air advocates and allied industries. This was truly a David and Goliath effort, but we made it happen with hard work, persistence, science-based facts, and much appreciated bipartisan support from the House and Senate.

If this Nation is to move forward from its dependence on foreign oil, then our government must encourage the use of renewable fuels. We thank Congressman Gutknecht for his support of biodiesel incentives in the Federal energy bill and ask for his continued support and influence as this critically important piece of legislation moves through the committee and onto the floor of the House.

Minnesota needs biodiesel incentives in the energy bill to reinforce and enhance the hard work our State has already done by promoting biodiesel and renewable fuels. I'll leave you with this thought. It takes Mother Nature 250 million years to renew her fossil fuels. It takes a Minnesota farmer just 7 months. Thank you for the opportunity.

[The prepared statement of Mr. Jacobsen appears at the conclusion of the hearing.]

Mr. GUTKNECHT. Thank you, Ron. Next, we have Mr. Haubenschild. I have visited his dairy, and I'm pretty excited about the technology that he has, and he's going to tell us a little bit about turning smell into energy.

**STATEMENT OF DENNIS HAUBENSCHILD, PRESIDENT,  
HAUBENSCHILD FARM**

Mr. HAUBENSCHILD. Mr. Chairman Gutknecht and members of the committee. I thank you for the opportunity to speak before you today. I'm a dairy operator along with my wife, Marsha, and two sons, Thomas and Bryan, from Haubenschild Farm in Princeton, MN. I'm giving this testimony about our anaerobic digester project on Haubenschild Farm to show how important this project can be to farmers, ranchers, rural small business, and I believe this program can help support self-sufficiency, promote rural development economic, and help to have a more sustainable environment.

First of all, I would like to thank the U.S. Environmental Protection Agency, the U.S. Department of Agriculture, and the U.S. Department of Energy for sponsoring the AgSTAR Program, which Haubenschild Farm applied for and was selected as an AgSTAR Charter Farm, one of the 13 farms selected nationwide to demonstrate farm-scale anaerobic digestion technologies. The program encourages the use of methane recovery technologies at animal feedlot operations.

I would also like to thank East Central Energy of Braham, MN, our rural electric cooperative. East Central was the first rural electric cooperative in the State of Minnesota. With their mission to enhance the quality of life and provide primer service to their customers, they were first to offer environmental programs such as their biomass, or Cow Power program to their customer members to purchase renewable power.

This has helped to make this a win-win program for East Central Energy, our dairy, and our community. I really believe they should get a congressional award for their hard work.

I have always believed a great percent of the farms in this U.S. could, and should, take advantage of this technology, but with the economics in agriculture today, most farms have difficulty financing a digester project from the traditional lending institutions. The Haubenschild project financing was achieved by the collaboration of government agencies, through a combination of direct technical assistance, grants and low interest loans. The AgSTAR program provided the technical assistance and grants and low-interest loans they estimated at \$40,000. The Minnesota Department of Commerce and the Minnesota Office of Environmental Assistance offered grants totaling \$87,500 for the construction of the system. And the Minnesota Department of Agriculture was able to offer a \$150,000 no interest loan for the project. This left \$77,500 for the Haubenschild farm to pay directly. A copy of the final report of the Haubenschild Farm anaerobic digester can be downloaded at [www.mnproject.org](http://www.mnproject.org).

Since September of 1999, the digester has produced over 106 million cubic feet of biogas, which has made 4.5 million kilowatt hours of electricity at a value of \$320,000. The biogas burnt is equivalent to 29,000 tons of carbon credits equivalence. The generator has been running 98.6 percent of the time, 24 hours a day, 7 days a week. It has created enough hot water to heat all the floors in the dairy, saving another 800 gallons of LP gas per week in the winter-time. With enhanced value of the manure, it makes for a payback of less than 5 years for the total investment.

The best benefit is the improved surface and ground water quality, enhanced fertilizer value of the processed manure, and it virtually eliminates offensive odors. Last January, one of the coldest months, Haubenschild Farm produced 109,880 kilowatt hours of electricity. It sold 62,860 to the electric co-op, enough electricity to support a dairy, plus 78 other homes in the neighborhood. This is a savings of about 35 tons of coal that did not have to be burnt to make electricity, and 1200 gallons of LP that did not have to be burned to heat hot water.

In the spring, when the digestate is incorporated into the ground, it will save another 34 gallons per acre of propane or natural gas



equivalent that did not have to be used to make anhydrous fertilizer.

Reasons for anaerobic digestion as kind of conclusion is the reduction of odor, generation of energy, thermal energy production, increase in value as fertilizer, pathogen reduction, weed seed reduction, and, then, greenhouse gas reduction of carbon credit value could potentially be of value.

Clearly, a major change in the perspective has taken place from viewing manure as a waste product to it becoming a renewable resource. Its ability to help support a heavily strained power grid system is starting to get some recognition. Perhaps an even more compelling reason for increased acceptance of a manure digester is their ability to reduce pollutants, odor risks associated manure. In summary, these are expected benefits of an anaerobic digester, again, is the odor control, the generation of electricity, thermal energy production, and a potential increase in the value of manure as fertilizer, the pathogen reduction from it, and the weed seed reduction, and the greenhouse. As costs of fuel increase and the odor complaints from neighbors mount, animal production facilities are looking for ways to shave costs by generating their own electricity and their reduced dependence on propane and natural gas to heat and process water.

When it comes to carbon, or energy use, the United States is driving down a dead end street at 100 miles per hour. Methane, or biogas, is never going to be as efficient as coal when it comes to generating electricity, but it takes Mother Nature 21 days to make biogas and 21 million years to make coal. Hopefully, as more electric utilities start using greenhouse gas offsets from renewable, energy facilities, the trading of carbon credits will become a business opportunity for both the producer and the utility. Thank you.

[The prepared statement of Mr. Haubenschild appears at the conclusion of the hearing.]

Mr. GUTKNECHT. Thank you, Mr. Haubenschild. So my colleagues and others understand, essentially, what you're doing is you're taking methane, which represents the bulk of the odor of manure produced and you are burning it in a converted diesel engine.

Mr. HAUBENSCHILD. It's, basically, a 3406 Cat engine, natural gas engine. It's the same engine they use in Texas running the natural gas wells.

Mr. GUTKNECHT. And it's an incredibly clean, efficient operation in terms of the operation of that engine. It's been operating continuously for how long now.

Mr. HAUBENSCHILD. That engine has been running for almost 5 years. It's never been overhauled. We shut it down once a month for oil changes, but we've got 38,000 hours on that engine already.

Mr. GUTKNECHT. It is amazing, and I wish my colleagues could come up and see that, because yours was one of the first, and I still have to believe one of the most efficient. There are more of them coming online now, and, the other thing I want to just mention for the benefit of my colleagues, is you still have the benefit of that as a wonderful fertilizer.

Mr. HAUBENSCHILD. It actually enhances the fertilizer value.

Mr. GUTKNECHT. So the neighbors aren't complaining about the smell?

Mr. HAUBENSCHILD. And, my daughter-in-law isn't either. That has a big value.

Mr. GUTKNECHT. And you get a check once a month from the utility.

Mr. HAUBENSCHILD. That is correct.

Mr. GUTKNECHT. What does your check average?

Mr. HAUBENSCHILD. We're basically, it's a \$2,000-plus check per month for electricity instead of paying that same amount for electricity.

Mr. GUTKNECHT. And it also provides all the electricity that your farm needs.

Mr. HAUBENSCHILD. That is correct.

Mr. GUTKNECHT. So it's a net-net of about \$2,000 a month for you.

Mr. HAUBENSCHILD. Right.

Mr. GUTKNECHT. It's a great story. I want to also go back and I'm going to reserve the right for a second round of questions because we've got some people here, and I'll try to hold my questions to 5 minutes and then perhaps we'll come back for more. But I want to get something on the record, and my 5 minutes is already up for my first round. Maybe I'll have to get back, or they just started.

Mr. MAXWELL. I just started them.

Mr. GUTKNECHT. OK. Thank you. Either of the Rons, I want to get something on the record here that is misunderstood by a lot of my colleagues. Do you get a check from the Federal Government as it relates to—do you personally get a check from the Federal Government as a corn producer for the ethanol program?

Mr. OBERMOLLER. No, we do not.

Mr. GUTKNECHT. That is one of the most misunderstood things. There are people, my colleagues in Washington, who think corn producers are getting a check from the Federal Government to produce ethanol.

Do you want to walk through how it works, and how the blenders credit currently works and who really does get the money.

Mr. OBERMOLLER. Well, just like it says, it's a blenders' credit. It really goes to the service station and the people selling the fuel.

Mr. GUTKNECHT. But it's a credit against the fuel tax. If the blender is like Koch refinery up here at Pine Bend, or I suspect you have refineries in California and Michigan, as well, all that really happens is they get a credit against the fuel tax that they would otherwise have to pay. Isn't that correct?

Mr. OBERMOLLER. And that's part of the reason why the VTech Bill is in transportation to correct some of that.

Mr. GUTKNECHT. Well, the Transportation Committee would like to have more money to build more highways, and because there's a blenders credit, their argument is they get less revenue than they would otherwise get, which is correct.

Mr. OBERMOLLER. Yes, that's true.

Mr. GUTKNECHT. But I want to, just for the record, once and for all, make it clear that in effect no money really changes hands. No one from the Federal Government writes a check to anybody for this, do they?

I mean, ultimately it's a credit against the tax that they would otherwise have to pay, and that is at the blenders' level, refiners, not going to the ethanol plants, not going to the corn producers. I just want that on the record because I have had a very difficult time explaining that to my colleagues. Now, the second part that you're asking for in the energy bill, and that I am supportive of, is a fuel standard. Can you talk a little bit about that, either one of you, in terms of what you're asking for?

Mr. OBERMOLLER. The fuel standard, I believe, is 6 million gallons by 2012? Is that the correct numbers?

Mr. GUTKNECHT. Well, if you don't have the correct numbers, we have got smart guys behind us who do so don't worry about that. But the point is, what we want to do is have a requirement that we gradually move up the amount of the biofuels that are required as a percent of our total fuel supply. Isn't that correct?

Mr. OBERMOLLER. Yes. We're back to the banks guaranteeing the loans, the farmers having the confidence of putting the investment in to grow the industry. That is what a lot of this is. We're going back to it.

Mr. GUTKNECHT. And I want to come back to this, because there are benefits, and sometimes our colleagues argue about, "Well, what are the monetized benefits of this? What is this really worth?" And that's hard to do sometimes. I mean, what is clean air really worth? And, you're both going to have an opportunity to ride in a vehicle, as you go to the airport, in a vehicle that's powered by biodiesel. And I hope you will get a chance to make a comparison between what the fumes coming out of the exhaust pipes are relative to a regular diesel powered vehicle. And I think you'll be surprised at the smell. To me it smells like you're someone who is producing french fries. Is that a fair way to characterize the odor?

Mr. JACOBSEN. It depends on how big a volume you burn. If you are burning a hundred percent, then, yes, you could say that.

Mr. GUTKNECHT. Well, the ones I have experienced I think are a 20 percent blend, and it's a much cleaner—you're at, what, 38, 39 percent of the particulates going out of the stack.

Mr. SMITH. Put your nose close to the exhaust pipe.

Mr. GUTKNECHT. Yes, you can get your nose too close to it. But the point is, you will notice, I think you will smell the difference, but more importantly you will see the difference between the amount of smoke going out.

Mr. JACOBSEN. Correct. And, in 2006, when the EPA new rules come in at a lower sulphur, we're going to have to have something for lubricity, and biodiesel is by far cheaper than anything the oil companies now have or will have. New York City is ultra low sulphur fuel and they have told us that it's been anywhere from 14 to 16 cents per gallon to put lubricity back in.

Mr. GUTKNECHT. How much is it going to cost in—

Mr. JACOBSEN. For biodiesel, for a 2 percent blend? While at oil prices right now, I would say 4 cents.

