UNITED STATES SENATE

AGRICULTURE COMMITTEE

HEARING ON:

"FUNDAMENTALS AND FARMING: EVALUATING HIGH GAS PRICES AND HOW NEW RULES AND INNOVATIVE FARMING CAN HELP"

TESTIMONY OF PROFESSOR BRUCE E. DALE

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Senate Agriculture Committee Hearing Room, SR-328A.

Senator Stabenow and Committee:

Thank you for the invitation to be here today. This is my third experience testifying before the Senate Agriculture committee about biofuels. I first testified when Senator Lugar chaired the committee, many years ago. Between then and now we have made significant progress…but we still have a very long way to go. So I will be as frank and honest as I know how to be. Unless we understand clearly our situation, we cannot hope to solve the serious problems we face. I will start out by being quite sober, but hopefully end on a more cheerful note.

Our economy depends very strongly on liquid transportation fuels, and that market is dominated almost completely by petroleum. The days of cheap, conventional domestic oil are gone. They will not return. We burned up that oil long ago. Likewise, the days of cheap, conventional oil produced outside our borders are rapidly ending. We are increasingly at the mercy of much more expensive oil, much more environmentally damaging oil, and much more insecure oil supplies. Not a pretty picture.

Three years ago, oil prices peaked at about $145 per barrel. Shortly thereafter the stock market tanked, and we entered the current severe recession. We are still struggling to emerge fully from it. Bad lending practices got most of the blame for this recession, and such practices certainly contributed to the problem. But we need to keep in mind that every recession since the end of World War II was preceded by increased oil prices. Oil prices are rising again, causing a lot of pain and threatening to kill this fragile recovery. A very sobering scenario arises: high and volatile oil prices kill economic growth, sending us into recession which decreases oil prices somewhat, leading to a recovery in which demand for oil rises again, which recovery is killed again by rising oil prices. And with every such cycle, more and more of our national wealth disappears, making us less able to emerge from this vicious circle and achieve a more sustainable future. Again, not a pretty picture.

So what can we do to reduce our vulnerability to high oil prices and oil price volatility? We can and should decrease demand for oil by increasing fuel efficiency standards over time. We can and should increase domestic production of oil. One way to do that is to combine carbon dioxide sequestration with enhanced oil recovery. We should do that—we need the oil and we need to sequester carbon. But increased domestic oil supply is only a transition measure to get us to more sustainable, long term solutions. Increased oil supply <u>cannot and must not</u> be an end in itself. Because one day soon, that oil will also be gone, burned up. And more fuel efficient vehicles will help, but they are also not enough. We require lots of liquid fuel, sustainable liquid fuel, if we are to continue our way of life.

Thus we need to increase production of oil alternatives, and that means biofuels. There simply is no way to a sustainable transportation sector without sustainable biofuels. I have worked for 35 years to help develop cellulosic ethanol, also called second generation ethanol, made from crop residues, woody materials , grasses, etc. Mr. Broin has discussed the corn ethanol industry, so called first generation biofuels. That industry has received a lot of criticism, almost all of it unfounded. Corn ethanol is a much better product and much better for our economy and environment than most people realize. But my point is that a viable cellulosic biofuel industry will depend very strongly on a healthy, strong corn

ethanol industry. It is going to be really tough to have second generation biofuels without first generation biofuels---you can't produce the child without having parents first.

Here is a case in point. Mr. Broin's firm, POET, is working hard and spending a lot of its own money to develop large scale cellulosic ethanol. POET provides one example why a strong first generation biofuel industry is critical to developing second generation biofuels. But large scale cellulosic ethanol has been essentially stalled for the past couple of years because of the so-called "blend wall". No one will lend the money for big cellulosic ethanol plants because there is no market for additional ethanol. Not because ethanol is not a great fuel…it is an excellent fuel. But simply because we don't have the right vehicles or the right infrastructure to use all the ethanol we can produce. As a result we are shipping our "excess" ethanol, over a billion gallons per year, out of the country, while importing ever more oil. How dumb is that?

