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OVERSIGHT—THE ENVIRONMENTAL PROTECTION AGENCY'S RENEWABLE FUEL STANDARD

HEARING

BEFORE THE

SUBCOMMITTEE ON CLEAN AIR AND NUCLEAR SAFETY

OF THE

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS UNITED STATES SENATE

ONE HUNDRED ELEVENTH CONGRESS

FIRST SESSION

APRIL 1, 2009

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ONE HUNDRED ELEVENTH CONGRESS
FIRST SESSION

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OVERSIGHT—THE ENVIRONMENTAL PROTECTION AGENCY'S RENEWABLE FUEL STANDARD

WEDNESDAY, APRIL 1, 2009

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
SUBCOMMITTEE ON CLEAN AIR AND NUCLEAR SAFETY,
Washington, DC.

The subcommittee met, pursuant to notice, at 10 a.m. in room 406, Dirksen Senate Office Building, Hon. Thomas R. Carper (chairman of the subcommittee) presiding.

Present: Senators Carper, Boxer, Voinovich, Cardin, Vitter, and Merkley.

OPENING STATEMENT OF HON. THOMAS R. CARPER, U.S. SENATOR FROM THE STATE OF DELAWARE

Senator CARPER. Well, Senator Wyden, nice to see you. Senator Wyden and I spent a lot of time together on another committee called the Finance Committee, and he is going to help write the book, I think, on health care reform in this Country. But we held a couple of hearings a week, and Senator Baucus, our Chairman, is putting us through our paces.

But he and I share interests in a whole lot of stuff, including trying to reduce our dependence on foreign oil and fossil fuels and so forth, and do something about climate change and the quality of our air. But I recognize him as our entire first panel.

I want to call the hearing to order. We welcome Senator Wyden and each of our witnesses who are here. We welcome all of our guests as well. And I appreciate your efforts to be with us today and to prepare for this hearing.

Today's hearing, as you know, is focused on the renewable fuel standard. In light of the current economic conditions, including reductions in fuel consumption and Environmental Protection's forthcoming life cycle analysis in its proposed renewable fuel standards rulemaking, in this case a Senator will have, Senators will have 5 minutes for their opening statements.

Senator Wyden can speak for as long as he wishes. We will break for lunch around noon and take it from there. But we will ask our witnesses to try to keep their comments close to 5 minutes, and if you run a little bit over, that is OK. We will probably be voting a fair amount today. My hope is that we can wrap this up before we get into the heavy duty voting, but we will see.

Senator Vitter will be coming here in a little bit, and we will probably have some other colleagues to drift in and out during the course of the morning.

You all recall not along ago, in fact about a year and a half ago in 2007, our Nation was part of a booming global economy and a healthy capital market. We were in a global fight for oil, competing with other nations to keep our economy and our automobiles moving. We were consuming about 21 million barrels of day per day and importing 60 percent of our oil from overseas. Our demand was, get this, 25 percent of the world's oil supply, but we have less than 2 percent of the world's oil reserves.

All signs were pointing to an increase in U.S. oil demand. It was clear that we needed to start changing or driving habits and to move us quickly away from traditional oil.

To address some of these concerns, we passed bipartisan energy legislation in 2007 that reduced our dependence, or seeks to reduce our dependence on foreign oil and to reduce at the same time harmful emissions into our air.

In the bill, we amended the Clean Air Act to greatly enhance the renewable fuel standard. We required 9 billion gallons of renewable fuels to be blended into our gasoline starting in 2008, last year. And this mandates ramps up, as you may recall, to 36 billion gallons per year by 2022.

In the renewable fuel standard, we provide clean, clear direction to the EPA to make sure that environmental protections are included such as reducing our carbon footprint and moving away from biofuel made from corn, or at least from kernels of corn. We hope to slowly increase our levels of biofuels and to increase our second generation of biofuels.

Two short years, and we all know we all face a vastly different world. We face trying economic times that are impacting our way of life, including our fuel consumption and our investments in advanced fuels. These economic challenges have created questions in the renewable fuel standard, questions I hope we will begin answering today with our hearing.

Gasoline consumption is down 2 billion gallons per day, and that is a good thing. As consumption decreases, though, our biofuel standard increases. The question is: Are we moving too fast for our infrastructure and for our engines to handle biofuels safely?

The lack of capital has made it difficult to make the needed investments for a new second generation biofuel market. Will we be able to meet our advanced biofuel marks in the capital-starved world that we face today? And EPA still has not proposed a rule on how to move forward on environmental protections we put in place in 2007, and how is that impacting the market?

Hopefully, we can answer these questions and evaluate any unintended consequences of the renewable fuel provisions and begin doing that, as I said earlier, today.

Personally, I believe biofuels, if done right, are a good thing, maybe a very good thing. Biofuels provide us with an environmentally friendly option to move away from foreign fossil fuels. We know our trade deficit is huge. It is about three-quarters of a trillion dollars this year, and we know about one-third of that is attributable to imported oil.

But I also believe that the renewable fuel standard must be implemented in a manner that positively impacts both our economy and our environment. And I believe this Committee must work together amongst ourselves, with the full Committee and others in the Senate, to make sure that this happens.

[The prepared statement of Senator Carper follows:]

STATEMENT OF HON. THOMAS R. CARPER, U.S. SENATOR FROM THE STATE OF DELAWARE

In 2007, our Nation was part of a booming global economy and a healthy capital market.

We were in a global fight for oil—competing with other nations to keep our economy and our automobiles moving.

We were consuming 21 million barrels of oil per day and importing 60 percent from overseas. Our demand was 25 percent of the world's oil supply, but we only had 1.7 percent of the world's oil reserves.

All signs pointed to an increase in U.S. oil demands—it was clear we needed to start changing our driving habits and move us quicker away from traditional oil.

To address some of these concerns, we passed a bipartisan energy bill in 2007 that reduced our dependence on foreign oil and reduced harmful emissions into our air.

In the bill, we amended the Clean Air Act to greatly enhance the Renewable Fuel Standard.

We required 9 billion gallons of renewable fuels be blended into our gasoline starting in 2008.

This mandate ramps up to 36 billion gallons by 2022.

In the new Renewable Fuel Standard, we provide clear directions to the EPA to make sure environmental protections are included—such as reducing our carbon footprint and moving away from biofuel made from corn.

We had hoped to slowly increase our levels of biofuels and increase our second generation of biofuels.

In 2 short years, we face a very different world.

We face trying economic times that are impacting our way of life—including our fuel consumption and our investments in advanced fuels.

These economic challenges have created questions in the new Renewable Fuel Standard. Questions I hope we will start answering today.

Gasoline consumption is down 2 million gallons per day.

As consumption decreases—our biofuel standard increases. Are we moving too fast for our infrastructure and engines to handle the biofuels safely?

The lack of capital has made it difficult to make the investments needed for a new second generation biofuel market. Will we be able to meet our advanced biofuel marks in a capital-starved world?

And EPA still has not proposed a rule on how to move forward on the environmental protections we put in place in 2007—how is that impacting the market?

Hopefully, we can answer these questions and evaluate any unintended consequences of the renewable fuel provisions.

But I believe biofuels done right, is a good thing. Biofuels gives an environmentally friendly option to move away from foreign fossil fuels.

I also believe the Renewable Fuels Standard must be implemented in a manner that positively impacts the environment and economy.

And I believe this subcommittee must work together to make sure this happens.

Senator CARPER. And now I would like to recognize Senator Vitter for any comments that he wishes to make. Go ahead, Senator Vitter.

[Laughter.]

Senator CARPER. Senator Vitter wanted to wish all of you a happy April Fools' Day. And we are now going to adjourn the hearing. No, I am kidding. I love April Fools' Day. I don't know about the rest of you. I have already had a great time pulling people's legs and chains. And I would just remind us all it is about 10:10 in the morning, and April Fools' Day lasts for about almost another

14 hours. Make full use of it. Have a good time and just enjoy this day. That is what it is meant to be.

And we always enjoy being with Senator Wyden, and I am pleased that he is here and has some interesting thoughts to share with us. He has interesting thoughts on a lot of issues, but certainly on this one.

We welcome you today. You are welcome to proceed for a reasonable period of time. But if we get to lunch, we will break.

[Laughter.]

OPENING STATEMENT OF HON. RON WYDEN, U.S. SENATOR FROM THE STATE OF OREGON

Senator WYDEN. Mr. Chairman, thank you very much, and as an alum of this Committee, I know the work you are doing is especially important.

I also want to say I appreciate your graciousness in accommodating me. I know you have a terrific panel of witnesses, and I also appreciate the good work that you are doing because I know in this area, like health care and so many of the big issues, the enduring changes only come about by going at it in a bipartisan way. And that is what you have sought to do again and again and again. And that is why we so appreciate working with you. And I thank you for it.

We also are very pleased that Jeff Merkley is now a member of this Committee. He has an outstanding record in terms of renewable fuels when he was Speaker of the House and will be a very effective advocate.

And Senator Merkley and I both share a great interest in biomass as a source of renewable fuel because this is an opportunity to use wood waste as a source of clean energy. And what we have been up against, Mr. Chairman, and I am going to make this case very briefly, is that current law excludes the use of biomass from Federal lands for renewable fuel. And so what I have essentially done is change the definition of renewable biomass in order to meet this renewable fuel standard. In my view, it is especially important because without expanding the universe of available biofuels, my view is it is going to be pretty hard to meet the renewable fuel standard without again diverting more corn and feed grains and private forest land to feed the fuel market.

This is also in addition to an energy matter, a very important issue as it relates to forest management because what we have seen is this huge buildup on the forest floor in our forests become fuel for catastrophic fires. So instead of being part of the path to energy independence, biomass on Federal lands now creates a problem for forest management and communities that border on the Federal forests. So when you come from a community, a State like Jeff Merkley and I do where the Federal Government owns much of the land, this is a very real and palpable problem.

So because of these concerns, I introduced S. 536. It has been referred to this Committee and would allow this woody biomass on Federal lands to become part of the solution to America's energy problems. So it would give us a chance to use the biomass for fuel, help pay for programs to reduce dangerous levels of dead and dying

trees that fuel the wildfires, and also let us thin out the unhealthy second growth forests.

So specifically, what the legislation does is it would allow biomass from national forests and BLM forests to qualify as renewable biomass under the Federal renewable fuel standard. At the same time, we would exclude biomass from the parks and the wilderness and other environmentally protected areas.

Second, the legislation requires the Federal land managers to ensure that the quantity of biomass harvested from these kinds of eligible lands are sustainable. Biomass holds a lot of potential as a clean source of energy, but we want to make sure that it is harvested in a sustainable way.

And finally, we do restrict the kind of biomass to be harvested so that old growth trees will continue to be protected. I think it has been the general feeling of folks in our part of the Country where we have the Federal Government own so much of the land, that there are literally millions and millions of acres of second growth, and that is where you can particularly go for the opportunity to look to biomass, while at the same time protecting old growth.

At the end of the day, this kind of excess biomass, the small diameter trees, the limbs, the debris, this is an opportunity to really generate the kind of green energy that we in Congress, that the President has talked about in terms of creating green jobs, and at the same time put us in a better position to meet the requirements of the renewable fuels standard.

So I hope that we can work together on this. My sense is that there is a lot of bipartisan support for a biomass definition along the lines this legislation calls for because it gives us a chance to balance sound energy policy with sound environmental policy, while creating jobs in the woods and practical and sustainable use of our forests.

Mr. Chairman, thank you. It is April Fools' Day, and I will not try to trick you with a secret kind of filibuster, but will break my speechifying off today.

I also want to extend my thanks to Senator Vitter for the chance to come. Louisiana, like Oregon, has a lot of forestry and I have often worked with Senator Landrieu on forestry issues, so this will be another opportunity to team up and work with both of you in a bipartisan way.

Senator CARPER. Thank you.

Before you head out, Senator Vitter, Senator Wyden has just outlined a proposal to be able to use wood waste to be able to completely eliminate our dependence on oil and natural gas from the Gulf of Mexico and other places, and I didn't know if you had any question of him.

Senator WYDEN. April Fools' Day, April Fool.

[Laughter.]

Senator CARPER. Just one question, and what I think I would like to do is maybe ask a quick question of Senator Wyden. And if you want to ask any questions or have any comments, that would be great. And then I will recognize you for your opening statement.

A question, you make the case in favor of using this resource in a positive way. I am sure there are folks who have some reservations about doing this. Could you just sort of outline the reserva-

tions, those reservations that have been addressed about this proposal? And just tell us how those reservations or concerns can be addressed?

Senator WYDEN. Senator Craig and I tried to work this out in the last Congress. The concern I think first and foremost has come from the environmental community that has been concerned about the prospect of an approach involving greater use of biomass somehow leading to additional cutting of old growth forest. And so that is why we have specifically segregated out that kind of approach. That is why I mentioned we leave alone the parks and the wilderness areas.