Mr. GUTKNECHT. And, what would the alternative be?

Mr. JACOBSEN. Sixteen.

Mr. GUTKNECHT. So, at the end of the day, biodiesel represents a great opportunity just in terms of meeting the new sulphur standards.

Mr. JACOBSEN. Correct.

Mr. GUTKNECHT. If we're unable to reach an agreement in Washington on an energy bill, and we have to scale this back, it's a tough question, and you may not want to answer this, but people like me may be forced to answer this some time later this summer, if you have to choose between the blenders credit or the mandated percentage, which would you choose?

Mr. OBERMOLLER. From the ethanol side, the blenders credit.

Mr. JACOBSEN. I'll reserve that one for now.

Mr. GUTKNECHT. Well, my time just expired, so you may have more time to think about that. I will yield to my colleague from California, Mr. Dooley.

Mr. DOOLEY. Thank you, and thank you all for your testimony. Mr. Truly, I was kind of interested, I mean, I think the work you're doing there is just exceptional and I applaud you for your focus on that.

On the wind energy, and the potential there, have you done the analysis on terms in what the efficiency factor is at as we talked about the ethanol is at 67 percent. I would think the wind would be far higher than that.

Mr. TRULY. I'm not personally familiar with a number that would compare, because one of the interesting things about renewables from a technology point of view is they're not very comparable to each other in the numbers game. Again, on the case of biomass you can compare, for example, corn grain ethanol versus lignocellulosic now versus gasoline because it's the same business. But I can say that in the wind that there have been enormous efficiencies that have come from the years of government sponsored research at places like NREL to allow the commercial companies to apply these technologies and get the costs down.

In today's world, for example, here in this country, GE Wind is, for the last several years, has been selling turbines that have been installed in appropriate places around the country. Each turbine generates a peak power of 1.5 megawatts. So you can imagine the multiplication, the advantage of a hundred turbine farm, but the upfront capital costs are great, and that's why the production tax credit from a public policy point of view is so important.

That same company has prototype wind turbines, each of which produce 3.6 megawatts and are currently being installed off the Irish coast in an offshore capacity.

Mr. DOOLEY. From a public policy perspective what would be interesting is that if we're trying to determine how to invest Federal tax dollars, it would be interesting to know just what the potential return on that investment, certainly in terms of moving towards energy independence and where are you going to get the biggest bang for your buck in terms of return per kilowatt hour, there must be somebody out there that you're doing more of the research on it, but there must be someone who is doing some work on that, because that's what my concern is. At some point here, if we're not careful, we create some of these programs that almost become an entitlement, which, whether it's a blended credit, whatever, it still manifests itself in terms of the price someone is willing to pay for ethanol versus something else. Is that the best investment of Fed-

eral tax dollars, I mean, is kind of the point that I think we have to be a little bit concerned with.

Mr. TRULY. Well, as a matter of fact, I believe that I agree with you. I think government funded research has to be very carefully evaluated to make sure that there is a payoff, to the public benefit. In the case of wind, which is—I mentioned it's the most commercially mature of the renewables that have been invested in recently. However, there's a long way to go, and that's why the goals that have been set by Assistant Secretary Garman's organization is to bring the competitive cost of wind not only to be nose to nose competitive with natural gas, but in a few years with coal.

And that is a research program that will probably last another decade, 8 to 10 years I'd say.

Mr. DOOLEY. Mr. Hemashield, I'm a farmer, actually, in the Central Valley of California and we're starting to buy a lot of very large dairies, and there have been a few of them that have experimented with some of the digesters like what you would have done very, very successfully. One of the problems we run into out there, because we're dealing primarily with private utilities, is securing the contract for them to buy back to make these projects work.

I would just be interested in two issues. One, with the co-op that you're negotiating with to buy that back, do they agree to accept your power all the time? Do you pay a flat rate per kilowatt that you're selling them? And, also, one final question, did you explore the possibility of using EQIP dollars to help finance the digester that you have on your place, on your farm?

Mr. HAUBENSCHILD. OK. As far as the co-ops, that's probably been the reason why the digester hasn't really taken off in the dairy industry is the utilities not willing to pay a win-win price. East Central Energy stepped out in front and said we're going to make this a doable project, for both the rural area and the Haubenschild Farm and the East Central Energy, and they went ahead and sold renewable energy, or to subscribers to make it work. So it did take effort on their part to make this work.

The EQIP dollars, Haubenschild Farm did some EQUIP through the University of Minnesota on doing some work on the digestate, or the manure itself, and we did get some EQUIP funding for that. That was a 3-year project.

Mr. GUTKNECHT. Cal, let me just say that part of the reason this thing works, and part of the reason he's getting a check for \$2,000 a month is that the contract that he has with the rural electric co-op that buys the power from him, it's a very generous contract. I don't think we will ever get one at that level, and it may well be with the newer technologies we won't have to. But somewhere we've got to come up with an equitable price for the price of the power that they generate.

Although, I think that we're finding more and more consumers who are willing to pay a slight premium for green power, and at that point it will make this more advantageous.

Mr. Haubenschild, though, we didn't show all of your slides, so I think we ought to at least bring up the one with all the family in the pictures. I think that's No. 3. So let's bring that up so everybody can see it, because I want to get to a point—because I think it's an important point not only for this hearing, but for all of us

on the Agriculture Committee—you have got a nice picture there at No. 3. If we can get it up there. Well, there's No. 1. No. 2.

OK. This picture. Can you talk about your dairy operation? How many cows do you milk, how many people does that dairy support?

Mr. HAUBENSCHILD. OK. Well, my folks, there, which are still on the farm with us. My goal every day in the morning when I wake up is trying to keep up with my dad. But he started in 1952. He moved from the Rochester-Owatonna area up to Princeton in 1952 and started out with 10 cows. And, when I came back with my wife in the 1970's, we went to an 80 cow operation. And when both of my sons, when they'd come to dad and said, "What do you think about milking 300 cows?" I said, "You have got to be crazy. You have got to show me how this is going to work. And if we're going to do it, it's got to be sustainable."

So it's a lot of work and a lot of research there. We built a thousand cow facility, and we're milking, this morning when I left at 3:30, we had 856 cows going through three times a day. We run 24 hours a day.

Mr. GUTKNECHT. And, you're able to support how many people?

Mr. HAUBENSCHILD. And, we have 22 employees, full-time equivalent employees, plus their families.

Mr. GUTKNECHT. And you're making a profit.

Mr. HAUBENSCHILD. And we're making a profit.

Mr. GUTKNECHT. Can you make a profit on \$9 milk?

Mr. HAUBENSCHILD. It's very hard.

Mr. GUTKNECHT. I found out in California they can't make money on \$9 milk either. But at least it's come back a little bit and we're happy to see it.

Mr. HAUBENSCHILD. That's that deal where you build your equity for a few years, and then you live off of it for the next couple of years.

Mr. GUTKNECHT. It's a great story, and we want to thank you for getting up at 3—of course, you're up at 3:30, anyway, I suspect, but we want to thank you for getting up early to come down and join us.

I want to come back to Admiral Truly, and, again, thank you to you for coming out here. One of the things that—that one of the motivations for having this hearing, and at least this morning a number of us got to hear from various people in the private sector, private entrepreneurs, one of the things that I would like to encourage you and the folks out in Golden, and a part of the reason I want to bring some of these folks out there, is to see if we can't get some cross-pollinization going, because not all great ideas originate in Golden, CO, or at the University of Minnesota, or Iowa State University, or wherever. I mean, I think if we're going to ramp up, and I really do think that we have to dramatically ramp up, and there was a chart that we had earlier in terms of how we're ramping up the level of renewable fuels, it just really—when I see what is happening with natural gas, especially, I think we have to ramp up production dramatically and we have to do it fast.

And that's why we would hope that we would have—if I could encourage you, and maybe we can work through the auspices of our subcommittee, to bring together more of these folks to share some

of their experiences, and their ideas, and what they're doing, and how, perhaps, that can become more cost effective.

You can respond to that if you want. I'm not running out of time yet. We each are going to take another 5 minutes.

Mr. SMITH. Well, I haven't had mine.

Mr. GUTKNECHT. You're going to get yours. Admiral Truly.

Mr. TRULY. Just a quick comment. I agree with you, and, as a matter of fact, I mentioned that NREL is one of the several national laboratories operated by the Department of Energy. One of the unique things about NREL is that we have an enormous touch with commercial companies, and universities. About half of the budget that comes to NREL from the Congress and then through the Office of Energy Efficiency and Renewable Energy goes out in cost share contracts with companies across the country in photovoltaics, and biomass, and wind, and geothermal, advance transportation, and et cetera. So we really do recognize the need for us to be very communicative about what we do, and I also what to point out that we have a lot of visitors at the laboratory, and I do a lot of, a lot of informal interfacing, if you will, with people in the fossil fuel industry, the oil business, and as well, we have today a person from the nuclear power part of the Department of Energy working with us on a sabbatical in a role that we have in systems integration in the hydrogen program.

So I recognize the importance of that, and I would look forward to looking for ideas about how we might do it better.

Mr. GUTKNECHT. One last question, and as a member of the Budget Committee, one of the things we're going to have a big fight about later this week and probably boiling into next week, and that is about this whole issue of earmarks. And I think you alluded to it in your testimony. Do you have and could you provide me with a list of how many specified earmarks were included in last year's appropriation bill, and for the folks who are here who don't quite understand what happens is sometimes people who are chairmen of powerful subcommittees on the Appropriation Committee will earmark certain amounts of money to be spent only for specific research at specific places.

Can you talk about the impact of that, because we're arguing on the Budget Committee for no earmarks this year of any kind so that folks like you can actually decide what is the best way to spend these public dollars.

Mr. TRULY. Well, first of all I certainly can work with the DOE to get you the information about earmarks, but I can tell you that at the ground working level, at the laboratory, the impact is the loss of people that we cannot support when a program is reduced—not—the appropriation is level, however, if a large percentage of that appropriation is not available to the plans, the planned pathways to get these technologies eventually into the marketplace, if the money is not there, we lay off scientists, engineers, technicians, and furthermore, even when they—when we can avoid letting them go, we—there is a good bit of disruption when we have somebody that is very valuable and we have to move them from what they were working on to something new.

So it is a very real impact. From a previous experience, I have spent most of my career in the aeronautics and space program, I

was a NASA administrator for 3 years under the first President Bush's term, and I have never seen earmarks in some program as dramatic as I have in a couple of the programs that DOE is facing.

Mr. GUTKNECHT. Well, we set records in the last appropriation bill; it was embarrassing. Mr. Dooley.

Mr. DOOLEY. Nick hasn't asked any questions yet.

Mr. GUTKNECHT. I'm sorry, Nick.

Mr. SMITH. I was very nervous you might ask my questions.

Mr. GUTKNECHT. The gentleman from Michigan is recognized for such time as he may consume.

Mr. SMITH. That would be dangerous, I think. Admiral Truly, I was going to ask this question to.

Secretary Garman, also, but Gil and I both serve on the Research Subcommittee of the Committee on Science, and we have research in renewable fuels, of course, in the Department of Energy, and the Department of Agriculture, with DARPA, and with the National Science Foundation. I'm a little concerned about the coordination and just wanted to get your ideas on how well you're aware of all of this research that's not going—that's going on in those agencies, as well as private research, as well as research that is taking place in other countries.

Should we be comfortable on our knowledge of coordination?

Mr. TRULY. We do the best we can to understand the research that's going on in other departments and agencies, and I think we do a very good job. In our case, for example, and as I mentioned, the R&D that we're doing in fuels, in biofuels, is very narrowly focused on learning how to take lignocellulosic biomass and turn that into fuels. I don't think that there is anywhere else in the country that that type of science is going on—

Mr. SMITH. How about the world?