So we should require that all new vehicles sold in the United States be flex fuel, and thereby give the consumers a real choice in the fuels they use. I encourage every Senator on this committee to become a cosponsor of The Open Fuel Standard Act in the 112th Congress. This act was introduced as Senate bill S.835 and House Bill H.R. 1476 in the 111th Congress. A tax credit could be provided for the small (roughly $100 per vehicle) added cost. And we need a lot more blender pumps, so that infrastructure limitations are reduced. Since gas stations replace their pumps every ten years anyway, we should require that all newly installed pumps be blender pumps, again giving fuel users some real choices, and minimizing the transition costs.

Ethanol and other renewable fuels have been criticized as "mandates" and contrary to free market principles. The folks who make these claims should know better. We already have a fuel mandate—it is gasoline. Worse than that, since we import 60% of our oil, the current mandate is effectively that we fill up our cars with foreign gasoline. Except for ethanol, we don't have fuel choice. And as for an "open market"…that is frankly ridiculous. The current fuel system is a closed market in which only oil is allowed to participate.

Some of the folks who criticize the "ethanol mandate", as they call it, also call for us to Buy American. I agree with them. We should open our fuel markets to genuine competition, let biofuels compete with petroleum fuels, eliminate the foreign gasoline mandate and make it possible for consumers to buy domestic biofuels. Corn ethanol and biodiesel are doorway biofuels. These first generation biofuels will open the door to large scale cellulosic biofuels, which will be much less expensive, and more stably-priced than gasoline and diesel. If we do not open our fuel markets, I believe we are doomed to have high priced fuels and very volatile fuel prices… probably causing one recession after another.

Now I will end on the cheerful note I promised. The Department of Energy and the Department of Agriculture are advancing cellulosic biofuels through research, development and extension activities. I would like to mention in particular the Bioenergy Research Centers funded by the Office of Basic Energy Sciences in the Dept. of Energy. These Centers bring together a large cross section of expertise: plant scientists, microbiologists, enzymologists, biogeochemists and even a few chemical engineers like myself, to help provide the integrated, fundamental understanding critical to large scale biofuels.

Without such a large, integrated effort, a "Manhattan Project" if you will, progress is much, much slower—or may not happen at all. Even in a time of tight budgets, we must press forward with research and development on cellulosic biofuels—the future of our country could well depend on it.

I am fortunate to participate actively in one of these DOE Bioenergy Research Centers, specifically Great Lakes Bioenergy Research Center, called the GLBRC. In just a few years in the GLBRC we have greatly improved our understanding of how to develop sustainable large scale cellulosic biofuels. Here is one example. Many people question whether we can actually have very large scale biofuels without causing food shortages or environmental devastation. Because of the GLBRC, my research group looked at how we could innovate in agriculture to provide large scale cellulosic biofuels, lots of food and big environmental improvements.

The answer turns out to be quite simple—grow lots of double crops. Double crops are annual grasses and legumes planted after the corn or soy crop is harvested in the fall and then harvested in the late spring before the new corn or soy crop. Using about 300 million acres of cropland (70% of our cropland), we analyzed what would happen if we planted double crops on about 1/3 of our corn and soy land. We found that doing this one simple thing would allow us to produce about 100 billion gallons of ethanol, roughly the amount of gasoline we import, provide all the food and animal feed the land currently produces, improve soil quality and biodiversity…and reduce total US greenhouse gas emissions by 10%. A very pretty picture indeed, a "win-win-win" for national security, economic security and climate security.

So I am confident that if we open our fuel markets to real competition, end our current mandate for foreign gasoline and promote agricultural innovation, we can exchange our current precarious and expensive fuel situation to one that is both economically and environmentally attractive.

Thank you for this opportunity to speak on these critical issues.

Two attachments to Professor Dale's testimony:

- "Ten Reasons Why It's Different This Time" Bruce E. Dale. *Biofuels, Bioproducts and Biorefining.* Vol. 4 pp 1-3 (2010).
- "Biofuels Done Right: Land Efficient Animal Feeds Enable Large Energy and Environmental Benefits" Bruce E. Dale, Bryan D. Bals, Seungdo Kim and Pragnya Eranki. *"Environmental Science and Technology"* Vol. 44, No. 22. Pp 8385-8389 (2010).