I expect to be introducing separate legislation before long to promote thinning in the second growth area. But essentially after Senator Craig and I began to make progress in the Energy and Natural Resources Committee on which I serve, that became arguably the only question that became part of sort of vigorous debate, and I think we have addressed that.

We have worked closely with environmental groups that I know want to do the right thing, and I think we have addressed it in this legislation.

Senator CARPER. Thanks very much.

Senator Vitter, any comments or questions with Senator Wyden?

OPENING STATEMENT OF HON. DAVID VITTER, U.S. SENATOR FROM THE STATE OF LOUISIANA

Senator VITTER. No. I would submit my opening statement for the record. I really don't want to take up the time of everyone here with it, but I will submit it for the record.

[The prepared statement of Senator Vitter follows:]

STATEMENT OF HON. DAVID VITTER, U.S. SENATOR FROM THE STATE OF LOUISIANA

I'd first like to thank the Chairman, Senator Carper, for holding this hearing as an opportunity discuss the latest issues facing the Renewable Fuels Industry. Second, I'd like to thank all the witnesses here today to discuss everything we are learning about the future of renewable fuels.

There are many opportunities for advanced biofuels in Louisiana, including ideas such as cellulosic ethanol from biomass, jet fuel from chicken fat, and biodiesel from switchgrass.

The new Renewable Fuel Standard increases the volume of renewable fuel required to be blended into gasoline from 9 billion gallons in 2008 to 36 billion gallons by 2022. Beginning in 2015, only 15 billion gallons of corn ethanol may be produced to meet the mandate, while the remainder must come from advanced biofuels, such as cellulosic ethanol. By 2022, 21 billion gallons must come from advanced biofuels—and 16 billion gallons of these advanced biofuels must come from cellulosic biofuels.

At the time Congress established the new RFS mandates, there was little reason to expect that gasoline consumption would not continue to rise. However, gasoline consumption has declined—the Energy Information Administration reports that U.S. consumption fell nearly 7 percent in 2008 and expects another 2.2 percent decline in 2009. In addition, expansion of E85 infrastructure has not occurred over the past few years, leaving the E85 market lagging 2007 projections. With a reduction in fuel demand, a lagging E85 market, and the RFS mandate specified in gallons—producers are concerned that the market for ethanol will soon be saturated at the 10 percent blending limit (the E10 "blend wall"), even though the Federal RFS mandates steadily rising ethanol production.

One of the problems with the current mandate of increasing biofuels into our energy portfolio is the lack of testing on small engines. For example, there are currently 18 million recreational boats and marine engines currently in operation in the United States, all currently designed, calibrated, and EPA-certified to run on

not more than E10. What safety concerns may arise if these engines fail on open waters miles from the shore?

To date, there have been no Environmental Protection Agency or Department of Energy studies or testing on the impact of mid-level ethanol blends (E12, E15, E20, etc.) on marine engines, fuel systems or components. There are a handful of private studies, including the Australian Orbital Study, on marine engines which indicate that mid-level ethanol blends pose serious problems for marine engines and equipment.

I also understand that one of the potential impacts of increasing the ethanol blend allowance is an increase in nitrous oxide, or NO_x, emissions, a smog-forming pollutant and a danger to public health.

Meeting air quality standards in the State of Louisiana is a major issue and it is imperative that we know what the impact of increased biofuels, of any make-up, will have on air quality and EPA attainment requirements.

Beyond air quality, what is the impact of mid-level ethanol blends on non-road engines and equipment, including the 18 million pieces of marine product currently on the market that are designed to run on not more than E10? My understanding from reviewing DOE and EPA information is that there have been no studies at all on mid-level ethanol's impact on marine engines, for example, by either DOE or EPA. On other small engines, only a DOE "screening study" has been performed, which revealed significant engine failures and performance problems for a group of non-road handheld power equipment. What can we expect in terms of safety from chainsaws, snow blowers, off-road vehicles and other legacy products if the blend rate were to be increased?

Given that there are known problems associated with increasing the concentration of ethanol in gasoline for marine and other non-road engines and equipment, including performance, safety, and air emissions problems, we must require a robust analysis of new technologies and biofuels before they enter the market.

Biofuels will likely provide one of the greatest tools for segueing into our energy future and to achieve energy independence. It is important that we know what options are available, what their impact may be on the economy and environment, that we ensure competitive markets and that support those options that are the most viable with the least amount of government intervention.

Senator VITTER. I appreciate the Senator's leadership and I certainly look forward to our other witnesses as well.

Senator CARPER. Does that mean we have to wait until the printing of the record to know what is on your mind here or not? Is that it?

[Laughter.]

Senator CARPER. All right. We will wait.

Senator Wyden, thanks so much. We will look forward to voting with you early and often today and tomorrow and tomorrow night. Maybe Friday as well.

Senator WYDEN. I can tell this is going to be a rollicking April Fools' Day hearing.

[Laughter.]

Senator WYDEN. Mr. Chairman, thank you very much for your courtesy, and look forward to working with you.

Senator CARPER. Thanks for getting us off on the right foot.

All right, let me invite our next panel of witnesses to join us at the table. I will take just a moment to introduce them, then we will welcome their testimony.

While our witnesses are coming, I will just ask unanimous consent. We have no witness today from EPA, but we do have submitted to our Subcommittee a statement for the record, and I would ask at this time unanimous consent that that statement be made part of the record.

Without objection, so ordered.

[The referenced document follows:]

MARGO T. OGE
DIRECTOR, OFFICE OF TRANSPORTATION AND AIR QUALITY
OFFICE OF AIR AND RADIATION
U.S. ENVIRONMENTAL PROTECTION AGENCY

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
SUBCOMMITTEE ON CLEAN AIR AND NUCLEAR SAFETY
UNITED STATES SENATE
APRIL 1, 2009

Written Statement

Mr. Chairman and members of the Subcommittee, I appreciate the opportunity to submit this statement on the renewable fuel provisions of the Energy Independence and Security Act of 2007 (EISA) and the status of the Agency's review of the petition we now have before us to increase the amount of ethanol that can legally be blended into gasoline.

Background on EISA

Since EISA was signed into law on December 19, 2007, the Agency has been working to develop regulations to implement the new RFS program established by that legislation, commonly called RFS2. The EISA legislation increased the national requirement for use of renewable fuels to 9 billion gallons in 2008 and required annual increases reaching a total of 36 billion gallons in 2022. Beyond the significant increase in the volume mandate, EISA expanded the parties responsible for ensuring use of the specified volumes to include producers of both nonroad gasoline and diesel fuel. The 36 billion gallon requirement includes several sub-standards, including 21 billion gallons of advanced biofuels, which must include 16 billion gallons of cellulosic biofuel and a minimum of 1 billion gallons of biomass-based diesel. The Clean Air Act also provides

EPA with the authority to grant a waiver of these volumes on the basis of either inadequate supply or severe harm to the economy or the environment. EISA provides EPA the authority to adjust the cellulosic biofuel standards from those specified in the statute to a lower volume. EPA is to establish the cellulosic biofuel standard each November for the following year based upon a projection of the volume that can be produced, up to the level of the target in EISA. Another key component in EISA requires the Agency to apply lifecycle greenhouse gas (GHG) performance standards to each category of renewable fuel. As a result, the new EISA provisions require careful evaluation and considerable new analysis. EPA has developed an extensive proposed rulemaking to implement the complex RFS2 provisions. This proposal was submitted to the Office of Management and Budget on February 6, 2009 and is currently undergoing interagency review.

Blendwall Issue

In order to meet these aggressive standards, a variety of actions may need to be taken to facilitate the increased consumption of much larger volumes of renewable fuels in our transportation vehicles and equipment. At present, the vast majority of renewable fuel consumed in the U.S. is ethanol in the form of 10% blends (E10), the maximum level allowed to be blended into gasoline for use in most types of vehicles and equipment. While ethanol is also consumed as E85 in flex-fueled vehicles (FFVs) specifically designed to operate on this alternative fuel, the volume has remained small. Based on the Annual Energy Outlook gasoline volume projections, if E10 blends were to be used nationwide, the gasoline market could consume approximately 14 billion gallons of

ethanol in the 2012 to 2013 time period. Even when taking into account the EISA required volume of biomass based diesel, the renewable fuels requirement in 2013 will very likely exceed the amount of ethanol that can be accommodated by the E10 market alone. This is often referred to as the ethanol "blendwall."

Given this situation, EPA believes there are three potential pathways for continuing to increase our nation's use of renewable fuels beyond 2013 and achieve the levels required by EISA. One pathway that is already being pursued is to expand the use of ethanol in the form of E85. Approximately 6 million vehicles capable of using such fuels have already been certified by EPA and are on the road today. Furthermore, the domestic vehicle manufacturers have committed to have 50% of their production be FFVs by 2012, but in order to increase ethanol consumption, more will have to be done to expand the retail infrastructure to make E85 more readily available to consumers across the country, and to ensure E85 can be priced to appeal to consumers

A second pathway would be through the use of non-ethanol renewable fuels that are not faced with the same blending limitation. New emerging renewable fuel production technologies are already being developed to make gasoline and diesel-like fuels from renewable sources. Their continued commercialization would provide another path for increasing renewable fuel use in the U.S. beyond the ethanol blend wall. Within the last year, the Agency has registered a number of these advanced fuels and continues to meet with numerous advanced technology companies regarding their potential contribution toward meeting the renewable fuel standards.

A third pathway would be through raising the concentration of ethanol used in conventional vehicles and engines beyond the current E10 limit; such fuels are often

referred to as "mid-level ethanol blends." Under the Clean Air Act, EPA may consider a waiver for fuels and fuel additives to be used in gasoline. Waiver applications must be from a fuel or fuel additive manufacturer. EPA reviews the waiver applications to determine whether the applicant has established that the fuel or fuel additive does not cause or contribute to the failure of any vehicle or engine emissions control systems or devices. EPA also evaluates the drivability and durability impacts associated with the use of the potential waiver fuel. Historical experience with both highway vehicles and nonroad equipment, even on E10, suggests that addressing these questions will be critical to ensure that the use of higher level ethanol blends will not cause any unacceptable unintended consequences to the in-use fleet of vehicles and equipment. Consequently, in order for there to be useful information for waiver purposes, mid-level ethanol blend testing for any level above E10 must consider the different engines and fuel systems currently in service that could be exposed to mid-level ethanol blends and the long-term impacts of such blends. It should be noted that EISA revised the fuel additive CAA waiver provisions, and E10 was approved in 1978 under different statutory requirements that included a default waiver approval if the Agency did not make a determination within 180 days.

Recognizing the need to address the blendwall issue, EPA has been engaged in an extensive and ongoing dialog and technical analysis for several years with our federal partners, and a wide range of other stakeholders. We have been working especially closely with the Department of Energy (DOE) to evaluate the impacts of the use of higher blends on the in-use fleet of highway vehicles and nonroad equipment, and hope to complete the testing over the course of the next year. This testing effort has been

designed to provide the necessary emissions and durability data to support a decision on the appropriate use (if any) of higher blends of ethanol in gasoline vehicles and engines. In coordination with EPA and the Coordinating Research Council, DOE is currently conducting a multi-million dollar testing program on a representative sample of newer vehicles to evaluate emissions impacts of higher ethanol blends, including durability over the useful life of the vehicle.

Growth Energy Petition

EPA recently received the first petition for a waiver for higher ethanol blends. On March 6, 2009, Growth Energy and 52 ethanol manufacturers submitted an application to the Agency requesting a waiver under section 211(f)(4) of the Clean Air Act to allow for the use of an ethanol-gasoline blend of up to 15 volume percent ethanol in conventional gasoline powered engines. Growth Energy maintains that this is a necessary first step to delay the pending blendwall.

As required by statute, EPA will establish a public docket for the petition from Growth Energy and will soon issue a Federal Register notice to take comments on the waiver application. EISA directs EPA to take action on this waiver request within 270 days of receipt. We recognize the tremendous interest in this issue from a wide variety of stakeholders and are moving forward to evaluate the petition and move through the public process.

As part of the notice, EPA will request comment on all legal and technical aspects that pertain to the decision criteria under the Clean Air Act. A key issue is whether a waiver should be granted in whole or in a conditional or partial manner, such that the use

of up to E15 would be restricted to a subset of gasoline vehicles or engines covered by the waiver provision, while other vehicles or engines would continue using fuels with blends no greater than E10. If a conditional waiver were granted, it may necessitate changes in the fueling infrastructure to accommodate different blend levels. New pump labeling requirements or other measures may be needed to ensure consumers use the appropriate fuel for their vehicles and equipment. EPA intends to seek comment on these issues in both the federal register notice on the ethanol blend waiver request and in our proposal to implement RFS2. We will also continue to work with stakeholders to solicit their input.