Mr. TRULY. Ah—

Mr. SMITH. They're doing some work—

Mr. TRULY. I honestly don't know. I do know in the case of the DOD that a couple of years ago I chaired a study for the Defense Science Board for the DOD on improving fuel efficiency of weapons platforms, land and sea and air. And, also, NREL does work in some cases with DARPA in some of the work that they do. But I really feel like that—that from my ability to have the knowledge of what's going on, that what we're doing is rather unique.

However, I agree that if there is duplication, we ought to get rid of it and do it in the best way.

Mr. SMITH. And, of course, the basic research that is done at the National Science Foundation, to utilize that. And, part of my concern is I think the world is trying to be more and more—and they are being more and more competitive with us as we see some of our jobs disappearing. And we have a provision, of course, that if any government money is involved in that, in research, then it has to be published and it's available.

Visiting some of these other countries, half of their Federal research dollars is monitoring the research that we're doing in this country, and the other half is trying to get it applied before we do. And, of course, in agriculture we've seen some countries like Japan surpass us. And, so, it just seems to me that we need to be a little more selfish maybe in terms of trying to make sure that the re-



search that we do is going to be as great or greater a benefit to the United States for our economy and jobs compared to the rest of the world.

Mr. TRULY. Yes, sir.

Mr. SMITH. Mr. Obermoller. On the 14 ethanol plants, and if I divide 76 by 14, you have, roughly, a quarter, a fifth of all of the ethanol plants in the country in this State, are the new plants going up with a preference given to farmers as far as allowing them to deliver their corn to the plant that they have invested in, or are they now—what's the tradition and what's the new plants going up in terms of the farmer investment on contracts?

Mr. OBERMOLLER. Well, the original plants, most of them were set up as new generation co-ops, so it was strictly farmers. The new plants are being mainly LLCs. Part of this is lack of funds out there to build plants. A lot of the traditional sources of funds have been tapped out. This allows them to go to main street.

It's a lot easier to permit plants. It's a lot easier to get them into the communities if everybody has a chance to invest if they own part of it. So a lot of it is just simply funding, to tap new funds to be able to build a new plant.

Mr. SMITH. But do you give a preference—are most of the new plants going up, do they give a preference to farmers in terms of “We'll make it easy for you to invest in this plant so you”——

Mr. OBERMOLLER. They've got to treat everybody equal. They would prefer to have the farmers to invest, because that is where the corn is coming from.

Mr. SMITH. Do you allow out-of-state investors in these new ventures going up?

Mr. OBERMOLLER. With the LLC, it depends on how much legal work they do. Some do, some don't. Every one is unique. No two are alike.

Mr. SMITH. Do you have a plant that's been running for—the most recent plant that's up in operation right now is 2 or 3 years old, where are you?

Mr. OBERMOLLER. It's probably 5 to 6.

Mr. SMITH. What are the returns on that investment?

Mr. OBERMOLLER. That I don't have an answer to.

Mr. SMITH. Less or more than 15 percent?

Mr. OBERMOLLER. Probably more.

Mr. SMITH. At least our plant that we have only got one plant in Michigan, and it's this last year, and it had a return of over 20 percent. Mr. Jacobsen, and then I'll quit, Mr. Chairman.

Mr. JACOBSEN. Yes, sir.

Mr. SMITH. You mentioned that 50 percent of your agricultural producers, your farmers, use at least some biodiesel on their farm operation. Is that what I understood you to say?

Mr. JACOBSEN. Yes, sir.

Mr. SMITH. How do you do that? How do we do a better job in our own States? How do you make it more available? How was this accomplished?

Mr. JACOBSEN. Basically, it was accomplished by farmer demand. Being 100, I would say, comes from out-of-state from down in Iowa, and it's sourced through certain co-ops, and their demand base

grew, so they brought more in, and people demanded it is basically how it is. Education on our part, yes, that has a lot to do with it.

Mr. SMITH. But we don't have any good machines invented where you can just throw your soybeans in and funnel it over to your tractor in some way, right? How many producers are there of biofuels in the State of Minnesota?

Mr. JACOBSEN. In the State of Minnesota.

Mr. SMITH. I mean, the distribution has got to be fairly significant and they have adapted to——

Mr. JACOBSEN. There's over 200 distributors in the State of Minnesota for biodiesel. That's as of the last time that I checked it. There are probably more than that now.

Mr. SMITH. Great. Thank you, Mr. Chairman.

Mr. GUTKNECHT. Thank you. Mr. Dooley.

Let me thank all of you, and, in fact, what Nick just asked about, and that really is almost one of the most critical questions is how do we get better distribution of these renewable fuels, whether it's wind, getting the wind into the grid, whether it's biofuels such as biodiesel and ethanol, how do we get them blended and ultimately to the consumer, because I think the consumers do want these products.

I think if we continue to work together we can have an energy future that makes sense for the environment, that makes economic sense, we've got to drive the technologies to be more efficient, more cost effective, but we want to be part of that, as well, as policy makers. I know that on our subcommittee, and, frankly, most of the Congress is very interested in this issue, and, unfortunately, sometimes we get bogged down with some of the oil States have one point of view, and somebody else has another point of view, and we have to work all of those things out.

But I want to thank all of you for coming here today. Particularly, to you, Admiral Truly, I look forward to seeing you out in Colorado here in another month or so and hopeful we will bring a delegation that can talk more about these issues and look at the exciting things that you are doing every day out there. We appreciate the work you do.

I also want to leave this last bookmark. I want to know about the earmarks, because I think that is becoming a very sensitive subject, and what it means is we have less money to do the research that the scientist things need to be done and more of those decisions are being made by politicians. I would like to prefer to think that you guys can make better decisions than we can, but we need to get some of the facts and we're going to work on those in the next couple of weeks.

The hearing record will be open for 10 days to accept written testimony as part of the public record.

With that, if there's no further comments or questions, I will adjourn the subcommittee hearing.

Thank you very much.

[Whereupon, at 3:20 p.m., the subcommittee was adjourned.]

[Material submitted for inclusion in the record follows:]

## STATEMENT OF GOVERNOR TIM PAWLENTY

Chairman Gutknecht, Congressman Dooley and Congressman Smith, it is an honor to be with you today.

Agriculture in America has gone through an amazing transformation. During the last century, our farmers moved from working their fields to feed their families to feeding the world. In the last couple of decades, agriculture has branched out into a whole host of new arenas that provide markets for American crops, create jobs for American workers, and offer new products for consumers here and around the world.

We're here today to talk about one of the most exciting and promising of those areas—energy.

Let me begin by praising this committee and the Bush Administration for understanding the connection between agriculture and energy—and the promise it holds for creating jobs in rural America. The 2002 farm bill was the first in history to contain a separate energy title, which underscores this commitment and shows the new face of agriculture.

It's appropriate that you've come to Minnesota to discuss this issue. This is a State that has long understood and realized the enormous potential energy has for agriculture and economic development.

In addition to creating jobs and keeping energy dollars here in Minnesota, our focus on renewable energy is helping us meet our goals of reducing the amount of pollution per megawatt of electricity generated and consumed. Protecting the environment is important to Minnesotans.

I want to focus on three areas, in particular, where Minnesota has been a real leader in renewable energy development: wind, ethanol and E-85, and bio-based renewable energy technologies.

## WIND

Minnesota ranks third in the Nation—behind only California and Texas—in terms of wind energy capacity. Last year, we installed more new wind power capacity than any other State.

The advancement of wind generation technology has made it feasible to develop wind farms in areas that were unfeasible just five years ago—areas such as southeastern and south central Minnesota.

Last legislative session, we took additional action to encourage and support the expansion of wind energy by increasing the cap on State renewable energy production incentives. Utilities in Minnesota are required to give customers the option of “green pricing,” or giving customers the option of buying energy with positive environmental attributes. In addition, we have property tax exemptions, a sales tax exemption, and wind energy rebates, funded by our Legislative Commission on Minnesota Resources. With current State policies, we have the potential to nearly triple our wind energy generation capacity to 3,000 megawatts by 2015.

Unlike conventional power plants, wind farms are spread out, which means their economic impact is felt more widely and almost exclusively in rural areas.

## ETHANOL/E-85

The next area in which Minnesota has been a leader is ethanol. I'm pleased to have just taken over as Vice Chairman of the Governors' Ethanol Coalition, a group of governors and leaders of ethanol-producing countries working to expand the production and use of ethanol.

One of the best ways to add value to the corn we grow in the United States is by producing ethanol. The dream of ethanol was for small producers to be able to invest in the processing of their crops and reap its reward. There is no State in the Nation in which this dream has been better realized.

Minnesota is the only State in the Nation to mandate that all fuel sold in our State contains 10 percent ethanol year-round. This creates an instant market for millions of gallons of ethanol that helps drive the industry's expansion.

We have the Nation's strongest farmer-owned ethanol production system. The State has been very progressive in working to ensure that ethanol is a way of boosting farm income and our rural economy, rather than just the bottom line of multinational corporations. Make no mistake, the investment and commitment of multinational corporations has played a critical role in ethanol development, but empowering producers and communities makes ethanol production a more effective and viable tool in reinvigorating rural Minnesota.

At the State level, we also have a generous program to support producers of ethanol by providing a producer payment of 13 cents per gallon. This support has been critical to growing the industry. Just last week, we announced that a new ethanol plant is being built near Lake Crystal. Interestingly, it will be the first producer-owned plant in Minnesota that will not receive this producer payment, countering those critics who suggest that the ethanol industry is not growing in viability and its ability to sustain itself.

Our State produces 400 million gallons of ethanol, or 20 percent of the Nation's ethanol. We're a national leader in developing an infrastructure for E-85—gasoline that is 85 percent ethanol, rather than just ten. There are more than 80 refueling stations in our State, making E-85 vehicles a realistic option for people in Minnesota. This infrastructure has enabled us to double E-85 consumption each year. Nearly two million gallons of E-85 were sold in Minnesota in 2003.

And as President Bush and others push expanded use of hydrogen as an environmentally-friendly fuel, cutting edge research at the University of Minnesota has developed an inexpensive method to produce renewable hydrogen from ethanol.

We intend to make sure Minnesota is at the front end of the hydrogen revolution just like we've been at the forefront of the ethanol revolution.

#### BIO-BASED RENEWABLES

There are other bio-based renewable fuels that hold great promise.

Several years ago, we were the first State in the Nation to pass a requirement that all diesel fuel sold in Minnesota contain two percent biodiesel to meet Federal clean air requirements. It starts next year and will create a market for 16 million gallons of the soybean-based fuel. The Commissioner of Agriculture formed a Biodiesel Task Force last year to work with the industry and developers to ensure that production capacity is in place once the new law takes effect.

Fortunately, the advancement of ethanol has given us good experience as we work to expand the use of biodiesel. The biodiesel requirement will rapidly accelerate

There are other examples as well:

- Haubenschield Farm near Elk River was the first in the Nation to produce electricity from a methane digester, which has significant promise;
- In Little Falls, a Minnesota company is working to develop a biomass gasification project that will use all the waste from the ethanol plant and two lumber mills to power the plant.

#### WHY HAS MINNESOTA BEEN SUCCESSFUL?

From ethanol to biomass gasification, Minnesota has had success in turning energy into a driving force in economic development because we have a long history of government working together with the private sector to successfully leverage State, Federal and private investment.

At the State level, we provide incentives for the development of wind and biomass production. We have an ambitious renewable energy goal of getting 10 percent of our energy from renewables by 2015.

At the Federal level, the Department of Agriculture has made millions of dollars in investments in Minnesota renewable fuel projects. And the Department of Energy has a wide array of programs and incentives aimed at renewables and conservation.

Our renewable energy development could not have happened without State and Federal support.

Now I'm a free market conservative and am not a fan of big government. But government can play an important role in getting fledgling industries, such as wind energy or ethanol, off to a good start. Government can reward and encourage innovation.