Conclusion

The RFS2 program, as mandated by EISA, will require use of increasing volumes of renewable fuels in our existing fleet of vehicles and equipment. For this reason, EPA has been actively engaged with our Federal partners and stakeholders for a number of years on all potential pathways to achieve these objectives, and is continuing to do so. As an important part of this process we will be acting as expeditiously as possible on the E15 waiver application. I appreciate the opportunity to share this update with you today.

Senator CARPER. Welcome, everybody. I will just provide a very brief introduction to each of you today.

First of all, Charles T. Drevna is the President of the National Petrochemical and Refiners Association. He has been with the Association for 6 years and served as President for the past 2 years. President Drevna, welcome. We are glad that you are here.

Joining the President today is Dr. Kelly Tiller, Director of the External Operations for the University of Tennessee's Office of Bioenergy Programs where she manages a $70 million State and university commitment to develop a cellulosic biofuels industry in Tennessee.

We are also joined here by a member of my staff. You have probably met Laura Haynes who spent a lot of her life in Tennessee, too, and helped us prepare for this hearing.

Dr. Tiller also serves as President and CEO of Genera Energy which has pioneered with DuPont, my constituent, to construct and operate a pilot scale cellulosic ethanol biorefinery in Tennessee. I might add that I think really the model, the operating model for the plant that you all are building literally had its roots in the experimental station in Wilmington, Delaware, the experimental station of the DuPont Company, a project that our congressional delegation gained money from the Department of Energy to help fund, and we are pleased to see that it is moving forward.

Next, our third president—I think you have to be president to be able to be on this panel—but our third president is Michael McAdams, President of the Advanced Biofuels Association. Good to see you. Thanks so much for coming today. Formerly, he worked for BP. Is that Beyond Petroleum?

Mr. MCADAMS. [Remarks off microphone.]

Senator CARPER. Thank you. And was involved with the design and implementation of BP's climate program as well as their efforts in clean fuels. And BP has been doing good work with DuPont with respect to biobutanol, and maybe we will hear something about that today.

Mr. Nathanael Greene, nice to see you, from the Natural Resources Defense Council, and is the Director of Renewable Energy Policy there. He is responsible for coordinating NRDC's work on renewable fuels and power.

And finally, Mr. Blake Early from the American Lung Association. Mr. Early, good to see you. Over the past several years, he has testified a number of times before the full EPW Committee and before this Subcommittee. He is no stranger and we are delighted to welcome him back.

Each of you will have 5 minutes to provide us with your opening statement. The full contents of your written statement will be included in the record.

Before we begin, as I said earlier, I want to submit for the record EPA's comments and thoughts and we have done that. And my hope is, while EPA could not be here today, we expect EPA to be before us after they have published a proposed rule on the implementation of the new renewable fuel standard. Currently, the proposed rule is before the Office of Management and Budget, and hopefully we will see a rule soon, and begin a healthy comment period on these tough issues.

We have been joined by the Chair of the full Committee, and just before that, Senator Merkley.

Senator Boxer, do you want to settle in? Or could I call on you for a statement at this time?

OPENING STATEMENT OF HON. BARBARA BOXER, U.S. SENATOR FROM THE STATE OF CALIFORNIA

Senator BOXER. I would say that I don't have an opening statement. I am here to thank you so much for calling this hearing, and I am really here to learn and listen.

Senator CARPER. OK, good. You all are welcome.

Senator Merkley, how are you doing on April Fools'?

Senator MERKLEY. I am doing very well, Mr. Chair. It is a pleasure to be here.

Senator CARPER. All right. Would you care to make any opening statement?

OPENING STATEMENT OF HON. JEFF MERKLEY, U.S. SENATOR FROM THE STATE OF OREGON

Senator MERKLEY. Only to say that I echo everything that Senator Wyden said about the importance of taking advantage of biofuels in our overgrown second growth forests, and I applaud his efforts in that field.

Senator CARPER. Good. Thanks so much.

All right. President Drevna, you are our leader. Why don't you go ahead and tell us what you would like to say. Thanks for coming.

STATEMENT OF CHARLES T. DREVNA, PRESIDENT, NATIONAL PETROCHEMICAL AND REFINERS ASSOCIATION

Mr. DREVNA. Thank you and good morning, Chairman Carper, Ranking Member Vitter, and Madam Chair and Senator Merkley.

I am pleased and privileged to have the opportunity to testify this morning not just on behalf of NPRA, but also on behalf of the National Marine Manufacturers Association and the Outdoor Power Equipment Institute.

NPRA is a national trade association with more than 450 members including those who own or operate virtually all U.S. refining capacity, as well as most of the Nation's petrochemical manufacturers. NMMA is a leading national recreational marine trade association with nearly 1,700 members involved in every aspect of the boating industry. And OPEI is the major international trade association representing the $15 billion forestry, utility, landscape, lawn and garden equipment manufacturing industry.

Collectively, our associations have just one fundamental message for the Subcommittee today. Ethanol should not be blended into gasoline at levels higher than 10 percent for use in nonflexible fuel motor vehicles and non-road gasoline-powered engines until comprehensive independent testing demonstrates that these so-called mid-level ethanol blends are safe for consumers and do not harm the environment or public health.

Our joint message is certainly not intended to be, nor should it be categorized, as anti-ethanol. Our organizations recognize the im-

portance of biofuels, including ethanol, in diversifying our Nation's fuels portfolio.

However, before the use of mid-ethanol blends is permitted, we must ensure that these blends are safe for consumers, do not harm gasoline-powered engines, and do not lead to increases in emissions that will harm the environment.

We are collectively opposed to any legislative or regulatory action to approve the introduction of mid-level ethanol blends until thorough unbiased testing of the safety, operational and environmental effects of those fuels has been completed.

Currently, the maximum level of ethanol that may be blended into gasoline for conventional gasoline-powered engines is 10 percent by volume or otherwise known as E–10. Some advocate breaching the blendwall, as the E–10 cap is categorized, through an administrative action by the Environmental Protection Agency or through legislative fiat.

We urge this Committee, this Congress and the Obama administration to heed President Obama's words when he stated that science, not politics, would guide his Administration's approach to difficult public policy issues we face today.

To quote from President Obama's March 9, 2009 memorandum on scientific integrity, "Science and the scientific process must inform and guide decisions of my Administration on a wide range of issues, including improvement of public health, protection of the environment, increased efficiency in the use of energy and other resources, mitigation of the threat of climate change, and protection of national security."

We are certainly not alone in our desire that science be placed above politics in this debate. Attached to my written testimony is a letter sent recently to senior officials in the Obama administration and signed by more than 50 national, State, local, business, environmental, public health and agriculture groups that echo the same sentiment. Comprehensive, independent testing of mid-level ethanol blends must be completed before these fuels are allowed into commerce.

Until this has been done and it has been demonstrated that these blends do not pose risks to the public health, the environment or consumers, we urge you in joining us in opposing the premature introduction of mid-level ethanol blends into the marketplace.

In addition, I have a copy of a recent letter from the Alliance for Automobile Manufacturers on mid-level ethanol blends that lends support to our associations' science-first message. With your permission, Mr. Chairman, I would like to submit this letter for the hearing record.

Senator CARPER. Without objection.

[The referenced material was not received at time of print.]

Mr. DREVNA. Despite what some may say to date, there simply has not been sufficient testing of motor vehicle and non-road equipment engines to justify a determination that any mid-level ethanol blend would meet current Federal air quality protection requirements or be safe for consumers to use.

In fact, existing test results suggest that mid-level blends may not only be incompatible with most of today's vehicle and non-road

equipment engines, but may actually lead to increases in emissions from those engines over their lifetimes. These test results also raise significant consumer safety concerns as mid-level ethanol blends may defeat engine safety features and may contribute to engine unreliability and malfunction.

Consumer safety, public health and environmental protection must be ensured through robust and thorough testing before EPA allows these blends for general sale in gasoline-powered engines, whether on-road or non-road.

Any decision to allow the use of mid-ethanol blends must be guided solely by unbiased science and must be undertaken through an open, public and transparent process that takes into account both the increased air pollution that will result from these higher blends and the potential risk to consumers driving vehicles or handling engines fueled with those blends.

Mr. Chairman, our associations stand ready to work with Congress, the Administration and other stakeholders to assure an effective, realistic, stable policy that will assist consumers and protect the environment.

This concludes my statement. Thank you again for this opportunity to testify this morning, and I will be happy to answer any questions that you may have.

[The prepared statement of Mr. Drevna follows:]

Joint Written Statement of the

National Petrochemical & Refiners Association
National Marine Manufacturers Association
Outdoor Power Equipment Institute

Delivered by

Charles T. Drevna
President
National Petrochemical and Refiners Association

Before the

United States Senate Environment and Public Works Committee,
Subcommittee on Clean Air and Nuclear Safety

Concerning

"Implementation of the Renewable Fuel Standard and
Mid-Level Ethanol Blends"

April 1, 2009

Washington, DC

I. Introduction

Good morning, Chairman Carper, Ranking Member Vitter, and members of the Subcommittee. My name is Charlie Drevna. I am President of the National Petrochemical and Refiners Association (NPRA). I appear here today representing the interests not just of NPRA's members, but also the National Marine Manufacturers Association (NMMA), and the Outdoor Power Equipment Institute (OPEI). I appreciate the opportunity to testify at this hearing today.

NPRA is a national trade association with more than 450 members, including those who own or operate virtually all U.S. refining capacity, as well as most of the nation's petrochemical manufacturers who supply "building block" chemicals necessary to produce products ranging from pharmaceuticals to fertilizer to Kevlar.

NMMA is the leading national recreational marine trade association, with nearly 1,700 members involved in every aspect of the boating industry. NMMA members manufacture over 80 percent of the recreational boats, engines, trailers, accessories and gear used by boaters and anglers in the United States.

OPEI is the major international trade association representing the $15 billon forestry, utility, landscape and lawn & garden equipment manufacturing industry. OPEI is a recognized Standards Development Organization for the American National Standards Institute (ANSI) and active internationally through the International Standards Organization (ISO) in the development of safety standards.

Our associations have one fundamental joint message for the Subcommittee today: ethanol should not be blended into gasoline at levels higher than 10 percent for use in non-flexible fuel motor vehicles and nonroad gasoline-powered engines until comprehensive and independent testing shows that higher ethanol blends – so-called "mid-level ethanol blends" – are safe for consumers and

do not harm the environment or public health. Our joint message should not be characterized as "anti-ethanol." Our organizations are not opposed to the prudent development and use of biofuels, including ethanol, to diversify our nation's transportation and nonroad fuels portfolio. However, before the use of mid-level ethanol blends is permitted, we must ensure that these blends are safe for consumers, do not harm gasoline-powered engines, and do not lead to increases in emissions from these engines that will harm the environment.

We collectively are opposed to any legislative or regulatory action to approve the introduction of mid-level ethanol blends until unbiased and comprehensive testing of the safety, operational and environmental effects of these fuels has been completed. Until that date, which will not happen in a matter of months, we urge you to join us in opposing the introduction of mid-level blends into the marketplace.

We are not alone in our concern that science be placed above politics with respect to mid-level ethanol blends. Attached to my testimony is a recent letter to senior officials in the Obama Administration signed by over fifty national, state and local business, environmental, public health and agricultural associations and companies that echoes the same sentiment: comprehensive and independent testing of mid-level ethanol blends much be completed before these fuels are allowed into commerce.

Currently, the maximum level of ethanol that may be blended into gasoline for use in conventional gasoline-powered engines is 10 percent by volume (referred to as "E10"). Some advocate "breaching the blendwall" – as the E10 cap is characterized – through an administrative action by the Environmental Protection Agency or through legislative fiat. We urge this Committee, this Congress, and the Obama Administration to adhere to President Obama's words when he stated that science, not politics, would guide his Administration's approach to the difficult public policy

issues we face today. To quote from President Obama's March 9, 2009 Memorandum on "Scientific Integrity":

> "Science and the scientific process must inform and guide decisions of my Administration on a wide range of issues, including improvement of public health, protection of the environment, increased efficiency in the use of energy and other resources, mitigation of the threat of climate change, and protection of national security."

To understand our associations' position on this issue, it is helpful to have some background on the 2007 renewable fuel standard ("RFS") and the upcoming "ethanol blendwall" that we face in the next 24 to 36 months.

II. Background on Revised Renewable Fuel Standard

A. "Energy Independence and Security Act of 2007" and the RFS2

President Bush signed the "Energy Independence and Security Act of 2007" ("EISA")(Public Law 110-140) on December 19, 2007. Among its many provisions, EISA increased the volume of renewable fuels mandated through the existing RFS (adopted under the "Energy Policy Act of 2005") starting in 2008, increasing these volumes to 36 billion gallons in 2022.

The RFS, as revised under EISA (and referred to here as RFS2 to distinguish it from the first RFS adopted in 2005) requires annually increasing volumes of renewable fuels to be blended into transportation fuels (gasoline and highway/nonroad diesel[1]). The 2005 RFS was tied to gasoline only. The RFS2 expands the scope to include renewable fuels used to replace or reduce the quantity of fossil fuel in home heating oil or jet fuel.[2]

The RFS2 also created a complicated mix of submandates for specific classes of renewable fuels:

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[1] Including nonroad vehicles and engines except for ocean-going vessels.

[2] By comparison, EPAct05 restricted RFS1 'renewable fuel' to replace or reduce the quantity of fossil fuel used to operate a motor vehicle. See CAA section 211(o)(1)(C)(i).

- Conventional Biofuels – Under the RFS2, there is no direct submandate for conventional biofuels, which generally is defined as ethanol derived from corn starch. However, there is an implicit corn ethanol mandate under the RFS2 which rises from 10.5 billion gallons in 2009 to 15 billion gallons in 2015. In addition, under the RFS2, conventional biofuels must reduce direct and indirect lifecycle greenhouse gas ("GHG") emissions at least 20 percent from the 2005 transportation fuel baseline if the renewable fuel manufacturing facility commences construction after the date of enactment (the "grandfather" provision).
- Advanced Biofuels – Under the RFS2, "advanced biofuels" exclude biofuels derived from corn starch and, if not grandfathered, must reduce direct and indirect lifecycle GHG emissions by at least 50 percent from the 2005 transportation fuel baseline. The advanced biofuels mandate has three submandates: cellulosic biofuel; biomass-based diesel; and, "other."
    - *Cellulosic biofuels* requirements are a subset of the advanced biofuels submandate and must reduce direct and indirect lifecycle GHG emissions, if not grandfathered, by at least 60 percent from the 2005 transportation fuel baseline. Cellulosic biofuels must be derived from any cellulose, hemicellulose, or lignin from renewable biomass.[3]
    - *Biomass-based diesel* is another subset of advanced biofuels and, if not grandfathered, must reduce direct and indirect lifecycle GHG emissions by at least 50 percent from the 2005 transportation fuel baseline. Biomass-based diesel is defined under section 312(f) of the Energy Policy Act of 1992.[4] The regulatory values for biomass-based diesel after 2012 will be determined by EPA, in consultation with DOE and USDA, and promulgated no later than 14 months before the first year for which the new volume applies.
    - "Other" advanced biofuels has regulatory significance because the statutory sum of cellulosic biofuels and biomass-based diesel does not equal the total volume requirement of advanced biofuels. The "other" advanced biofuels subset can be met with ethanol derived from sugar or additional cellulosic biofuels or biomass-based diesel.

The table on the next page graphically portrays the nested nature and statutory annual volumes of these new RFS2 requirements.

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[3] Renewable biomass is restricted to exclude planted crops and crop residue from agricultural land cleared after December 19, 2007, and planted trees and tree residue from federal land.

[4] Section 312(f): "For the purpose of this section - -
(1) the term 'biodiesel' means a diesel fuel substitute produced from nonpetroleum renewable resources that meets the registration requirements for fuels and fuel additives established by the Environmental Protection Agency under section 7545 of this title [Section 211 of the Clean Air Act, Regulation of Fuels];"

RFS2 (billion gallons)

	Biomass-based Diesel	Cellulosic Biofuel	Total Advanced Biofuel	Total Renewable Fuel
2007				4.70
2008				9.00
2009	0.50		0.60	11.10
2010	0.65	0.10	0.95	12.95
2011	0.80	0.25	1.35	13.95
2012	1.00	0.50	2.00	15.20
2013	TBD	1.00	2.75	16.55
2014	TBD	1.75	3.75	18.15
2015	TBD	3.00	5.50	20.50
2016	TBD	4.25	7.25	22.25
2017	TBD	5.50	9.00	24.00
2018	TBD	7.00	11.00	26.00
2019	TBD	8.50	13.00	28.00
2020	TBD	10.50	15.00	30.00
2021	TBD	13.50	18.00	33.00
2022	TBD	16.00	21.00	36.00

B. EPA Has Not Yet Promulgated Regulations to Implement the RFS2

EPA has not yet proposed implementing regulations for the advanced biofuels statutory requirement for 2009, the greenhouse gas reduction restrictions for new biofuel plants, or the expansion of the scope under the RFS2 to include renewable fuel used to replace or reduce the quantity of fossil fuel in home heating oil or jet fuel. As a result, these aspects of the RFS2 program will not be effective in 2009.

However, the implicit conventional biofuels, or corn ethanol, submandate under the RFS2 does not require regulatory implementation and was effective upon enactment of EISA. EPA has implemented an 11.1 billion gallon RFS2 conventional biofuels requirement for 2009 using the original RFS regulatory framework.

III. What Is The "Blendwall"?

To understand the issues associated with the "blendwall," it is necessary to examine the Clean Air Act procedures through which fuels and fuel additives are introduced into commerce in the United States.

A. Clean Air Act Restrictions on Introducing New Fuels and Fuel Additives

In 1977, Congress enacted Section 211(f) of the Clean Air Act (42 U.S.C. 7545(f)), which generally requires that any fuel or additive introduced into commerce – including gasoline additives such as ethanol or gasoline blended with different levels of ethanol – be "substantially similar" (commonly referred to as "sib sim") to fuels used to certify vehicle and engines to their respective emission standards. This so-called "sub sim" restriction was put in place by Congress to ensure that new fuels or fuel additives would not interfere with or render inoperative the air pollution control devices that were being installed on motor vehicles in the 1970s.

Section 211(f)(4) provides a fuel or fuel additive manufacturer with an opportunity to seek a waiver of the general "sub sim" prohibition from EPA if the manufacturer can prove to EPA that its fuel or additive will not harm emissions control devices on motor vehicles and other internal combustion engines regulated under the Clean Air Act. Prior to the enactment of EISA, such a 211(f)(4) waiver could be deemed granted by EPA if the Agency did not act on a manufacturer's "sub sim" petition within 180 days. It was under this pre-EISA "deemed granted" provision that E10 was "approved" by EPA in the 1980s. In other words, EPA never issued a formal determination that E10 was "sub sim" or that it would not harm vehicles' emissions control devices. Instead, EPA allowed the E10 petition's 180 day review period to expire without taking formal action, thereby permitting the introduction of E10 into the marketplace.

Congress amended Section 211(f)(4) through Section 251 of EISA in 2007 in several ways. First, the "deemed granted" feature of the pre-EISA 211(f)(4) waiver process was discarded in favor of a final Agency action approving or denying a manufacturer's petition within 270 days of the receipt of a petition – an action that could then be reviewed judicially. Second, EISA provided that EPA must give the public notice and the opportunity to comment on any "sub sim" petition during the 270 day period. Third, EISA clarified that Section 211(f)(4) applied not only to motor vehicle engines but to all onroad and nonroad engines. With respect to ethanol, that means that a manufacturer of ethanol seeking a "sub sim" waiver for a mid-level ethanol blend must prove that such a blend is not harmful to the emissions control systems of both motor vehicles and nonroad mobile and stationary engines such as motorcycles, generators, lawn mowers, chain saws, and marine engines.

B. Current EPA Limits on Ethanol Blending into Gasoline

The current EPA limit for blends of ethanol with gasoline for use in conventional gasoline engines is E10. Blends in excess of E10 (such as E85) are classified by EPA as alternative fuels, not

gasoline, and may only be used in alternative fuel vehicles, such as those with flexible fuel designs. Thus, under the Clean Air Act and EPA "sub sim" regulations, it is unlawful for mid-level ethanol blends, such as E12, E13, E15 or E20 to be sold in the United States for use in conventional motor vehicles or non-road engines.

C. Gasoline-Powered Engine Engineering and Mid-Level Ethanol Blends

The E10 limit has been in place for almost 20 years and is the maximum ethanol content standard to which all gasoline-powered engine manufacturers have engineered their conventional motor vehicle and nonroad engines for the past two decades. Currently, there are over 240 million motor vehicles and 400 million non-vehicle gasoline engines in use by hundreds of millions of American consumers. These motor vehicles and nonroad engines are not designed to operate on mid-level ethanol blends.

That is not to say that motor vehicle and nonroad engines cannot be engineered to run on mid-level ethanol blends in the future. Clearly, flexible fuel vehicle technology proves that motor vehicles can be designed to run on any ethanol level, including as high as E85. However, flexible fuel vehicles currently make up less than five percent of the motor vehicle fleet in the United States. Even if all new vehicles were designed with this capability starting today, it would take decades for the fleet to turn over, and some classes would remain, such as antique vehicles, that could not use ethanol blends. Similarly, nonroad engines can be engineered to run on E20, but none of the hundreds of millions of nonroad engines currently owned by consumers have been engineered to run on an ethanol blend higher than E10.

D. Ethanol Penetration in the U.S. Gasoline Pool and the "Blendwall"

Ethanol currently is blended into about 75 – 80 percent of every gallon of gasoline sold in the United States, generally at a blend rate of 10 percent (although some gallons do contain ethanol

blends of 5.7 and 7.7 percent due to blending, tax, or environmental restrictions in some areas of the country).

The U.S. Department of Energy's Energy Information Administration ("EIA") reports that gasoline consumption in the United States was 139 billion gallons in 2007 and 135 billion gallons in 2008. If all U.S. gasoline contained ethanol at the E10 cap today, then 13-14 billion gallons would be the maximum level of ethanol that could be used in gasoline in the United States. This is the so-called "blendwall." As the implicit conventional biofuels (corn ethanol) submandate of the RFS2 program rises above the level of E10 saturation, the remaining mandate for that year must be met either through use of ethanol in E85 or through biomass-based diesel.

If gasoline demand in the United States declines in 2009 at the same rate it did in 2008, then our country could reach the E10 saturation point as soon as 2011. Indeed, EIA forecasts predict that 2009 gasoline demand will have declined a total of 10 percent from 2007 demand.[5] At that point, unless the use of mid-level ethanol blends is approved for use in non-flexible fuel engines, all additional corn ethanol production would be forced into the E85 marketplace, although demand for E85 remains relatively small due to the proportionately small number of flexible fuel vehicles compared to conventional vehicles.

IV. The Need for Comprehensive Research on Mid-Level Ethanol Blends and Conventional Gasoline-Powered Engines

There has been no comprehensive research conducted on the potential safety, public health, engine operation, or increased emission impacts from the use of mid-level ethanol blends in conventional gasoline-powered engines. The data that does exist can be summarized as follows:

- Past durability studies from earlier this decade indicate that mid-level ethanol blends result in increased emissions from, and emissions control device failures in, motor

[5] EIA. "Short Term Energy Outlook." March 10, 2009; http://www.eia.doe.gov/emeu/steo/pub/contents.html.

vehicle engines over their useful life and result in safety degradation and performance deficiencies with other gasoline-powered engines;

- More recent data developed and promoted by the ethanol industry on very small numbers of vehicles fueled with mid-level blends for short periods of time. The development of this data was not conducted under established federal test procedures and it has not been peer-reviewed; and,
- Screening, or preliminary tests conducted by DOE and the Coordinated Research Council ("CRC")[6] that indicate that emissions of some pollutants increase when conventional vehicles use mid-level ethanol blends and nonroad engines actually fail. Notably, 44% of the vehicles tested by DOE are vulnerable to catalyst deterioration during their useful life. (marine engines have not been tested at all by any federal agency, although some private studies reveal significant problems).

Independent observers have concluded that a great deal of additional testing must be completed before the use of mid-level ethanol blends is authorized by EPA. And many research projects on mid-level ethanol blends have been identified that would fill critical gaps in knowledge, especially regarding the durability of vehicles and their emission control systems. The attached chart provides an overview of the needed vehicle studies, some of which are completed and some of which still require funding, with associated timelines. The research program would provide basic but comprehensive testing on such issues as durability (catalysts, evaporative systems, and fuel systems), tailpipe emissions, driveability, materials compatibility, and on-board diagnostics. We anticipate they can be completed in about two more years, assuming they are all fully funded and move forward on a reasonable schedule.