In particular, I want to urge this committee to reauthorize the Federal Production Tax Credit for wind energy. With the expiration of this credit, we've seen wind energy expansion slow significantly. Wind energy has enormous economic potential for rural America and it is good for the environment. I know Congressman Gutknecht is working hard to extend this critical piece of legislation and I urge Congress to follow his lead.

Thank you very much.

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#### STATEMENT OF DAVID GARMAN

Mr. Chairman, Members of the subcommittee, I appreciate the opportunity to be here today in Minnesota to testify about the future of renewable energy in America's

rural communities. I especially appreciate the opportunity to testify with Deputy Secretary of Agriculture Moseley. Our agencies have forged a close and extremely productive relationship in the past few years. I also want to commend the chairman for his leadership in this area, both on this Committee and the Science Committee where we talked just a couple of weeks ago about the President's Hydrogen Fuel Initiative. I hope that the discussions and relationships established here today will help us continue to strengthen our cooperative efforts to promote renewable energy and economic growth in rural America.

This Administration's strong commitment to the development and deployment of renewable energy is without question. The Department of Energy (DOE) FY 2005 budget request for renewable technologies totals \$374.8 million, a \$17.3 million increase over the FY 2004 appropriation. We have requested increased funding in our programs for wind, hydropower, geothermal, hydrogen, and, when impact of congressional earmarks is taken into account, solar and biomass as well. Over the past three years we have invested more than \$984.7 million in research, development and deployment of renewable energy technologies.

And that investment is paying off. Technology has brought us great strides in improved performance and competitiveness of renewable technologies. And the benefits of renewable energy are as abundant as the resource itself—minimal environmental impact, economic growth, and enhanced energy security. My testimony today will focus on the programs in the DOE Office of Energy Efficiency and Renewable Energy to develop and deploy renewable energy technologies and the barriers we have identified to our success.

Biomass—agricultural crops, trees, wood wastes, plants, grasses, fibers, animal and other wastes—represents an abundant, domestic and renewable source of energy that has tremendous potential to increase domestic energy supplies. Many think of biomass mainly as a source for liquid fuel products such as ethanol and biodiesel. But biomass can also be converted to a multitude of products we use every day. In fact, there are very few products that are made today from a petroleum base, including paints, inks, adhesives, plastics and other value-added products, that cannot be produced from biomass.

The Department estimates that the total available domestic biomass, beyond current uses for food, feed, and forest products, is between 500–600 million dry tons per year. Within the continental U.S., we can literally grow and put to use hundreds of millions of tons of additional plant matter per year on a sustainable basis. These biomass resources represent about 3–5 quadrillion Btus (quads) of delivered energy or as much as 5–6 percent of total U.S. energy consumption. In terms of fuels and power, that translates into 60 billion gallons of fuel ethanol or 160 gigawatts of electricity. This is enough energy to meet 30 percent of U.S. demand for gasoline or service 16 million households with power.

The goal of our Biomass program is an integrated approach to the simultaneous production of liquid fuels, power and products. While it is difficult to make fuels or products or power alone at a competitive cost, simultaneous production of products and electricity provides synergies that can lower production cost significantly. As we state in the Office of Energy Efficiency and Renewable Energy Strategic Plan, we are working toward the day when “rural America is revitalized through the sustainable production of biomass feedstocks for biorefineries that produce power, fuels, chemicals and other valuable products.”

Increased demand for production and processing of biomass will create new cash crops for America's farmers and foresters, many of whom currently face economic hardship. New processing, distribution, and service industries will be established in rural communities, and as the agricultural and forestry industries begin to provide feedstock for more than just food, feed and fiber, they will become an integral part of the transportation and industrial supply chain.

A new bioindustry will also encourage better use of agricultural and forestry residues, such as woody biomass. Last December President Bush signed the Healthy Forest Restoration Act, which was aimed at reducing forest fire risks by making productive use of thinnings from forest lands. These efforts will yield cellulosic materials in the form of brush and small diameter trees that could be converted into liquid fuels. Woody biomass utilization is an important part of a Memorandum of Understanding signed last year by the Departments of Agriculture, Interior and Energy.

Given the potential impact of our program on rural communities, we work very closely with the Department of Agriculture. The Biomass Act of 2000 created the formal framework that guides our efforts. The Act created the Biomass R&D Technical Advisory Committee, an advisory group to the Secretaries of Energy and Agriculture. The Committee includes 30 industrial and other biomass experts that advise the Department (and the Department of Agriculture) on program technical

focus. The Committee also facilitates partnerships among Federal and State agencies, producers, consumers, the research community, and other interested groups. In October 2002, the Federal Advisory Committee released their Vision for the Bio-energy and Biobased Products in the United States. The report sets aggressive goals to increase the role of biomass in the US economy by 2020 and beyond.

I am privileged to serve with Under Secretary Mark Rey from the Department of Agriculture as Co-chairs of Biomass R&D Board, which also includes high-level representatives from the Department of Interior, the Environmental Protection Agency, the National Science Foundation, the Office of Science and Technology Policy, and the Federal Environmental Executive. The Board interacts with the Committee to ensure that recommendations are considered and implemented, if it is determined that they will facilitate Biomass R&D.

Our Biomass program issues joint solicitations with the Department of Agriculture to competitively award funding for breakthrough technology development. This is an unprecedented level of cooperation between our two agencies that we hope to continue in the future.

Wind Technologies. Wind energy is a virtually emissions free electricity generation technology that eliminates all environmental concerns associated with conventional fuel cycles—extraction, emissions, and disposal. Wind energy is also one of the most widely used and fastest growing renewable energies in the world. Since 2000, nationwide installed wind turbine capacity in the United States has more than doubled. Largely because of the success of DOE sponsored research, the cost of electricity generation from wind has been reduced by a factor of 20 since 1982, to four cents or less per kilowatt-hour in areas with excellent wind resources.

Wind resources are widespread and substantial in many rural areas of the Nation, particularly in the Midwest and West. The Department estimates that nearly \$2 billion has been invested in 2003 alone with today's technology in new wind power facilities in more than a dozen states. Wind energy projects provide a new source of revenue to farms and ranches and an increased local tax base for rural communities. We estimate that our efforts with industry to achieve aggressive but credible growth in wind power over the next 20 years will create over \$80 billion in capital investment in rural America, \$1.5 billion in new income for farmers and rural land-owners.

Here in Minnesota, it was a bold policy by the State and Northern States power (now Xcel Energy) that moved Minnesota into the forefront of wind development. The Prairie Island Compact allowed storage of spent nuclear fuel at the Northern States Power Nuclear Plant in exchange for the utility agreeing to acquire 425 MW of wind power and 100 MW of biomass. Today, Minnesota has more than 560 MW of wind energy from projects ranging in size from 2–100 MW. It is important to note, however, that much of this growth is likely to come to an abrupt halt with the recent expiration of the Production Tax Credit for electricity produced from certain renewable sources, including wind. The Production Tax Credit provides a 1.8 cent per kilowatt-hour credit for electricity generated from wind, and plays a critical role in the financing of wind projects. In North Dakota more than half of the employees at DMI Industries, a manufacturer of wind turbine towers, were laid off just prior to the holidays last year. In Texas, Lone Star Transportation of Fort Worth, TX., is projecting losses of as much as \$ 1.5 million in revenue per month. While there still remains economically viable opportunity in high quality wind resource areas with today's technology, the Department's R&D program focuses on technology that will make other, even more widely available, wind resources viable for development. This so called "low wind speed" technology will expand available land area for wind development by a factor of 20, while reducing average distance between the resources and where power is needed by a factor of five. Further opportunity is emerging in development of wind energy resources off the coasts and in the Great Lakes of the United States, which can bring immense, economically viable energy sources close to major urban areas with growing demand and increasingly limited energy production and delivery options.

Although wind power can provide electricity at some of the lowest costs available from new generation sources, barriers remain to full realization of the Nation's wind power potential. Cost is still the primary barrier. After cost, the capability to integrate wind power into its range of applications—providing electricity to the grid, serving remote, standalone power needs, or producing hydrogen or clean water in the future—poses both technical and institutional challenges.

Geothermal Energy. Geothermal energy is an inherently clean source of heat that can be used for space heating, aquaculture, greenhouses, and other applications in rural communities. Geothermal energy is a non-combustion source of energy, so no carbon, sulfur or nitrogen oxides are produced. And geothermal energy is a stable

source of energy not subject to price swings such as in the natural gas or fuel oil markets.

Low-and-medium temperature geothermal resources exist throughout the western United States. A survey of 16 western states identified more than 9,000 thermal wells and springs, more than 900 low-to-moderate temperature geothermal resource areas, and hundreds of direct use sites. There are 404 resource sites within five miles of a community in 16 western states that have a potential of serving 9.2 million people. Currently there are 41 geothermal greenhouse operations in nine western states, and 48 geothermal aquaculture operations in 11 western states. Many opportunities exist for the future development of new geothermal sites into thriving greenhouse or aquaculture businesses. Other opportunities include the processing of fruit and vegetable products where geothermal energy provides an even heat source superior for dehydration.

Our program has also supported ground source heat pumps, heating and cooling systems that can be applied to most rural areas. They do not require a low-to-medium temperature geothermal resource but instead use the near surface ground as a heat source during the heating season and as a heat sink during the cooling season. More than half a million ground source heat pumps are installed in the United States, and they are being installed at a rate of about 35,000 units per year. In rural areas, ground space to install the ground loop, either in a horizontal or vertical loop configuration, should be readily available, or in lieu of a ground loop, ground water can be pumped directly to the heat pump.

Solar Energy Technology. Our solar energy technology program focuses on advanced solar devices that can harness a widely available domestic energy resource to help meet electricity needs and reduce the stress on the electricity infrastructure. The photovoltaic program is focused on next-generation technologies such as thin-film photovoltaic cells and leap-frog technologies such as polymers and nanostructures that can increase system durability and develop technologies to improve interconnections with the electric grid. Our research and development seeks primarily to reduce the manufacturing cost of highly reliable photovoltaic modules.

Earlier this month we discussed the President's Hydrogen Fuel Initiative in light of a study by the National Research Council. This potential solution to problems caused by petroleum dependence holds the promise of virtually limitless clean, safe, secure, affordable, and reliable energy from domestic resources. We discussed that producing the amount of hydrogen needed in a hydrogen economy will require a variety of domestic feedstocks. To the extent that hydrogen is produced from renewable sources of energy, we will not only be producing a clean domestic energy carrier to power emission free cars, we will be helping to improve the economies of rural America. DOE is actively supporting research and development into all of these routes to renewable based hydrogen.

Biomass. According to the National Research Council report, hydrogen from biomass is one of the earliest and lowest cost options from renewable resources (with near net zero CO<sub>2</sub> emissions). Biomass can be used to produce hydrogen through gasification or pyrolysis. In gasification, the biomass is directly converted to gaseous hydrogen in large central plants. To produce hydrogen at costs competitive with gasoline by this route, the cost of the biomass feedstock, the capital cost of the gasification process, and the cost of transporting hydrogen from central plants to refueling stations all need to be reduced. Another potential route is biomass pyrolysis that results in a liquid bio-oil that can then be reformed to hydrogen. The pyrolysis pathway is currently more costly than biomass gasification due to somewhat higher capital costs.

Wind. Wind generated electricity can be used in combination with electrolysis to produce hydrogen. The electricity could be produced centrally and the electrolysis could be done in a distributed manner at refueling stations. To be competitive with the cost of gasoline, the cost of the electricity needs to be reduced and better electrolysis technology needs to be developed to reduce the electrolyzer capital cost.

In another approach, large electrolyzers could be placed at central wind farms. The wind farm could co-produce hydrogen and electricity. While the wind resource is intermittent, hydrogen could be made and stored when there is a lot of wind and less need for electricity. A fuel cell could utilize the stored hydrogen to produce electricity when there is too little wind and a high need for electricity on the grid. Advances in technology are needed to reduce the cost of hydrogen storage, to reduce the capital costs and increase the size of electrolyzers, and to further reduce the capital cost and durability of fuel cells.