Separate and apart from vehicle testing, there has been virtually no testing on mid-level ethanol blends on nonroad gasoline engines. Our associations are deeply concerned with the potential impacts on these engines, which consist of: (1) higher exhaust gas temperatures and attendant operational and safety risks; (2) possible irreversible damage to engines; (3) loss of

[6] CRC is a non-profit organization that directs research on the interaction between automotive/other mobility equipment and petroleum products. The Sustaining Members of CRC are the American Petroleum Institute, the Society of Automotive Engineers and a group of automobile manufacturers (Chrysler, Ford, General Motors, Honda, Mitsubishi, Nissan, Toyota, and Volkswagen). See www.crcao.com

durability; (4) materials compatibility; (5) emissions increases; (6) damages to manufacturers' reputations; and, (7) warranty validity. Further, nonroad engines generally utilize open loop air-fuel control systems which cannot compensate for changes in the oxygen content caused by mid-level ethanol blends. Additional research is necessary on a variety of engines[7] and applications with different load cycles and cooling designs and operation speeds[8] (including durability testing) and this has not yet begun.

Nonroad engines comprise over some 900 engine "families" currently regulated and certified for emissions by EPA. Of these 900 engine families, DOE recently tested 28 pieces of equipment to determine how mid-level ethanol blends may impact these engines. OPEI's analysis of the technical data reveals most of these engines experienced performance irregularities, operational issues, damage and/or failure during testing using mid-level ethanol blended fuel.

One finding of the DOE tests on nonroad engines is of extreme concern to OPEI -- safety hazards dramatically increased due to unintentional clutch engagement caused by high idle speeds. This means that blades engage in the idle position. The risks to a chainsaw user in this example are profound and unacceptable. Chainsaws are used by nearly every fire house, utility crew and emergency weather crew as well as commercial foresters and consumers. Their reliability and safe performance are critical to their users. Another example of genuine concern is the possible failure of emergency generators in a crisis. Again, their reliability and safe performance is critical to users. The potential use of mid-level ethanol fuels is a highly complex issue as related to outdoor power

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[7] 2-stroke, 2-stroke with catalyst, stratified scavenging, compression wave injection, 2-stroke/4-stroke hybrid, 4-stroke, and stratified with catalyst.

[8] Professional backpack blowers, homeowner handheld blowers, professional chainsaw (heavy use), armer chainsaw (moderate use), homeowner chainsaw (light use), professional trimmer/brush cutter, farmer trimmer/brush cutter, homeowner trimmer, professional hedge trimmer, and consumer hedge trimmer.

equipment and its users and it cannot be rushed by efforts that overlook the impacts on consumer safety and their economic interests.

Marine engines manufactured by NMMA's members and others face many unique challenges and none have been addressed yet in any research programs on mid-level ethanol blends. Ethanol may degrade fiberglass and aluminum fuel tank material with resulting leaks and build-up of resin on valves, rods and stems, and can clog fuel systems. An ethanol blend may experience phase separation when the boat is stored for a long period. Phase separation attracts water, which can damage engines and cause metallic fuel tanks to leak. Marine engine manufacturers are concerned about increases in engine temperatures causing increased NOx emissions and stress on other components such as valves, head gaskets and head bolts, increased permeation and diurnal emissions, vapor lock, as well as a broad range of performance and durability issues.

V. EPA Has Received a Mid-level Ethanol Blend Waiver Request and Should Deny It

On March 6, 2009, Growth Energy LLC announced that it, joined by some ethanol manufacturers and other trade associations, had submitted a petition to EPA pursuant to Section 211(f)(4) for approval of E15. It is anticipated that EPA will announce soon the public comment period and the public hearing as required by Section 211(f)(4).

Our associations will urge EPA to deny this petition in our comments. Our collective position will be that EPA must deny this request because the science on the impact of mid-level ethanol blends on consumer safety, engine performance, and potential environmental harm has not been completed and likely will not be for at least two years. It would be premature for EPA to grant such a waiver and would in fact directly contradict the congressional intent expressed in EISA and now embodied in Section 211(f)(4).

In the same vein, our associations will oppose vigorously any legislative effort to bypass the Section 211(f)(4) approval process by directing EPA to permit the introduction of a mid-level ethanol blend. Congress should not subvert the 211(f)(4) process, ignore President Obama's directive to value science over politics, or put consumers, human health or the environment at risk by considering such a directive to EPA.

Similarly, our associations also will oppose strongly any attempt by Congress or EPA to sidestep the Section 211(f)(4) process by permitting the introduction of E12 or E13 into commerce. Ethanol proponents have argued that such a small adjustment in the E10 cap is not significant and should be authorized outside of the standard Section 211(f)(4) process. The fact is that they don't know whether this argument is true or not. Our associations assert that Congress and EPA have a duty to put consumer safety, public health and the environment first when considering mid-level ethanol blends – not the unsubstantiated and self-interested assertions of the ethanol industry.

VI. Liability for Harm Caused by Mid-Level Ethanol Blends

Growth Energy's petition to EPA for the approval – through the Section 211(f)(4) process or through an administrative shortcut – of mid-level ethanol blends concludes that sufficient testing has been done on motor vehicle, nonroad and marine engines to determine that these higher blends pose no risk to the environment, to public health, or to consumer safety. Our associations strongly disagree with this conclusion.

Motor vehicle and engine manufacturers and fuel providers carry considerable legal liability for any risks to consumers and for non-compliance with regulations. In addition, introducing higher blends into the marketplace would confuse consumers, with more than 600 million owner manuals of motor vehicles and nonroad engines advising consumers to avoid using gasoline that contains more than E10. There are questions of who will bear the liability for warranty claims and recalls,

and how to prevent harm to company reputations. Finally, if problems emerge, there is the possibility of consumer backlash against ethanol, which would have a damaging impact on public support for the use of ethanol as a transportation fuel. These challenges must be addressed in advance of any introduction of mid-level ethanol blends.

VII. Conclusion

There has not been sufficient testing of motor vehicle and nonroad equipment engines to justify a determination that any mid-level ethanol blend would meet the safety and environmental requirements of the time-tested Clean Air Act protections under Section 211(f). Some have asserted that preliminary or incomplete scoping studies suggest that mid-level ethanol blends may be compatible with some engines. However, other test results suggest that mid-level ethanol blends: (1) may be incompatible with some of today's volume of ethanol mandated through the motor vehicle and nonroad equipment engines; (2) may cause a failure of emission control devices or systems; (3) may defeat these engines' safety features; and (4) may lead to a significant increase in emissions from these engines over their useful life.

Our associations stand ready to work with Congress, the Administration and stakeholders to assure a stable and effective policy that will assist consumers and protect our environment. Consumer safety, public health, and environmental protection deserve robust and thorough testing before EPA allows mid-level ethanol blends for general sale in gasoline-powered engines – whether onroad or nonroad. Any decision on whether to permit the use of mid-level ethanol blends in motor vehicles and other equipment not designed for such use must be guided solely by sound, unbiased and comprehensive science and must be undertaken through an open, public and transparent process that takes into account both the increased air pollution that will result from the use of higher ethanol blends in many engines and the potential risks to consumers driving vehicles or handling engines fueled with these blends.

Thank you for the opportunity to testify at this hearing today. I would be pleased to answer any questions my testimony may have raised.

March 26, 2009

The Honorable Steven Chu
Secretary of Energy
U.S. Department of Energy
Washington, D.C. 20585-1000

The Honorable Lisa Jackson
Administrator
U.S. Environmental Protection Agency
Washington, D.C. 20460

The Honorable Tom Vilsack
Secretary of Agriculture
U.S. Department of Agriculture
Washington, D.C. 20250

The Honorable Carol Browner
Asst. to the President for Energy & Climate Change
The White House
Washington, D.C. 20500

Dear Secretaries Chu and Vilsack, Administrator Jackson and Mrs. Browner:

The undersigned diverse group of business, environmental, taxpayer, free-market and public health groups opposes any administrative or legislative efforts to increase the current cap on the amount of ethanol permitted to be blended into gasoline until independent and comprehensive testing has been completed that indicates that such mid-level ethanol blends (whether E12, E15 or E20) will not pose a risk to all gasoline-powered engines, to public health, to the environment and to consumers.

To quote from President Obama's March 9, 2009 Memorandum on "Scientific Integrity":

> "Science and the scientific process must inform and guide decisions of my Administration on a wide range of issues, including improvement of public health, protection of the environment, increased efficiency in the use of energy and other resources, mitigation of the threat of climate change, and protection of national security."

Some have advocated that Congress or the Environmental Protection Agency ignore President Obama's Memorandum, avoid the safeguards built into Section 211(f) of the Clean Air Act (safeguards that were just strengthened by Congress in 2007), and approve mid-level ethanol blends before comprehensive testing programs on these blends have been completed by qualified and independent stakeholders, such as the Department of Energy and the Coordinating Research Council. We collectively, and strongly, oppose such an ill-considered approach as contrary to scientific integrity and potentially harmful to our environment, public health and consumers.

Sincerely,

Alliance for Worker Freedom

American Bakers Association

American Beverage Association

American Conservative Union

American Lung Association

American Meat Institute

American Sportfishing Association

Americans for Tax Reform

Americans for the Preservation of Liberty

Association of International Automobile Manufacturers

Association of Marina Industries

Boat Owners Association of the United States

Center for Auto Safety

Clean Air Task Force

Competitive Enterprise Institute

Council for Citizens Against Government Waste

Earthjustice

Engine Manufacturers Association

Environmental Working Group

Friends of the Earth

Grocery Manufacturers Association

Hispanic Alliance for Prosperity Institute

The Hispanic Institute

International Dairy Foods Association

International Snowmobile Manufacturers Association

National Center for Public Policy Research

National Chicken Council

National Council of Chain Restaurants

National Marine Manufacturers Association

National Petrochemical and Refiners Association

National Restaurant Association

National Taxpayers Union

National Turkey Federation

Natural Resources Defense Council

Outdoor Power Equipment Institute

Personal Watercraft Industry Association

Public Citizen

Sierra Club

Small Business & Entrepreneurship Council
Snack Food Association
Taxpayers for Common Sense

Alabama Poultry and Egg Association

California Poultry Federation

Georgia Poultry Federation

Indiana Poultry Federation

Iowa Turkey Federation

Minnesota Turkey Growers Association

Mississippi Poultry Association

North Carolina Poultry Federation

Poultry Federation of Arkansas, Oklahoma and Missouri

Virginia Poultry Association

Butterball, LLC

FarmEcon LLC.

Gold'n Plump Poultry

Pilgrim's Pride

Program Summary

Mid-Level Ethanol Blends
Research Coordination Group
Jan. 28, 2009

Topics of Interest		7	8	9	10
		J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D
Durability Testing (DT)	Catalyst Durability Aging		CRC E-87 Ph-I	CRC E-87 Ph-II	
	Evap Emissions Systems				CRC E-91
	Base Engine				CRC CM-136-09
	Fuel system, Damper, Lvl sen, Mat'l Compat.			AVFL-15	AVFL-15 Follow-On
Tailpipe Testing (TP)	Catalyst Durability Aging		CRC E-87 Ph-I	CRC E-87 Ph-II	
	Powertrain Systems Cold Operation (MSAT NMHC &SULEV)				CRC E-XX
	Vehicle Emissions, Late Models		DOE V1 ★	CRC E-87 Ph-II	
	Vehicle Emissions, Older Models			EPAct	
	Emissions - DOE will monitor		MN RFA E20 Study ★		
	Veh Perf & Emissions - DOT sponsored		RIT Study ★		
Evaporative Emissions (EV)	Evap Emissions, Permeation and Durability	CRC E-65 ★	CRC E-77		CRC E-91
Driveability (DR)	Powertrain Systems Cold Operation (MSAT NMHC &SULEV)				CRC E-XX
	Vehicle Emissions, Late Models		DOE V1 ★	CRC E-87 Ph-II	
	Driveability of 20 FFVs 6 non-FFVs		CRC CM-136		
	Driveability of 80 vehicles - DOE will monitor		MN RFA E20 Study ★		
	Veh Perf & Emissions - DOT sponsored		RIT Study ★		
Materials Compatibility (M)	Base Engine				CRC CM-136-09
	Permeation of Fuel System				CRC E-91
	Fuel system, Damper, Lvl sen, Mat'l Compat.			AVFL-15	AVFL-15 Follow-On
	Elastomer, Plastic & Metals - DOE will monitor		MN RFA E20 Study ★		
Emissions Inventory (EI)	Emissions/Air Quality Monitoring				E-68a Follow-on / A-13
OBD (OB)	On-Board Diagnostics			CRC E-90	

Key:
- Comprehensive
- Comprehensive in development
- Preliminary, partial or screening
- Gap

Note: 2003 Australian Orbital Study includes preliminary data for catalyst durability, emissions tests & materials compatibility.

★ Cited by Growth Energy Petition, notation added by Auto Alliance

CHRYSLER Ford GM HONDA MITSUBISHI MOTORS NISSAN TOYOTA

Follow-Up Questions for Written Submission
Senate Environment and Public Works Committee Hearing on "Blendwall" and Mid-Level Ethanol Blends
April 1, 2009

Responses to Senator James Inhofe

1. **A few weeks ago *The Wall Street Journal* printed an article titled, "Everyone Hates Ethanol". The article states: *The biggest losers in this [RFS] scheme are U.S. oil refiners. Liability for any problems arising from ethanol blending rests with them, because Congress refused to grant legal immunity for selling a product that complies with the mandates that it ordered. The refiners are also set to pay stiff fines for not fulfilling Congress's mandates for second-generation cellulosic ethanol. But the cellulosic ethanol makers themselves already concede that they won't be able to churn out enough of the stuff. ... So successful but politically unpopular businesses will be punished for not buying a product that does not exist...***

   Your industry is justifiably concerned with RFS2. The industry is facing mandates which potentially can't be met. What would you like to see Congress or EPA do?

   NPRA and NMMA Response: NPRA and NMMA believe that Congress should freeze at 2009 levels or repeal the entire conventional biofuels mandate contained in the Energy Independence and Security Act of 2007 (EISA), unless and until sufficient independent scientific testing is conducted on all impacted engines and equipment and that testing determines that mid-level ethanol blends will not endanger consumers, the environment, or the gasoline-powered engines in which such blends are used.

2. **As you know, the proposed RFS2 regulations were required to be finalized last December. It's very possible that the EPA may not be able to finalize these regulations before the end of this year. What impact will a delay into next year have on your industry?**

   NPRA Response: EPA published the proposed RFS2 regulation last week (74 FR 24904 May 26, 2009) and the public comment period on the proposal will end on July 27, 2009.

   If it is assumed that EPA must finalize an RFS2 regulation by November 1, 2009 in order to give regulated parties sufficient lead time for compliance, then EPA will need to forward a final set of regulations to the Office of Management and Budget (OMB) for review by at the latest October 1, 2009. That would mean that EPA would have approximately 60 days from the close of the public comment period and submission to OMB to consider all of the public comments and revise or rewrite some or much of the proposal as necessary in response to those comments.

It took EPA almost 18 months to draft the RFS2 regulation – it would seem unlikely that EPA could review all of the public comments and finalize a coherent, lawful and workable set of rules within 60 days.

It is much more important that EPA get the RFS2 regulations right, even if it means the regulations will not be effective on January 1, 2010.

3. **Could you discuss some of the safety issues that are occurring with small engines and boats at current E-l 0 blend levels?**

   NMMA Response: There are about 13 million legacy marine products currently in operation in the United States which have been designed, calibrated, or certified to be compatible with any gasoline fuel containing 10 percent ethanol by volume.

   Performance irregularities in marine applications, such as those that may occur through the use of mid-level ethanol blends, are a significant concern because they pose inherent safety risks. Boats are highly regulated for safety because marine environments are volatile and unpredictable—marine engines and boats must be reliable, durable, and perform as intended.

4. **As of the end of March, AAA stated that E-85 on a MPG/BTU adjusted basis costs 28 cents more per gallon than regular gasoline. And that's despite a 45 cent blending credit and a 54 cent import tariff. Are consumers buying E-85, and are they willing to pay more for it? What will it take for E-85 to be cost competitive without subsidies and how long will that be?**

   NPRA, NMMA and OPEI Response: NPRA, NMMA or OPEI are not qualified to respond to this question. We respectfully suggest that the Committee ask consumers and motor fuel retailers these questions in order to obtain expert information on these subjects.

5. **Could a bifurcated system work to address the blendwall? Mid-level ethanol blends can be used in new vehicles and vehicles only a few years old; and older vehicles, small engines, and boats could continue to use E-10 or less. Don't we have a bifurcated system now with E-0 and E-l0?**

   NPRA and OPEI Response: No.

   The country currently does not have a *bifurcated* system with respect to E10 and E0. Rather, neat ethanol and gasoline are *segregated* above the wholesale terminal "rack" for

operational and quality reasons. Then E10 and E0 are again *segregated* for air quality reasons between the wholesale terminal "rack," where the ethanol generally is blended into gasoline, and the retail outlet.

At the retail outlet, however, consumers rely millions of times each day on the fact that all of the gasoline being sold at the 166,000 retail motor fuel outlets across the nation is compatible with the gasoline-powered engine for which it is being purchased. Consumers have this confidence because virtually the entire current legacy inventory of gasoline-powered engines – onroad, nonroad, vehicle, marine, or equipment – has been certified to meet EPA regulations using both E0 and E10. Therefore, from a consumer's point of view, E10 is indistinguishable from E0 and the two blends can be, and are, mixed or commingled in an engine's fuel tank.

As a result, the current possibility of a consumer misfueling an engine at a retail motor fuel outlet is very small, unless the consumer mistakenly purchases diesel fuel rather than gasoline. Such misfuelings do occasionally occur, but not frequently.

If EPA authorizes bifurcated, as opposed to segregated, retail gasoline sales in the future, then the opportunity for consumer misfueling will skyrocket. The last time EPA bifurcated the nation's gasoline supply – for the gradual introduction of unleaded gasoline in the late 1970s and early 1980s -- EPA estimated that over 13 percent of consumers misfueled their vehicles annually. It must be noted that the unleaded gasoline introduction program included physical barrier to misfueling – smaller fuel tank fill pipe openings on vehicles designed to use unleaded gasoline and larger gasoline dispenser nozzles to stop the use of leaded gasoline in engines designed for unleaded gasoline. Despite these barriers designed to make it almost physically impossible to misfuel a vehicle, over one in ten consumers misfueled annually.

There is no reason to assume that there would be lower levels of misfuelings if EPA were to bifurcate the retail gasoline system by authorizing the use of a mid-level ethanol blend in a subset of on-highway vehicle engines under a "partial waiver." If one assumes a similar rate of misfueling as was experienced during the introduction of unleaded gasoline, then annually over 50 million gasoline-powered engines will be misfueled with a gasoline on which they were not designed to run. To our knowledge, there has been no study of the economic consequences, potential consumer safety issues or the negative environmental impacts that may result from such a tremendous number of misfuelings.

We cannot envision a practical system whereby a mid-level ethanol fuel, approved for use in an on-highway vehicle under a "partial waiver," would not also be utilized to fuel the off-road engine or equipment. Nonroad engines generally are fueled from portable containers which are in turn fueled at the same time and location as the vehicle used to transport the container from the filling station to the nonroad equipment location. In fact, many types of nonroad products (including lawn, garden and forestry products, smaller

marine engines and off-road ATVs and utility vehicles) are exclusively refueled from portable containers. Portable fuel containers do not have any standard or uniform openings used to refuel the container. Consequently, any limitations on nozzle and fuel-inlet size or dimensions will be ineffective. Clearly, any fuel dispensing nozzle that could be utilized to fill a vehicle could, and would, also be utilized to fill the portable container.

Warnings on either the pump or the nonroad equipment to the user about misfueling will have minimal influence on the consumer's perceived convenience of filling both the vehicle and their portable container from the same nozzle. Moreover, any warnings on labels of nonroad products will not be present or visible when a consumer selects the fuel to pump into his or her portable container. It would be even less likely that a consumer would remember and follow fueling requirements set forth in the owner's manual for nonroad products – when he or she is selecting a particular fuel.

NMMA Response: No. A bifurcated fuel system puts consumers at risk of product failure and significant confusion. We do not currently have a bifurcated fuel system because all marine engines and products are designed, manufactured, calibrated and certified to run on E10, the current legal allowable limit. Allowing a "parallel" or "dual" fuel system will result in inevitable confusion and misfueling by the consumer. This risk is high for the marine sector, since the 95 percent of recreational boats are less than 26 feet in length, trailered, and fueled at regular automotive gas stations (as opposed to marinas).

For most consumers, the decision point on fuel is price. Should a new fuel, such as E15, be sold at gas stations as a general purpose fuel, no amount of labeling and virtually no economically viable safeguard would prevent the misfueling of recreational boats.

Additionally, it is unreasonable for Congress or EPA to force recreational boat, non-road engine, and older automobile owners and operators to using more expensive premium fuel. Recreational boating activity and recreational marine sales are closely correlated to the price of gasoline. Even a marginal increase in the price of fuel drives down new boat sales and discourages boating activity.

6. **Would the elimination of import tariffs on ethanol imports help the situation for refiners?**

NPRA Response: Yes. Given the significant strain on our nation's fuel supply system associated with the dramatically increased ethanol mandate in EISA, Congress should suspend the tariff on imported ethanol in order to maximize the supply of renewable fuels. This is not a new position for NPRA; NPRA advocated this position in testimony before the Senate Commerce, Science, and Transportation Committee in May 2006, the

Senate Energy and Natural Resources Committee in February 2008, and the House Energy and Commerce Committee in May 2008.

By removing the tariff on imported ethanol, sugarcane ethanol from Brazil could supply a portion of EISA's advanced biofuels mandate. In addition, removing the tariff on imported ethanol could also expand supplies of cellulosic ethanol produced abroad. This would provide opportunities for refiners to meet their RFS2 compliance mandates

7. **Who would be liable if ethanol-blended gasoline is found to damage engines?**

NPRA Response: This is not an easy question to answer and likely can be answered only through a detailed discussion of state and federal tort law. However, if mid-level ethanol blends are found to damage engines, it is a virtual certainty that the nation's plaintiff's bar will attempt to secure a judgment against any potential defendant with "deep pockets" to compensate engine owners for this damage.

NPRA has stated in its testimony before the Committee that it is pre-mature to introduce mid-level ethanol blends into commerce due to the lack of comprehensive science on the environmental and safety impacts of these blends on legacy onroad and nonroad vehicles and engines.

According to several public statements, however, the nation's domestic ethanol manufacturers have disagreed with NPRA's testimony and have called for EPA to approve the sale of mid-level ethanol blends. If these ethanol manufacturers are convinced that the science is complete and mid-level blends will not harm the environment or engines, then we urges them to support federal legislation that fixes liability for environmental and engine damage on ethanol manufacturers.

NMMA Response: Marine engine manufacturers specifically advise consumers in their owner's manuals and warranty documents that usage of incompatible fuel, including gasoline blended with more than 10 percent ethanol, could void the warranty. All marine engine manufacturers warranty their products up to E10, the current maximum allowable legal limit, but marine engine manufacturers are not in a position to provide warranty support and have not accrued warranty funds, for products run on fuels containing higher than 10 percent ethanol. It remains unclear who will ultimately be liable for failed products resulting from higher ethanol blends.

Senator CARPER. Great. Mr. Drevna thank you so much.

Dr. Tiller, you are now recognized. Welcome.

STATEMENT OF KELLY TILLER, DIRECTOR OF EXTERNAL OPERATIONS, UNIVERSITY OF TENNESSEE OFFICE OF BIOENERGY PROGRAMS

Ms. TILLER. Thank you, Senator Carper and Members of the Committee. I am Kelly Tiller and I am here representing today the University of Tennessee and Genera Energy, and our efforts to develop a biomass-based energy industry in the State of Tennessee.

The expanded renewable fuels standard established in 2007 provides a market-based program supporting and accelerating the commercialization of second generation cellulosic and other advanced biofuels. Meeting the RFS will require aggressive build-out and expansion of cellulosic biofuels.

For several years, we have been on the verge of technical and commercial feasibility for cellulosic ethanol. We are no longer on the verge. Technology breakthroughs and technical milestones are occurring very rapidly. Cellulosic biofuels are being produced today in several pilot and pre-commercial demonstration facilities around the Country with more than two dozen new projects in development and in construction phases.

We still need intense focus on the basic science like that coordinated at DOE's three bioenergy science research centers and at many of our Nation's academic institutions. It will take years to fully optimize conversion processes and technology, but basic technology is no longer a barrier to startup cellulosic ethanol facilities.

Perhaps the most significant remaining challenge to commercial success of advanced biofuels is the availability of large quantities of sustainably produced biomass feedstocks at prices that are attractive to both farmers and biorefineries. This requires much more than simply picking regionally appropriate and sustainable feedstocks as the production of biomass is only one piece of the entire biomass feedstock supply chain.

In Tennessee, we have learned much about a fully integrated biomass supply chain by using switchgrass as a dedicated energy crop to supply a cellulosic ethanol biorefinery. Through Tennessee's biofuels initiative, we have partnered with DuPont Danisco Cellulosic Ethanol and jointly invested in a demonstration scale cellulosic ethanol biorefinery in Tennessee. The biorefinery is under construction and will begin production of cellulosic ethanol by the end of this year.

To supply the pilot biorefinery, conduct large scale cellulosic ethanol feedstock research and development, and develop a portfolio of uses for switchgrasses, we are contracting with farmers within a 50-mile radius of the biorefinery to grow 6,000 acres of switchgrass. Nearly 3,000 acres are already in production on 41 local farms.