Some envision distributed wind electricity and hydrogen production, perhaps even at refueling stations. This would require cost reduction in hydrogen storage, more cost effective wind turbines, and lower cost electrolyzers.

Solar. There are several routes to produce hydrogen from solar energy. One of the most attractive long term options for hydrogen production is direct water splitting using photo-active materials or photobiological processes. While the feasibility of this process has been demonstrated, breakthroughs in material costs, durability and efficiency are required for this to be viable. Photovoltaics could also be used to generate electricity while electrolysis is used to generate hydrogen. This option is very similar to the wind electrolysis option with similar barriers. Also the cost of electricity from solar photovoltaics is currently higher than that from wind.

Research is underway to try to utilize high temperature thermochemical cycles to produce hydrogen. There are several chemical cycles that recycle all of the chemical constituents while splitting water to form hydrogen. These could use solar concentrators as the source of the energy to generate the high temperatures required. This research is in a very early stage of exploration and development but could be a very attractive long term option.

Mr. Chairman, we have made great strides in our research, development and deployment programs for renewable energy sources—solar, geothermal, wind, hydropower, and biomass. And the Administration continues to strongly support comprehensive energy legislation that would include incentives for renewable energy, including production tax credits for renewable energy, a renewable fuels standard to support ethanol and biodiesel, and a variety of energy efficiency provisions to help us use all of our energy resources more efficiently.

Mr. Chairman, that completes my prepared statement. I would be happy to answer any questions at this time.

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#### STATEMENT OF RON OBERMOLLER

Good afternoon, I'm Ron Obermoller President of the Minnesota Corn Growers Association. I farm on a fourth generation farm about a hundred miles east of Rochester. My farm consists of 675 acres. Half of these are used for growing corn and the other half of the acres are devoted to soybeans each year.

Minnesota farmers have a problem because of location; we are at the end of all the major rail lines and 1000 miles from the port of New Orleans. This means the agriculture producers pay more freight on both the inputs to farm and outputs produced on these farms. One logical way to turn this into an advantage is to do the processing of the crops close to where they are grown to reduce freight costs. This helps to explain the success of ethanol in Minnesota. In our last promotion for ethanol in Minnesota we used the slogan "Ethanol - Fuel That Helps our Economy Grow". The ethanol industry has helped revive the main streets of small towns in which they are located.

Though the use of new technology farmers continue to increase production of corn by 1.5 to 2 bushels per year. The added production tends to depress price to the point of price being below the cost of production. This added production needs to find a use locally or we will need to pay to ship the corn out of Minnesota. The ethanol program helped to address this major problem.

In 1980 Minnesota started with a \$0.04 per gallon tax credit for a 10 percent blend. Through out the 1990's legislation continued to encourage ethanol production. By the year 2002 Minnesota used ethanol in 98 percent of the gasoline at the 10 percent level. Now we have 14 ethanol plants in Minnesota producing 400 million gallons per year. This is more than enough to supply all of the states needs and then some. Twelve of these plants are farmer owned. This means farmers supplied the capitol to build the plants and the corn to process for ethanol. When the local residents own the plant the profits stay within the small towns to grow the local communities.

Producer payments by the state helped the new industry to establish itself by helping to guarantee banks would loan money to build the plants (\$370 million), giving the farmers the confidence to invest (\$180 million) and helping the plants to profit while growing the industry. For every dollar the state invests in the ethanol industry it creates eight dollars of economic activity in Minnesota. The ethanol industry has created a market for 160 million bushels of corn in Minnesota or about 17 percent of the corn crop. At this time there are at least five new groups of farmers starting on new ethanol plants in Minnesota to start producing in the next two years. To make these plants successful we need to continue to grow the ethanol markets to provide opportunities for profit. One of the key elements for this continued growth is the Energy Bill/Renewable Fuel Standard. The increased ethanol production is projected to increase corn prices by \$.16 per bushel. Consumption of corn for ethanol in the United States exceeded 1 billion bushels or about 10 percent in



2003. Not only is this a great way to increase corn usage, it also reduces Federal Farm Program payments by a projected \$10.6 billion over the next 10 years.

One of the arguments used over the years by oil companies to try to slow ethanol development was that it would increase the price of fuel at the gas pump to the consumers. But in reality it reduces the price of the blend by 5 percent or almost \$0.07 per gallon. This is due to the exemption from Federal excise taxes on ethanol blended motor fuels and because of the increased octane rating obtained by the 10 percent ethanol blend. A 5 billion gallon RFS could save consumers \$3.3 billion at the pump.

In Minnesota much of the success of our ethanol program has to be credited to a unique partnership between the Minnesota Corn Growers and the Minnesota branch of the American Lung Association. It is this partnership which has helped to educate the general public on the value of an ethanol program. Without first educating the public it would have not been possible to pass the legislation necessary to grow the industry. It is through this partnership which we continue to grow the E-85 program in Minnesota. There are near to 100 stations around Minnesota selling E-85 to the flex fuel vehicles. Each tank of E-85 sold represents 6 bushels of corn in that fuel tank. A year ago 1 million gallons of E-85 were sold and this year it has doubled to 2 million gallons. We look at E-85 as fuel of the future because of how clean it burns and it is the ideal fuel to use in fuel cells. Ethanol can be the bridge between the gasoline engine and the fuel cell car.

Ethanol is the fuel that helps our economy go. In Minnesota our rural communities have benefited from job creation for the next generation, a better tax base for rural Minnesota, reduced dependence on foreign oil, reduced fuel prices for consumers, reduced Farm Bill expenditures, and cleaner air. I would strongly urge you to work with your colleagues in Washington to pass an energy bill soon; one that includes the renewable fuels standard as originally agreed. Our country will benefit from the increased investment in renewable fuels, particularly ethanol and biodiesel, created by the RFS, just as Minnesota has received multiple benefits from its investment in ethanol over the last two decades.

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#### STATEMENT RICHARD H. TRULY

Mr. Chairman and members of the committee, I'm Richard Truly, director of the National Renewable Energy Laboratory (NREL) in Golden, CO. NREL is the Nation's premier laboratory for research and development of renewable energy technologies and is a leading laboratory for research and development of energy efficiency technologies. NREL is home of the National Bioenergy Center and the National Wind Technology Center and is managed for the Department of Energy by Midwest Research Institute and Battelle.

I appreciate the opportunity to testify today about some of the new and innovative ways NREL and its partners are putting renewable energy to work for rural America. To address the Committee's question about the role of renewable energy and its impact on the farm economy, I will focus on one of the key renewable energy technologies with significant application to the farm economy and rural America—biomass energy. I will also review the status of NREL's research in the area of wind energy, another technology with significant benefits to the farm economy and rural America.

DOE's Office of Energy Efficiency and Renewable Energy (EERE) has long sponsored research at NREL and other national laboratories that has helped to bring clean, affordable energy technologies to Americans and to people all over the world. New developments in these technologies provide ample evidence of the progress that has been made, but even more importantly, they have offered a picture of what can be achieved in the future.

I want to focus on two of those programs that provide significant benefits to rural America—biomass and wind—and share with you some of the key technology opportunities and challenges we face in these areas.

#### BIOMASS: A UNIQUE RESOURCE

In the realm of renewable energy, biomass—organic materials such as agricultural crops, plants, trees, grasses and wastes—presents us with unique opportunities and tremendous challenges. All renewable energy technologies offer the ability to directly or indirectly capture the sun's energy. Biomass, however, is the only renewable technology that can use the sun's energy to capture carbon dioxide (CO<sub>2</sub>), a major greenhouse gas in the atmosphere, and turn it into organic (carbon-based)

molecules that we can use to produce fuels and chemicals, making this renewable resource uniquely indispensable as our supply of fossil fuel diminishes.

Unlike other sources of renewable energy, biomass (and the land that is dedicated to its production) serves as the source of all our food, feed and natural fiber. Any sustainable scenario for the use of biomass as a renewable energy source must, therefore, balance all of these high priority needs, which are uniquely met by biomass. That will be true before and after we run out of fossil fuels. No other renewable energy source faces this added challenge.

Biomass is also unique in that it can take advantage of the natural recycling process for atmospheric CO<sub>2</sub> associated with photosynthesis. CO<sub>2</sub> released by the combustion of bio-based fuels, for example, is recycled back into new plant matter. The net effect is that, while the use of bio-based fuels results in CO<sub>2</sub>, it adds no net CO<sub>2</sub> to the atmosphere.

#### THERE'S PLENTY OF BIOMASS

The good news is that there are already plentiful supplies of biomass, and there are many opportunities to substantially increase our ability to harvest biomass and recycle CO<sub>2</sub> through the biomass-CO<sub>2</sub> cycle. Researchers at DOE's national labs have already developed sustainable scenarios that show how biomass resources produced within the United States could replace a significant amount of our gasoline usage. Achieving such a target will likely require significant change in agricultural and forestry practices, and it is certainly not going to happen overnight.

In the future, biomass can combine with other renewable energy sources, especially wind and solar, to play a steadily increasing role in supplying electrical power and will someday be a critical source of renewable hydrogen. We cannot be certain what percentage of our energy usage will need to come from biomass. And, just as the timeframe for exhausting petroleum, natural gas, and coal reserves is uncertain, so is the timeframe for transitioning to alternative energy sources. In fact, it seems likely to many that the transition to alternative energy will be driven more by environmental and energy security concerns than a depletion of fossil energy resources.

#### THE MULTIPLE PATHWAYS FOR BIOMASS CONVERSION

DOE's Biomass Program includes research on a number of different technologies for converting biomass into fuels, chemicals and electricity. These technology pathways fall into two categories: thermal and biological processes. The simplest thermal process for biomass conversion is combustion to produce heat and electricity. More sophisticated thermal processes include gasification and pyrolysis technologies that use heat to break down biomass into gaseous and liquid products that can be further processed into fuels and chemicals. On the biological side, recovery and fermentation of the sugars contained in biomass processes that are as old as the brewing industry can be used to produce an array of fuels and products, most notably ethanol. Anaerobic digestion is another very well established biological pathway that takes advantage of natural microbial processes that can convert most organic matter into methane—the main component of natural gas.

#### BUILDING ON THE SUCCESS OF FUEL ETHANOL FROM CORN GRAIN

One of the most important currently available bioenergy technologies is corn grain ethanol. Fuel ethanol represents a major success for DOE and USDA, as part of our efforts to develop viable near-term alternatives to gasoline in our almost exclusively petroleum-dependent transportation sector. The first ethanol plants built in the late 1970's were costly and energy-intensive, sparking an early debate about whether it made good "energy sense" to replace gasoline with ethanol. Today's ethanol process is considerably more cost effective. Most experts now acknowledge that fuel ethanol offers real energy savings. Minnesota and Iowa have both shared in the outstanding growth in corn grain ethanol plants over the past two and half decades. With over 3 billion gallons of annual production capacity in the U.S. today, and an annual growth rate of about 30 percent, corn grain ethanol is clearly becoming a critical source of renewable liquid transportation fuel. One of the important benefits of ethanol is the manner in which it can be blended with gasoline and used in today's dispensing systems and the internal combustion engines used in automobiles.

#### LIGNOCELLULOSIC BIOMASS IS CRITICAL TO FUTURE LARGE-SCALE REPLACEMENT OF PETROLEUM

When we began promoting the production and use of ethanol made from corn grain in the late 1970's, we saw this industry as the home for future technology that

would allow us to move beyond corn grain to include other forms and sources of biomass, commonly referred to as lignocellulosic biomass. Lignocellulosic biomass is “everything else” in biomass beyond the simple sugars, starch and protein that are more valuable as inputs to our food supply.

There is an enormous amount of available lignocellulosic biomass. It comes in a variety of different forms, including the municipal solid waste now being sent to landfills, residues left on the farm after the harvesting of corn and wheat, forest residues, and in the future, a new generation of dedicated energy crops. The latter includes a new generation of perennial grasses and fast-growing trees that have been developed jointly by researchers at DOE and USDA laboratories, in partnership with industry and universities. For biomass to significantly reduce petroleum usage, we need to reduce the cost of producing ethanol from the much more plentiful lignocellulosic forms of biomass.

#### LIGNOCELLULOSIC BIOMASS ABILITY TO REDUCE FOSSIL ENERGY USE

In an ideal world, every Btu of ethanol burned in a car would completely displace a Btu of fossil fuel. However, the production, transport and conversion of biomass require fossil energy inputs. We measure the effectiveness of ethanol’s ability to replace fossil energy by calculating its “Fossil Energy Replacement Ratio” (FERR). It is defined as the ratio of the useful energy produced in the form of fuel grade ethanol per unit of fossil energy consumed in the production of the fuel. In order to be effective at reducing fossil energy use, a fuel must have a ratio greater than one, and the higher the ratio the better. While fuel ethanol from corn grain has a ratio of 1.3, fuel ethanol made from the lignocellulosic biomass such as corn stover has a ratio of 5.1. This means that, for lignocellulosic biomass, one Btu of fossil energy can yield 5.1 Btu of fuel ethanol.

#### THE ECONOMIC GOALS

So, why aren’t we producing ethanol from lignocellulosic biomass today? Simply put, the research is not complete and the cost is too high. If we were to build a facility today for converting lignocellulosic biomass to ethanol, it would produce ethanol at twice the price of one of today’s existing corn grain ethanol facilities. However, through research, we are making steady progress to reduce the cost. Just a few years ago the cost was 4 to 5 times too high. The focus of our research is to make this conversion competitive with corn ethanol within the next 6 years, and in the long run, our goal is make fuel ethanol competitive with gasoline.

Congress, through DOE’s Office of the Biomass Program (OBP), has, for the past five years, invested \$90 to 110 million per year in research and development aimed at the goal of introducing new biomass-based alternatives to petroleum-derived transportation fuels. The largest portion of this annual investment is dedicated to the commercialization of ethanol made from lignocellulosic biomass. OBP, with support from NREL and other national laboratories, has developed technical plans detailing how a continued investment of this size could lead to commercial demonstration of ethanol and other biomass technologies by the end of the decade.

#### OVERCOMING TECHNICAL BARRIERS TO A NEW BIOINDUSTRY: THE ROLE OF NREL AND THE NATIONAL BIOENERGY CENTER

The Department of Energy created the National Bioenergy Center (NBC) in 2000 to foster the national development of technologies and capabilities for producing fuels, chemicals, and power from biomass. Working for the Office of the Biomass Program within EERE and headquartered at NREL, this virtual center coordinates the biomass research at other national laboratories and works with universities and industry partners. Together, the NBC and OBP have developed a comprehensive multi-year plan that outlines the major technical barriers and DOE’s strategies for overcoming these barriers to make the production of biofuels from lignocellulosic biomass economical and attractive for investment by the private sector.

The major areas of the NBC’s research include:

- Resource assessment—to better understand the full potential and availability of biomass, and develop strategies to maximize the yield of fuels after meeting the need for food and fiber.
- Harvesting technology R&D—to develop sustainable low-cost methods of harvesting agricultural crops in a single pass. The grain is harvested for food and the remainder of the plant is harvested for conversion to fuels, chemicals and power in a biorefinery. Some of the plant is left on the soil to maintain soil quality.
- Transportation logistics—to develop lower cost methods of handling and transporting biomass. Today, the cost of getting agricultural residues off the farm and

transported to a biorefinery is a major contributor to the high cost of producing fuels from agricultural residues.

- Conversion technology—to reduce cost and improve yield of useful fuels, chemicals and power from biomass. This area of research represents the greatest area of effort by the DOE national laboratories. One focal point of this research is on pre-treating biomass to make it more susceptible to conversion technologies. Another focus is on reducing or overcoming the difficulty of biochemical conversion of cellulose to ethanol.

- Products research—to ensure high yields of quality fuels that can be blended with gasoline, diesel, or jet fuel and develop higher-value chemical co-products that can improve the economics of an integrated biorefinery.

- Analytical studies—to thoroughly assess and understand the economics of producing fuels, chemicals, and power from biomass. Analytical studies also include the life cycle assessments of various biomass conversion strategies to understand and quantify all the environmental aspects of bioenergy systems.

- Measurement techniques—to provide chemical and physical measurement methods and associated equipment needed by the emerging bioenergy industry to characterize biomass feedstocks.

#### PUBLIC-PRIVATE PARTNERSHIPS

DOE is working in partnership with the today's corn grain ethanol industry to develop the technology that will enable the creation of a new bioindustry. For example, DOE is currently partnering with Broin and Abengoa—two major ethanol technology providers and ethanol producers—to increase the yield of ethanol from existing corn ethanol facilities. Both of these partnerships are intended to expand the feedstock range and conversion efficiency of the private partner's ethanol plants.

DOE is also partnering with existing chemical industry leaders such as Dupont and Dow Chemical to develop new opportunities for producing both fuels and chemicals from biomass. DuPont and DOE are working together with several other partners to develop what Dupont calls an Integrated Corn Biorefinery (ICBR.) The goal of this public/private partnership is to develop a biorefinery that can efficiently convert the starch in corn grain to a low-cost sugar as feedstock to make value-added chemicals, while using the remaining lignocellulosic parts of the corn plant to produce ethanol and power. The ethanol produced from these ICBR's would have a goal to be competitive at first with corn grain ethanol, and possibly with gasoline in the absence of a subsidy. When successful, Dupont's process design could be added onto existing corn ethanol facilities to dramatically improve the yield of ethanol and overall profitability of the facility.

Here in Minnesota, DOE is partnering with both large and small companies in the biomass area. Cargill is working with DOE on the development of a new chemical building-block produced from sugars. Cargill-Dow, another Minnesota Corporation and a joint venture formed by Cargill and Dow Chemical, is working with DOE and its labs to develop new biorefineries that use the corn plant (both the grain and the lignocellulosic fraction) to produce polylactic acid (PLA)—a unique and environmentally-friendly renewable polymer. Cargill-Dow has also constructed its first PLA facility in Blair, Nebraska. This facility produces PLA from the starch in corn while the technology focus is to utilize the remaining lignocellulosic components in the corn plant in the PLA production process.

DOE labs are also partnering with equipment manufacturers, Case New Holland and John Deere, to develop new harvesting equipment that would allow farmers to harvest the grain and straw at the same time. This technology is being developed for wheat and corn first, but the concept has broader applicability. In stakeholder meetings with farmers and equipment manufacturers, DOE has determined that single-pass harvesting technology could significantly reduce the cost of supplying biomass (wheat straw or corn stover) to a biorefinery.

With its plentiful biomass resources, Minnesota provides an excellent example of how rural America is well positioned to enjoy considerable economic growth, as renewable energy technologies become more cost competitive with petroleum.

Minnesota is a leader in the field of biofuels, and is home to more than a dozen ethanol plants, several first-of-a-kind biopower facilities, and an emerging biodiesel industry. District Energy, located in St. Paul, has constructed and is operating one of the world's largest and most innovative Combined Heat and Power (CHP) biomass facilities. Minnesota has also pioneered several early-stage exploratory projects with different energy crop concepts.

## WIND ENERGY BENEFITS FOR THE RURAL ECONOMY—A NEW CASH CROP

There is another bright spot on the rural economic development horizon: wind energy. The wind industry contributes to the economies of 46 states, and the outlook for regional economic growth from wind energy is impressive. Wind energy projects provide new jobs, a new source of revenue to farmers and ranchers, and an increased local tax base for rural communities. And wind energy helps secure our energy future during uncertain times while reducing pollution emissions and offsetting the larger water consumption associated with fossil fuel central station power plants.

Wind energy offers rural landowners a new “cash crop”. Rural landowners who lease their land to wind developers typically receive about 2 percent to 4 percent of the gross annual turbine revenue. In southern Minnesota and northern Iowa, landowners receive annual payments from \$2,000 to more than \$4,000 per turbine, which can help compensate for a downturn in commodity prices.

## EXPANDING WIND ENERGY IN RURAL AMERICA: THE LOW WIND SPEED TURBINE

There is a recognized and important opportunity for broader use of wind energy in rural America. This new opportunity is based on the development of wind turbines that can efficiently operate in lower wind regimes.

Strong, frequent winds are ideal for generating electricity. The best resource areas are shown on maps incorporating wind speeds based on meteorological measurements and models. Annual average wind speed is used to calculate the energy in the wind blowing through a wind turbine’s rotor per square meter of area, expressed as watts per square meter. Geographic areas as small as one square mile are assigned a wind power class from 1 to 7. State officials and developers use this information for wind development. Sites in wind power class 3 or higher are candidates for wind farm development.

Currently, utility-scale wind turbines can produce cost-competitive electricity on class 6 wind sites (average wind speeds of 16 miles per hour at 33 feet). However, as more sites are developed, easily accessible Class 6 sites are becoming rare. In addition, many Class 6 sites are located in remote areas that do not have easy access to transmission lines.

Class 4 wind sites (13 mph at 33 feet) cover vast areas of the Great Plains from central and northern Texas to the Canadian border. While the average distance of Class 6 sites from major load centers is 500 miles, Class 4 sites are significantly closer, with an average distance of 100 miles from load centers. Utility access to the Class 4 sites is more attractive and less costly, and Class 4 sites represent almost 20 times the developable wind resource of Class 6 sites.

DOE and its national laboratories, in partnership with our industry partners, are developing the next generation of wind turbine technology to produce competitively priced electricity in lower wind regimes and thereby expand the use of wind energy to even greater expanses of America. The goal of DOE’s Low Wind Speed Turbine (LWST) project is to reduce the cost of energy from large wind systems. The strategy for the LWST project, developed in cooperation with industry, includes:

- Developing public/private partnerships to support continuing innovation.
- Aligning program research and testing activities to support public/private partnerships.
- Guiding portfolio planning and technology transfer with applied systems integration activities.
- Performing program evaluations regularly using performance-based management techniques to provide a strong analytical basis for performance criteria, periodic review, and adjustment.

Today, biomass is making the largest contribution of renewable resources to the nation’s energy needs, currently supplying about 3 percent of all the energy consumed in the U.S. When combined with the advantages of wind energy, the energy and economic future looks bright for rural America.

The shared vision of DOE and NREL is that biomass will supply an increasing percentage of U.S. energy needs. Our belief is that over the next 10–20 years, biomass will be used to supply increasing amounts of ethanol, biodiesel, biobased chemicals, and power. Future biorefineries will maximize the value of biomass by producing the optimum slate of products, in much the same way that petroleum refineries maximize the value of crude oil by producing an array of petroleum products.

Beyond biomass, wind energy is becoming the other new “cash crop” for rural America. The challenge is to bring wind power to more of rural America by bringing

the next generation of wind technology capable of producing competitively priced electricity to farms and ranches in Minnesota and other states.

Ultimately, we expect that clean burning hydrogen and hydrogen fuel cell technology will begin to become cost effective, and all renewables, including biomass, wind, and solar, will eventually be used to produce hydrogen as it becomes the energy currency of the latter half of the 21st century. That's good news for rural America and for the rest of the country.

Mr. Chairman, that concludes my prepared statement. I would be happy to answer any questions from members of the subcommittee.

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#### STATEMENT OF RON JACOBSEN

I wish to welcome and thank Congressman Gutknecht and members of the subcommittee for visiting our region and for the opportunity to present this testimony.

My name is Ron Jacobsen and I farm near Wells, Minn. I am the president of the Minnesota Soybean Growers Association.