Switchgrass has proven to be an ideal platform for our work to develop an integrated biomass supply solution. Switchgrass in Tennessee has yielded between 6 and 12 tons of carbon-sequestering biomass per acre. It is being grown on marginal land not well suited for food or feed crops, requiring only minimal fertilizer and other chemicals, using existing farm equipment without irrigation.

Research is underway to increase production yields of energy crops through several routes. Additionally, ongoing work seeks to reduce the relatively high cost of harvesting, handling, densification, storage and transportation. Both target areas offer significant opportunities for near-term gains in feedstock efficiency and cost reductions.

Without a doubt, commercial success of advanced biofuels will require development of sustainable integrated biomass feedstock systems that are largely nonexistent today. To provide the millions of tons of biomass feedstocks required to meet the RFS, we need more focused efforts and support for biomass feedstock production, supply chains and logistics.

Substantial investment and participation of the private sector are also clearly required to meet the expanded RFS. A predictable investment climate is essential to enabling the commitment of the private sector and achieving RFS goals.

Stable policies and market-based supports for the biofuels industry are absolutely critical.

Thank you again for this opportunity to appear before you today. We are well on the path to build a large scale commercial cellulosic biofuels industry. Now, we must ensure that we achieve the profound positive impacts that cellulosic biofuels can deliver. We must continue and expand focused efforts to develop biomass feedstock systems, not just crops, but integrated systems. We need policies that promote long-term stability and a market that is attractive for investment.

Support of achievable market-based underpinnings like the RFS are setting the stage for success.

Thank you for everything this Committee and the Senate is doing to support this important energy alternative.

[The prepared statement of Ms. Tiller follows:]

Testimony of

Kelly J. Tiller, Ph.D.
The University of Tennessee
and *Genera Energy LLC*

Before the Senate Committee on Environment and Public Works
Subcommittee on Clean Air and Nuclear Safety
Hearing on "Oversight – the Environmental Protection Agency's Renewable Fuel Standard"

April 1, 2009

Chairman Carper and Members of the Committee, thank you for the opportunity to speak to you today. My name is Kelly Tiller. I am the co-director of Bioenergy Programs at the University of Tennessee and President of Genera Energy, where I am coordinating an unprecedented investment of more than $70 million for a statewide Biofuels Initiative that demonstrates at a large scale the assembly and integration of all of the moving pieces in this industry value chain and facilitates the development of a new biomass-based energy industry in the state.

The expanded Renewable Fuel Standard (RFS) established in 2007 provides a market-based platform supporting and accelerating the commercialization of second generation cellulosic and advanced biofuels. Meeting the ambitious directives of the RFS—36 billion gallons of biofuels, with 21 billion from greenhouse gas-reducing cellulosic and advanced biofuels by 2022—will require rapid buildout and expansion of cellulosic biofuels.

Cellulosic Ethanol & The RFS

For several years, we have been on the verge of technical and commercial feasibility for cellulosic ethanol. We are no longer on the verge. Technological breakthroughs and progress on technical milestones are occurring rapidly. Cellulosic biofuels are being produced today in several pilot and pre-commercial demonstration facilities, with more than two dozen new pilot, demonstration, or commercial scale projects ranging from the development to construction phases.

We still need an intense focus on the basic science, like those coordinated out of the DOE's three bioenergy research centers. It will take years to fully optimize conversion processes and technologies, but we are close enough to remove technology as a barrier to start-up.

Sustainable, Affordable Biomass Feedstocks

Perhaps the most significant remaining barrier to commercial success of advanced biofuels is the availability of large quantities of sustainably produced biomass feedstocks, at prices that are attractive to both farmers and biorefineries. This is not as simple as picking regionally appropriate and sustainable feedstocks. Producing sustainable biomass feedstocks is only one piece of the entire biomass feedstock supply chain.

In Tennessee, we have had the opportunity to learn much about the integrated biomass supply chain for switchgrass as a dedicated energy crop to supply a cellulosic ethanol biorefinery. Through the state's Biofuels Initiative, we have partnered with DuPont Danisco Cellulosic Ethanol (DDCE) and jointly invested in a pilot scale cellulosic ethanol biorefinery and process development unit in East Tennessee. The Vonore biorefinery is under construction and on schedule to begin production by the end of this year.

To supply the pilot biorefinery and conduct large scale feedstock R&D and develop a portfolio of uses for switchgrass, we are contracting with farmers within a 50 mile radius of the biorefinery to grow 6,000 acres of switchgrass, with nearly 3,000 acres already in production on more than 30 local farms.

Switchgrass has proven to be an ideal platform for our work to develop an integrated biomass supply solution. Switchgrass in Tennessee has yielded 6-10 tons of carbon sequestering biomass per acre, grown on marginal cropland not well-suited for food and feed crops, with minimal use of fertilizer and other chemicals, without irrigation, using existing farm equipment.

Efforts are underway to increase the productivity of switchgrass (e.g., through traditional crop breeding, development of new herbicides, improved crop management practices, and genetic modification to make it better tailored as an energy crop). However, the relative high costs of harvesting, handling, densification, storage, and transportation of feedstocks appear to offer the most significant opportunities for near-term gains in feedstock efficiency and costs.

Without a doubt, commercial success of advanced biofuels will require development of sustainable, integrated biomass feedstock systems that are largely nonexistent today. To be prepared to handle the millions of tons of biomass feedstocks required to meet the RFS, we need more focused effort on biomass feedstock production, supply chains, and logistics.

Predictable, Supportive Policy & Investment Climate

Substantial investment and participation of the private sector is also clearly required to meet the expanded RFS. A predictable investment climate is essential to enabling the commitment of the private sector, whose participation is necessary to maintain momentum in developing next-generation, non-food biofuel feedstocks, and achieving the critical RFS goal of making the use of renewable fuels a standard component of the transportation fuel market.

Stable policies and market-based supports for the biofuels industry are critical. Plans under development today for a commercial cellulosic biorefinery to be constructed in 2012, commencing operations in 2013, and financed in part with long-term debt will require long-term predictability in policies to move forward.

Thank you again for the opportunity to appear before you today. We have already started down the path to buildout of a large-scale commercial cellulosic biofuels industry. Now, we must ensure that we achieve the profound positive impacts that cellulosic biofuels are poised to deliver. We need a focused effort to develop biomass feedstock systems—not just crops, but entire integrated systems—that maximize environmental benefits while minimizing unintended consequences, at costs that are attractive to both farmers and biorefineries. We need policies that promote long-term stability and a market that is attractive for investment. Supportive, achievable market-based underpinnings like the RFS are setting the stage for success.

Senator CARPER. Thanks so much.

We have been joined by Senator Voinovich. Senator Voinovich introduced me to the concept of roundtables a couple of years ago, as opposed to a more formal hearing setting, and I have found them to be of great virtue. I think it was at one of those roundtables that George and I convened where I first heard of the virtues of switchgrass. I was pretty impressed at the end of the hearing. I described switchgrass as the grass that saved the world, or maybe will save the world. I don't know that that is, that may be a bit of an overstatement, but I am encouraged by what you have had to say here today. We look forward to discussing it and other aspects of your testimony.

Mr. McAdams, we are happy you are here. Please proceed.

STATEMENT OF MICHAEL McADAMS, PRESIDENT, ADVANCED BIOFUELS ASSOCIATION

Mr. MCADAMS. Thank you, Mr. Chairman, Madam Chairman, Members of the Committee.

I am delighted to be here this morning with you on behalf of the Advanced Biofuels Association. The Association, newly formed, represents 16 second generation biofuels companies, three of which are in California, that hold the promise to deliver significant scalable volumes of high performance, environmentally advantageous fuels.

In my remarks, I will focus on four points: not all fuels are created equal; not all advanced technologies are cellulosic; not all advanced fuels are ethanol; and this Country needs a transition that balances feedstocks over time.

Our Association strongly urges the Congress to continue to support a technology neutral approach and not advantage one type of fuel or technology over another.

Let me turn to my first point. I have attached several slides to my presentation. The first slide is a depiction of the current RFS. As you can see, there are four distinct categories of fuels mandated under the law. If you do the simple math, you will see that the current law allows 4 billion gallons of advanced biofuels other than biomass-based diesel and cellulosic fuels. The law was drafted to specifically designate Brazilian ethanol with its significant greenhouse gas reductions as an advanced biofuels so as not to take gallons away from first generation ethanol.

The second and third slides represent two advanced biofuel technologies of different types of fuels other than ethanol. As you can see from the charts, these fuels have dramatically different volatility ranges. The volatility of a particular fuel is significant for two important reasons. First, it affects the components a refinery must remove from its base blendfuel, currently called RBOB, which then impacts the fuel's cost to consumers now and in the future.

Second, the higher volatility parameter, the greater the potential for a particular renewable fuel to negatively impact environmental performance and backslide under the Clean Air Act on ground level ozone. As we move forward, advanced biofuels other than ethanol can address these concerns. Not only are they on the short developmental timeframe, they can also be made in existing ethanol plants.

In sum, all fuels are not created equal and the types and amounts of particular fuels that may move forward could have a dramatic impact on our ability to maintain attainment in a number of areas across America.

Second, there are significant advanced biofuels technologies that are not cellulosic. In the attached packet, I have included a slide on types of renewable diesel. As you can see, there are a variety of different technologies, a number of different technologies which can make diesel utilizing a diverse range of feedstocks and literally produce a hydrocarbon molecule which is totally fungible as if it came out of a barrel of oil.

For most of these technologies, the renewable diesel will meet the existing standard specification for all diesel fuels.

We applaud the Congress for the manner in which it constructed the biomass-based diesel provision contained in EISA 2007 because it is both technology and feedstock-neutral, allowing second generation renewable diesel fuels an opportunity to contribute over time in the market.

To illustrate the third and fourth points of this testimony, many second generation companies, including a majority of the Association members, will make a molecule which is not ethanol, but a hydrocarbon or an ester. These processed technologies are being demonstrated on existing commercial feedstocks from around the world, currently other than cellulosic material.

Let me state for the record, we are extremely optimistic and supportive of the cellulosic technologies and support their development. For many of these cellulosic companies, their mission is to turn cellulosic biomass into a sugar feedstock. Should the cellulosic industry be able to convert these large volumes of material into commercially competitive sugar-based feedstocks, many of the Association members would welcome the opportunity to combine their respective technologies and produce advanced fuels.

Until such time as the cellulosic companies are able to provide commercially competitive feedstocks, we urge all policymakers to allow the continued development of various advanced technologies from today's affordable and available feedstocks. Given the current economic realities and the credit market, it is crucial for these companies to have the flexibility in terms of their ability to utilize these feedstocks and bid on the solicitations in the Department of Energy research and development programs, the Recovery Act, and other programs in the Federal Government.

Last, I personally had the opportunity to work with the Office of Mobile Sources on a variety of issues, from the Clean Air Act to the low sulfur diesel rule. This is one of the most dedicated and talented groups of people we have in our government. They understand these issues and they have a long track record of delivering tough, but fair solutions to the challenge of fuels, engines and air quality.

Clearly, there will be much debate in the upcoming rulemaking. The current proposed life cycle and indirect land use provisions, as well as how to construct an appropriate methodology to reward more energy-dense and environmentally friendly fuels. But it is now time to get on with the work and we would urge the Adminis-

tration to get this rule out for an open comment period and allow the market to respond.

The disagreements should be aired in public where science, not politics, drives the process.

Thank you for the opportunity to be here.

[The prepared statement of Mr. McAdams follows:]

Senate Committee on Environment and Public Works
Subcommittee on Clean Air and Nuclear Safety

Hearing on Oversight - The Environmental Protection Agency's Renewable Fuel Standard

Wednesday April 1, 2009

Written Testimony

Michael McAdams
President
Advanced Biofuels Association

Chairman Carper, Members of the Committee, it is a privilege, an honor and a responsibility to appear before you this morning. My name is Michael McAdams and I am the President of the Advanced Biofuels Association. The Association represents sixteen second generation companies that hold the promise to deliver significant scalable volumes of high-performance, environmentally advantageous fuels to America. The companies represent a diverse array of technologies that plan to produce a range of fuels: from jet and diesel fuel, to substitute gasoline or gasoline additives. In some instances these companies may be able to make an entirely neat fuel as 100% substitute to diesel, while in other cases they would ultimately be able to replace up to 100% of an existing hydrocarbon fuels at the existing performance standard.

In my limited remarks, I will focus on four points: 1) not all fuels are created equal; 2) not all advanced technologies are cellulosic; 3) not all advanced fuels are ethanol; and 4) this country needs to transition and balance its feedstocks over time. It is because of our belief in these four principles that the members of the Association supported the Senate version of the advanced biofuels program in the last Congress. However, we pledge to work with the existing program as passed.