I appreciate the opportunity to talk about our Nation's need for renewable energy and the role agriculture can play.

I am especially pleased that you are here during National Ag Week and on the second anniversary of the day Minnesota's biodiesel legislation was passed into law.

My testimony will focus on biodiesel—an alternative to petroleum-based diesel fuel that can be made from soybean oil, animal fats or other vegetable oils.

As you well know, the United States is extremely dependent upon foreign petroleum oil as an energy source. That dependency puts the U.S. at risk and at the mercy of OPEC's production and supply whims. Current gasoline and diesel fuel prices are a perfect example.

Why not source renewable fuels, like biodiesel, right out of Minnesota's own vast oil fields—its soybean fields.

Biodiesel is a clean fuel that significantly reduces almost all regulated pollutants, including carbon monoxide and particulate matter, and the compounds in diesel exhaust that have the potential to cause cancer and lung disease.

Beyond the human health benefit, biodiesel improves the environment by reducing noxious emissions, increases domestic security by reducing our Nation's dependence on imported oil and provides economic development opportunities in greater Minnesota.

I am proud to say that Minnesota is the first state in the Nation to enact legislation requiring the state's petroleum diesel fuel to contain 2 percent biodiesel.

A key component in Minnesota's biodiesel legislation was a requirement that the Commissioner of Agriculture certify that a plant in Minnesota has an annual capacity of 8 million gallons of biodiesel.

On Friday of this week in Brewster, MN, Minnesota Soybean Processors will be breaking ground on Minnesota's first biodiesel plant.

We are also aware of two more plants that are "in the process" as we speak.

Currently biodiesel is sourced from out of state, but that hasn't hindered Minnesotans from using biodiesel.

Minnesota already has the distinction of being the state with the most on-farm use. (50 percent of Minnesota's producers use biodiesel on their farms.)

In addition, several fleets, including the City of Brooklyn Park, the City of Minneapolis, Hennepin County, Voyageur's National Park, Eureka Recycling and AMS trucking, as well as school districts and many others are already enthusiastically using biodiesel because it is a superior, cleaner fuel.

Once biodiesel production facilities are built here in Minnesota, biodiesel fuel can be sourced right here at home, made from the oil in the soybeans we grow so abundantly.

Struggling rural communities need economic development opportunities and value-added alternatives for Minnesota grown commodities.

In 2002, the Minnesota Department of Agriculture studied the impact of the "on road" diesel market, which consumes over 631 million gallons of diesel fuel each year.

A two-percent biodiesel blend, for the on-road demand alone, will generate a direct economic impact of over \$212 million dollars annually and create over 1,120 jobs, predominately in greater Minnesota.

The study also found that there would be a positive impact to the soybean processing industry of over \$78 million, and a positive \$56 million dollar impact on Minnesota's soybean farmers.

Additionally, a U.S. Department of Energy study identified that when all of the other markets that would be using a 2 percent blend are taken into consideration, the total consumption of biodiesel blend totals 831 million gallons.

Thus the positive economic impact figures quoted earlier, will increase significantly.

The positive economics on the economy are only part of the picture.

The benefit to Minnesota's environment was also be significant.

Burning just 2 percent biodiesel in 830-plus million gallons of diesel fuel will curtail harmful tailpipe emissions. Annually, it will:

- Reduce poisonous carbon monoxide emissions by more than 800 thousand pounds.
- Reduce ozone forming hydrocarbon emissions by almost 91 thousand pounds.
- Reduce hazardous diesel particulate emissions by almost 70 thousand pounds.
- Reduce acid-rain causing sulfur dioxide emissions by more than 70 thousand pounds.

Biodiesel is unique in that it has a positive energy balance—for every one unit of energy used to produce biodiesel, 3.2 units of energy are created.

This positive energy balance reduces Life Cycle Carbon Dioxide emissions by more than 250 million pounds annually.

Biodiesel also extends the fossil fuel supply almost four-fold for every gallon of diesel replaced by biodiesel.

But the environmental benefits don't end there.

As you may recall, the Bush Administration approved a recommendation from the Environmental Protection Agency to reduce sulfur in diesel fuel from its current level of 500 parts per million, to 15 parts per million by 2007. That's a 95 percent reduction.

Removing that amount of sulfur will significantly reduce lubricity.

The beauty of biodiesel is that it will not only replace lost lubricity, but also improve engine performance and extend engine life.

Biodiesel is ag-based, renewable and clean burning. It has advantages to the economy, the environment and to the Nation's energy independence.

Minnesota's legislation passed because of the groundswell of support of farmers, other commodity groups, agricultural organizations, the Lung Association, Clean Air Advocates and allied industries.

It was truly a David vs. Goliath effort, but we made it happen with hard work, persistence, science-based facts, and the much-appreciated bipartisan support of the House and Senate.

If this nation is to move away from its dependence on foreign oil then our government must encourage the use of renewable fuels.

We thank Congressman Gutnecht for his support of biodiesel incentives in the Federal Energy Bill ask for his continued support and influence as this critically important piece of legislation moves through committee and onto the floor of the House.

Minnesota needs biodiesel incentives in the Energy Bill to reinforce and enhance the hard work our state has already done in the promotion of biodiesel and the use of renewable fuels.

I'd like to leave you with this thought:

It takes Mother Nature 250 million years to renew her fossil fuels. It takes Minnesota soybean farmers just seven months.

Again, thank you for the opportunity to address the subcommittee.

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#### STATEMENT OF JAMES R. MOSELEY

Mr. Chairman and members of the committee, I am pleased to appear before you today to discuss the Department of Agriculture's efforts to advance renewable energy and thereby contribute to the energy security of our Nation.

My remarks will focus largely on the economics of renewable energy, followed by a brief discussion of USDA programs that promote renewable energy. At the outset, I want to emphasize two underlying themes throughout this discussion: the ongoing role of research, as renewable energy systems are developing technologies, and the overall need for coordination—among Federal agencies, as well as government partnerships with the private sector, academia and others—to conduct research effectively.

I also want to stress the strong support of this Administration—as documented in the President's National Energy Policy—for developing renewable energy as part of efforts to increase domestic energy supplies to satisfy America's growing demand

for energy. Within this framework, one of USDA's goals is to increase the use of renewable energy. By doing so, we have the potential to create jobs, stimulate economic activity, reduce dependence on foreign oil and cut back on environmental pollution.

USDA is involved in many aspects of renewable energy that contribute to its increased use. Our programs support production of renewable energy. We also support research, development, and pre-commercial work to advance renewable technology and to reduce their costs. USDA also monitors the role of renewable energy in energy markets and U.S. agriculture, and conducts economic analyses that alert us to both roadblocks to greater renewable energy use and opportunities for expansion.

USDA renewable energy activities address an array of energy forms, such as starch and cellulosic ethanol, biodiesel from agricultural oils, biomass, wind and solar, and anaerobic digestion for power.

#### ECONOMICS OF RENEWABLE ENERGY

Ethanol. Ethanol is a renewable energy success story. Currently, 73 ethanol plants are operating in 20 States, with a total production capacity of 3.1 billion gallons per year. With 15 ethanol plants now under construction, total production capacity will increase to 3.7 billion gallons per year by early 2005.

Last year, U.S. ethanol producers converted more than 1 billion bushels of corn and sorghum to more than 2.8 billion gallons of ethanol. This was an increase of 680 million gallons—or 32 percent—over 2002. As new plants come on line and as current plants operate at higher levels, we project this year's production to reach 3.3 billion gallons. In terms of the estimated cost to Federal taxpayers, this amounts to \$1.1 billion and \$1.3 billion in fiscal years 2003 and 2004, respectively. We believe ethanol demand will continue increasing in the United States. Moreover, if the energy bill is passed and the renewable fuels standard implemented, ethanol production will increase to at least 5 billion gallons per year by 2012.

Ethanol demand increased significantly in 2003 when California, New York, and Connecticut replaced methyl tertiary butyl ether (MTBE) in their gasoline with ethanol. More than 900 million gallons of ethanol are required annually to replace MTBE in California and about 450 million gallons are required in New York and Connecticut. With this greater demand, ethanol prices rose to over \$1.60 per gallon during November and December 2003. Seventeen states have now banned MTBE in their gasoline, an important factor in ethanol's growth.

In terms of production inputs and expense, corn accounts for 95 percent of feedstock used to produce ethanol. Although corn prices are higher this year, due to a tighter supply/demand balance, these price increases are being offset by higher prices being paid for corn-ethanol byproducts.

One concern ethanol producers have is the rising price of energy. Following corn, fuel—mainly natural gas—is the second largest cost item in producing ethanol. Natural gas prices increased from \$2.50 per million British thermal units (Btu) in 1999 to \$5.50 per million Btu in 2003, and energy experts expect the price of natural gas to remain high during the next five years. There are no economic alternatives to natural gas for existing ethanol plants. Using petroleum products instead of natural gas would require additional capital investment and prices for both have been moving together.

Estimates of the energy efficiency of ethanol are the subject of debate. Some studies estimate that there is a net energy loss and an environmental loss from ethanol. Although it takes energy to produce ethanol, we emphasize that repeated USDA studies, using robust corn yields and increasingly efficient fertilizer and alcohol conversion processes, show a positive net-energy balance of corn ethanol: we believe that the energy in ethanol exceeds the amount of energy used to produce it, and that this energy balance has improved over time.

Technological innovations in corn production and ethanol conversion are important factors in this improvement. Corn yields have improved, and ethanol plants are rapidly adopting innovations which substantially reduce the energy required to convert corn into ethanol. Our most recent estimate of the energy ratio is 1.67, up from 1.22 in 1995. This indicates that the energy content of ethanol is 67 percent greater than the energy used to grow, harvest, and transport corn, and to produce and distribute the ethanol. We are estimating similar positive energy ratios for biodiesel.

Research directed at lowering both feedstock and production costs is key to improving ethanol's competitiveness as a fuel or fuel additive. To achieve these cost reductions, USDA research is targeting several areas: the development of organisms that will convert multiple, mixed substrates; superior product recovery and separation technology; high-value co-products; more efficient technologies and processes for co-product recovery and separation; and better fractionation of feedstocks. We also



have scientific work focused on developing varieties of corn that would be easy to mill and provide optimum levels of fermentable substrate and co-products.

#### ADDITIONAL RENEWABLE ENERGY SOURCES

Turning to other sources of renewable energy, interest in wind power has surged in U.S. energy markets. With technology advances, the cost of electricity from wind power has decreased 80 percent in the past 20 years, according to the Cambridge Energy Research Associates. Some projects reportedly can produce electricity for as low as 3 cents per kilowatt. Over 90 percent of U.S. wind power capacity is concentrated in four states, including Minnesota. While the economics of some installations can compete with traditional power sources, others require assistance. In the short run, a number of factors limit the wind energy market—namely, the unpredictability of wind resources, distance from demand centers, and emerging oversupply of electric power in some regions. We see expanded market potential in the long run, taking into account technological improvements and state renewable energy set-asides.

Biodiesel, as well as lubricants, chemicals, and solvents produced from agricultural fats and oils, offer an opportunity to supplant petroleum derivatives in the coming decade. In the process, “new uses” markets for agricultural fats and oils may expand, giving farmers new outlets for their crops and bringing them into high-volume markets producing high-value nonfood products.

As these markets develop, they have important national policy implications. Because agricultural fats and oils are very energy efficient to produce, our calculations show that their emission of greenhouse gases is much lower than petroleum-based fuels on a net emissions basis. They also represent a sustainable source of domestic liquid transportation fuels.

Selected niche market opportunities for biodiesel are emerging. USDA assessed the life-cycle costs of alternative fuel technologies to determine whether biodiesel is cost competitive for urban bus use. We found that while biodiesel and biodiesel blends have higher total costs than some alternative fuels, they have the potential to compete with compressed natural gas and methanol as fuels for urban transit buses.

The major obstacle to the widespread use of fats and oils for biodiesel manufacture is the relatively high cost of biodiesel from food-grade oils: about \$2 per gallon (B 100) compared to \$1 per gallon for petroleum diesel on a pre-tax basis. Tallows, yellow and white greases (often termed waste vegetable oil), and true wastes, such as sewage trap grease, are cheaper to use than food-grade oils.

A focused research program is critical to creating economically viable sustainable fuels and chemicals markets based on renewable fats and oils. USDA’s research is aimed at lowering the cost of production, optimizing the properties of feedstocks used to produce biodiesel, and developing conversion and utilization technologies which take advantage of the unique properties of the fats and oils.

Biomass crops, such as poplar, willow, and switch grass, have the potential to become important feedstocks for electric power, liquid fuel, and chemical production. They can offer significant environmental benefits over fossil fuels. As long as there is no net energy loss, the energy produced from biomass crops does not add greenhouse gases to the atmosphere during the life cycle of the production and use of the crops.

Analysis by USDA and the Department of Energy (DOE) suggests that, with an aggressive research program aimed at boosting crop yields and developing appropriate power and chemical conversion technologies, biomass might compete with fossil fuels for a broad range of uses. If fossil fuel prices were higher than expected, the biomass industry would be more competitive. A key assumption in our analysis is the development of improved production, harvesting, delivery, and utilization systems. Much hard engineering, organizational, and research work will be required to demonstrate the workability of these systems.

#### USDA RENEWABLE ENERGY ACTIVITIES

USDA has a wide variety of ongoing renewable energy programs. Now, I would like to focus on what we are doing to implement new authorities provided in the energy title of the Farm Security and Rural Investment Act of 2002.

Section 9002, Federal Procurement of Biobased Products, requires Federal agencies to increase their procurement of qualifying biobased products. When fully implemented, the program should stimulate development of a broad range of high performing and environmentally friendly biobased products. This section also provides for a voluntary labeling program and use of a “USDA Certified Biobased Product” label. A proposed rule was published in the Federal Register on December 19, 2003,

and the comment period ended on February 17, 2004. Once we have considered the more than 60 public comments received, a final rule will be published.

Section 9006, Renewable Energy Systems and Energy Efficiency Improvements, authorizes loans, loan guarantees, and grants to farmers, ranchers, and rural small businesses to purchase renewable energy systems and make energy efficiency improvements. We are developing a proposed rule for this program to operate it on a long-term basis.

Last year, we selected 113 applications to receive funding to help develop renewable energy systems, including 35 applications totaling \$7.4 million to support wind power; 30 applications totaling \$7 million for anaerobic digesters; six totaling \$1.1 million for solar, and 16 totaling \$3.9 million for ethanol plant/anaerobic digesters, direct combustion, and fuel pellet systems. Minnesota received almost \$5 million in grant funding.

Section 9008, Biomass Research and Development Program, provides \$14 million for a USDA-DOE solicitation for biomass research and development. We are pleased to be able to work closely with Assistant Secretary Garman and his DOE colleagues to implement this program. Over 400 pre-applications for the joint program have been reviewed and DOE will send out invitations for full applications, which are due by March 26. Final projects will be selected by early May for total grant awards up to \$14 million from USDA funding and \$10 million from DOE funding. Awards are scheduled to be made by June 1. Two projects from Minnesota were chosen last year in a competitive, merit-based award process. I would like to emphasize that merit-based awards are the best way to ensure that Federal taxpayers get the most for their tax dollars.

Section 9010, the Commodity Credit Corporation (CCC) Bioenergy Program, provides payments to eligible processors to encourage increased purchases of eligible commodities to expand bioenergy production and support new production capacity. For this program year, \$150 million is provided in our budget.

I also want to mention that USDA has an ongoing program of research to improve the economics of renewable energy. Our goals are two-fold: to overcome the technical barriers to developing renewable energy, and to strengthen coordination with other Federal agencies and with universities, private sector companies, and environmental organizations.

Continued implementation of the Biomass Research and Development Act of 2000 is a key vehicle for improving coordination. The Act creates a structure led by USDA and DOE to coordinate Federal biomass research activities and develop more effective plans. I also want to acknowledge the outstanding support DOE has provided USDA in implementing Section 9006 of the Farm Bill. DOE experts were instrumental in helping us evaluate the technical merits of grant applications.

Taken together, our programs, our research, as well as our direction and focus, will help advance agriculture's key role and realize its potential in meeting the demand for clean, affordable renewable energy. It is our conviction that this process will contribute both to the vitality of rural communities and energy stability of our Nation.

That completes my statement Mr. Chairman.

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#### STATEMENT OF DENNIS HAUBENSCHILD

Chairman Gutknecht and members of the committee, I thank you for the opportunity to speak before you today. My name is Dennis Haubenschild; I am a dairy operator along with my wife Marsha and two sons Thomas and Bryan of Haubenschild Farm in Princeton, Minnesota. I'm giving this testimony about our anaerobic digester project on Haubenschild Farm to show how important this project can be to farmers, ranchers, and rural small businesses. I believe this program can help support self-sufficiency, promote rural economic development, and help have a more sustainable environment.

First of all I would like to thank the U.S. Environmental Protection Agency, the U.S. Department of Agriculture, and the U.S. Department of Energy for sponsoring the AgSTAR Program which Haubenschild Farm applied for and was selected as an AgSTAR "Charter Farm", one of 13 such farms selected nationwide to demonstrate farm-scale anaerobic digestion technologies. The program encourages the use of methane recovery (biogas) technologies at animal feeding operations.

I would also like to thank East Central Energy of Braham, Minnesota our local rural electric cooperative. East Central Energy was the first rural electric cooperative in the state of Minnesota. With there mission to enhance the quality of life and provide premier service to their customers, they were first to offer environmental programs such as their bio-mass or Cow Power program to their customer members

to purchase renewable power. This has helped to make it a win-win program for ECE, our dairy, and the community. I really believe they should get a congressional award for their work.

I have always believed a great percentage of the farms in the U.S. could and should take advantage of this technology, but with the economies in agriculture today most farms will have difficulty financing a digester project from traditional lending institutions. The Haubenschild project financing was achieved by a collaboration of government agencies, through a combination of direct technical assistance, grants and low-interest loans. The AgStar program provided the technical assistance for the project, estimated at \$40,000. The Minnesota Department of Commerce and the Minnesota Office of Environmental Assistance offered grants totaling \$87,500 for construction of the system and the Minnesota Department of Agriculture was able to offer a \$150,000 no-interest loan for the project. This left \$77,500 that Haubenschild Farm paid directly.

A copy of the "Final Report: Haubenschild Farms Anaerobic Digester" can be downloaded at: [www.mnproject.org](http://www.mnproject.org).

Since September 24, 1999, the digester has produced over 106 million cubic feet of bio-gas which has made 4.5 million kWh of electricity at a value of \$320,000. The bio-gas burned is equivalent to 29,000 tons of carbon credits. The generator has been running 98.6 percent of the time, 24 hours a day, and 7 days per week. It has created enough hot water to heat all the floors in the dairy, saving 800 gallons of LP gas a week in the winter. With the enhanced value of the manure, it makes for a payback of less than 5 years on the total investment.

The best benefit is the improved surface and ground water quality, enhanced fertilizer value of the processed manure, and the virtual elimination of offensive odors.

Last January, one of the coldest months, Haubenschild Farm produced 109,880 kWh of electricity, and sold 62,860 to the electric co-op, enough electricity for the dairy plus 78 homes in the neighborhood. This is a saving of about 35 tons of coal that did not have to be burned to make electricity and 1,200 gallons of LP that did not have to be burned to heat water. In the spring when the digestate is incorporated into the ground it will save another 34 gallons per acre of propane or natural gas equivalent that did not have to be used to make anhydrous ammonia.

Reasons for Anaerobic Digestion

1. Reduce Odor
2. Generation of Electricity
3. Thermal energy production
4. Increase in value as fertilizer
5. Pathogen reduction
6. Weed seed reduction
7. Greenhouse gas reduction -Carbon Credit value

Clearly, a major change in perspective has taken place from viewing manure as a waste product to it becoming a renewable resource. Its ability to help support a heavily strained power grid system is starting to get some recognition.

Perhaps an even more compelling reason for increased acceptance of manure digesters is their ability to reduce pollutants and odor risks associated with manure. In summary these are expected benefits of an anaerobic digester: Odor control; Generation of electricity; Thermal energy production; Potential increase in value of manure as fertilizer; Pathogen reduction; Weed seed reduction; and Greenhouse gas reduction. As costs of fuel increase and odor complaints from neighbors mount animal production facilities are looking for ways to shave costs by generating their own electricity and reduce dependence on propane/ natural gas to heat process water.

When it comes to carbon or energy use, The U.S. is driving down a dead end street at 100 miles an hour. Methane or Bio-gas is never going to be as efficient as coal when it comes to generating electricity, but it takes Mother Nature 21 days to make bio-gas and 21 million years to make coal. Hopefully as more electric utilities start using greenhouse gas offsets from renewable energy facilities, the trading of carbon credits will become a business opportunity for both the producer and the utility.

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#### STATEMENT OF ADAM M. SOKOLSKI

Thank you for allowing our testimony to be included in the record of the House Agriculture Committee, Subcommittee on Department Operations, Oversight, Nutrition and Forestry field hearing of March 15, 2004 held in Rochester, Minnesota.

The League Izaak Walton League of America (IWLA) was founded in 1922 as a national organization of hunters, anglers and other conservation-minded outdoor en-

thusiasts who work through volunteer, community-based action and education programs to ensure the sustainable use of America's natural resources. Today, 50,000 members support our work. League programs focus on natural resources advocacy through state and Federal legislation, outdoor ethics, community sustainability, energy efficiency and sustainable agricultural practices.

League members strongly support the development of our nation's vast renewable energy resources in a responsible manner. Renewable energy represents an important investment in rural economies, but also in cost effective energy that does not create the pollution problems associated with fossil fuel combustion.

#### REAUTHORIZE THE PRODUCTION TAX CREDIT FOR RENEWABLE ENERGY

Wind energy is the fastest growing and, in many locations, the least cost method of generating electricity. Wind provides pollution free electricity that can be used to fuel America's economy.

As your committee was able to see while visiting southeast Minnesota, wind energy's presence is just beginning to bring benefits to that part of the State. Ten years ago it was impossible to economically convert nature's winds to usable electricity in that area. Wind turbine technology has come a long way since then, allowing development of wind farms to begin in that part of the state. Certainly, with the Federal National Renewable Energy Laboratory's (NREL) work on low speed wind turbine technology, more and more areas of the country will be viable locations for wind farm development.

One important priority for Congress should be reauthorizing the Federal Production Tax Credit for renewable energy (PTC), that provides a 1.5 cent per kilowatt hour tax credit for wind energy production sold into the electric market. The PTC expired on December 31, 2003.

The delay in reauthorization has caused the loss of over 2,000 manufacturing, trucking, construction, and engineering jobs. The delay is putting on hold about 1,500 megawatts of wind energy development representing \$2 billion in economic activity.

An immediate reauthorization can help bring back jobs, construct projects with minimum delay, and ensure steady growth in economically competitive, pollution free, electric energy. Wind energy helps diversify America's energy sources, provides an excellent hedge against spikes in natural gas prices, reduces the use of fossil fuels, and helps to develop rural economies. The PTC has been a strong tool for advancing wind energy technology and has helped bring down costs of utility scale wind projects some 80 percent since 1990.

It is very important to reauthorize the PTC as soon as possible to bring back good jobs in the wind industry and ensure that projects under development are constructed on schedule. The House of Representatives should move forward to reauthorize the PTC independently from the Energy Bill as soon as possible. Waiting for a breakthrough on the Energy Bill will only prolong uncertainty and delay the return of activity in the industry.

On behalf of the Izaak Walton League of America, I thank you for your time and consideration.