Our Association strongly urges the Congress to continue to support a technology-neutral approach and to not advantage one type of fuel or technology over another. There is too much at stake and the effects on performance and the environment are too great to mistakenly lock-in a potentially inferior fuel or technology choice simply because they have a head start. I would submit that we might not have the IPod today if we had chosen to lock-in the 8-Track tape back in the 1980s.

Let me turn to my first point. I have attached several slides to my presentation. The first slide is a depiction of the current RFS. As you can see, there are four distinct categories of fuels mandated under the law. If you do the simple math, you will see that the current law allows for four billion gallons of advanced biofuels other than biomass-based diesel and cellulosic fuels. The law was drafted to specifically designate Brazilian ethanol with its significant greenhouse gas reductions as an advanced biofuel so as not to take gallons away from first generation ethanol.

The second and third slides represent two distinct advanced biofuel technologies of different types of fuels other than ethanol. As you can see from the charts, these fuels have dramatically different volatility ranges. The volatility of a particular fuel is significant for two important reasons. First, it affects the components a refinery must remove from the base blend fuel, which then impacts the fuel cost to the consumer now and in the future. Second, the higher the volatility parameter it has, the greater the potential for a particular renewable fuel to negatively impact environmental performance and backslide under the Clean Air Act on ground level ozone. As we move forward, advanced biofuels other than ethanol can address these concerns. Not only are they on a short developmental time frame, they can also be made in existing ethanol plants. In sum, all fuels are not created equal and the types and amounts of the particular fuels that may move forward could have a dramatic impact on our ability to maintain attainment in a number of areas across America.

Second, there are significant advanced biofuels technologies that are not cellulosic. In the attached packet, I have included a slide on renewable types of diesel. As you can see, there are a variety of different manners in which one can make diesel utilizing a diverse range of feedstocks to make what essentially is a totally fungible molecule as if it came from a barrel of oil. For most of these technologies, the renewable diesel will meet the existing standard specification for diesel fuels, ASTM D975. We applaud the Congress for the manner in which it constructed the biomass-based diesel provision contained in EISA 2007 because it is both technology and feedstock neutral, allowing all second generation renewable diesel fuels an opportunity to contribute over time to the market.

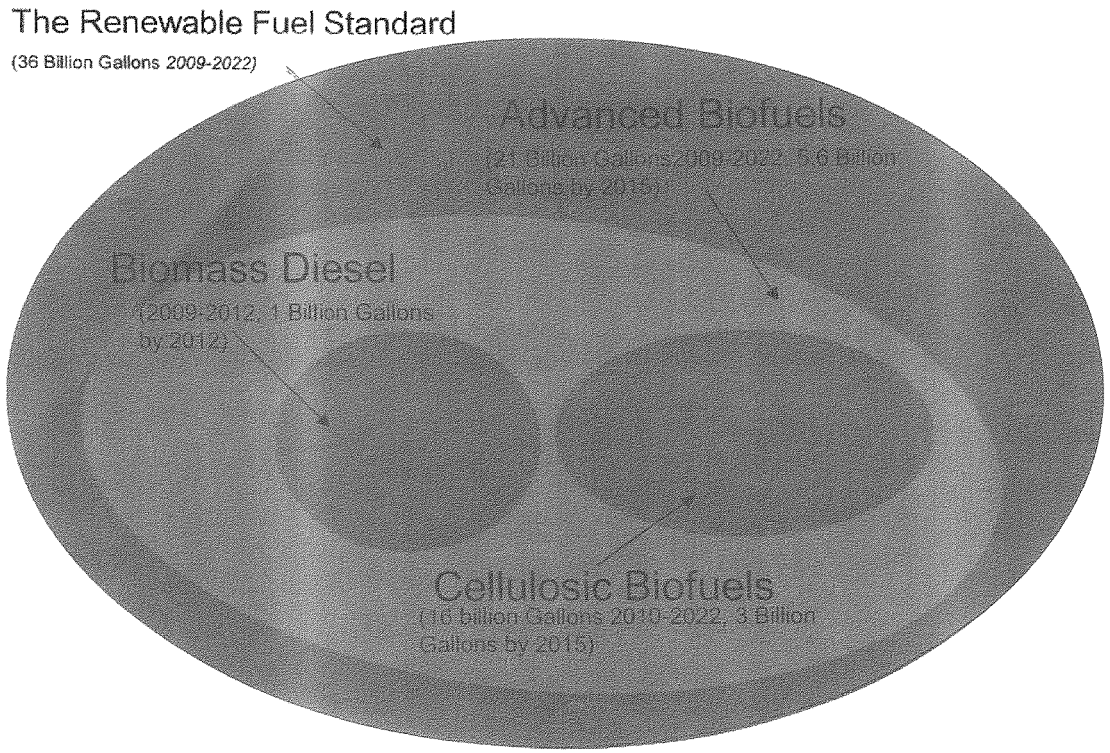
Here, I would like to make two additional points on technology. First, there are a number of advanced technologies now being developed to make biodiesel as well as renewable diesel. And second, in addition to the efforts on diesel and jet fuel, I would be remiss not to also mention that on the gasoline side of the equation, a number of diverse technologies using a range of feedstocks are also planning to make a totally fungible substitute gasoline molecule or a range of molecules which would meet the standard specification for gasoline, ASTM 4814.

To illustrate the third and fourth points of this testimony, many second generation companies, including a majority of Association members, will make a molecule which is not ethanol and which could be made from existing commercial feedstocks from around the world other than cellulosic material. For many of the cellulosic companies their mission is to turn cellulosic biomass into a sugar feedstock. Should the cellulosic industry be able to convert the large volumes of available material into commercially competitive sugar-based feedstocks, many of these companies would welcome the opportunity to combine their respective technologies to produce advanced fuels. Until such time as those cellulosic companies are able to provide commercially competitive feedstocks, we urge the Committee to allow the continued development of various advanced technologies from today's affordable feedstocks. Given the current economic realities and credit markets, it is crucial for these companies to have flexibility in terms of their ability to utilize all feedstocks and to do so in a manner where they may be eligible for Department of Energy Research and Development funding in the same manner as the cellulosic companies.

Lastly, given that this hearing is an oversight hearing on the RFS rulemaking currently pending, I wanted to make a couple of personal remarks about the division of EPA which has been working on this rule. Over the past 20 years, I have personally had the opportunity to work with the Office of Mobile Sources on a variety of issues ranging from the 1990 Clean Air Act to the low sulfur diesel rule. This is one of the most dedicated and talented group of people we have in our government. They understand these issues and they have a long track record of delivering tough but fair solutions to the challenges of fuels, engines, and air quality. Clearly, there will be much to debate in the upcoming rulemaking, the current proposed lifecycle and indirect land use provisions, how to construct an appropriate methodology to reward more energy dense and environmental friendly fuels, to name just a couple of issues. But it is time to get on with the work, and we would urge the Administration to get on with the open comment period on the rule and to allow the market to respond. The disagreements should be aired in a public process where science, not politics, drives the process!

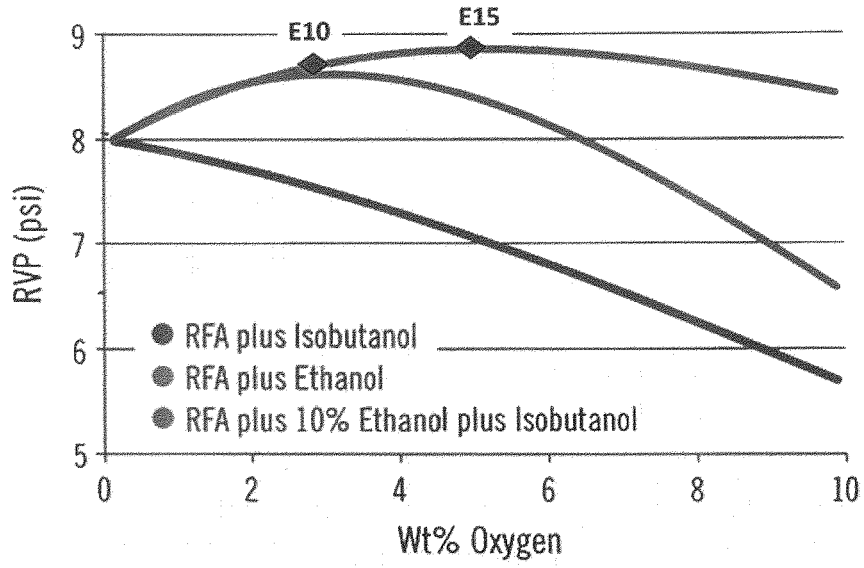
Thank you for the opportunity to testify before you today, I look forward to answering your questions.

New Renewable Fuel Standard



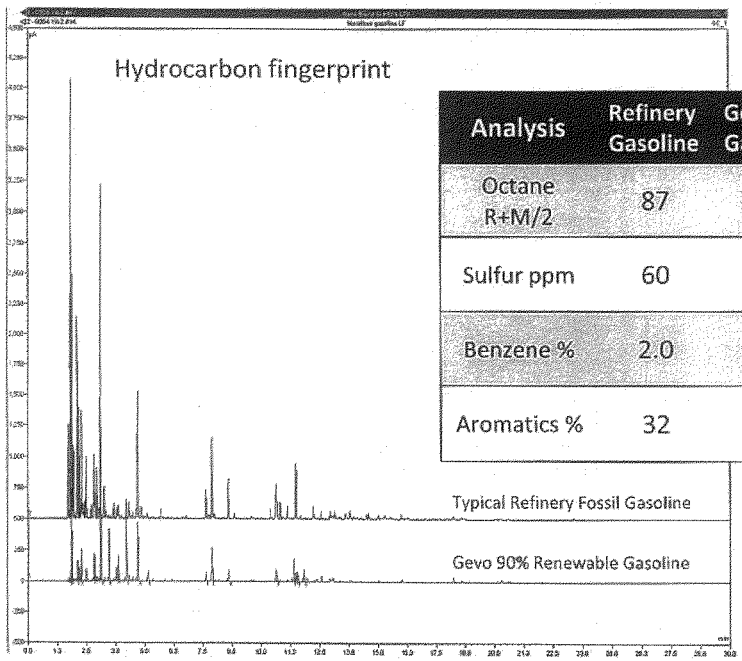
Isobutanol Lowers RVP in Gasoline

Lower RVP is better for air quality attainment



RFA is a reference gasoline used for blending studies

Renewable Gasoline that meets ASTM Specs

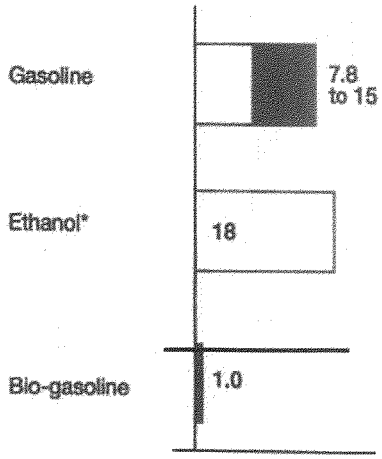


Analysis	Refinery Gasoline	Gevo Gasoline
Octane R+M/2	87	>100
Sulfur ppm	60	<1.0
Benzene %	2.0	<0.1
Aromatics %	32	20

Bio-Gasoline Performance Attributes

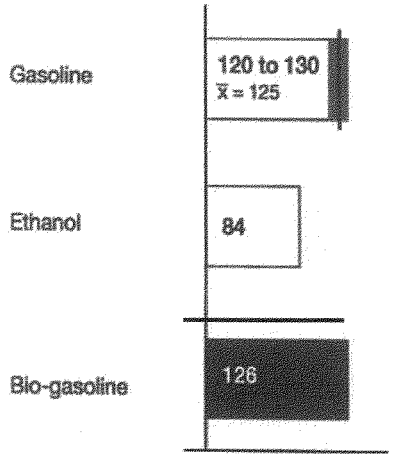
Best in class vapor pressure results in less VOCs and/or enables us of low cost blending components

Vapor Pressure
max, psi



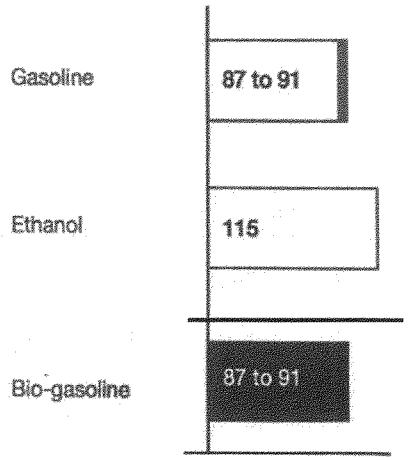
Provides equivalent mileage as gasoline

Energy Density
1000 BTU per gallon



Provides equivalent octane as gasoline

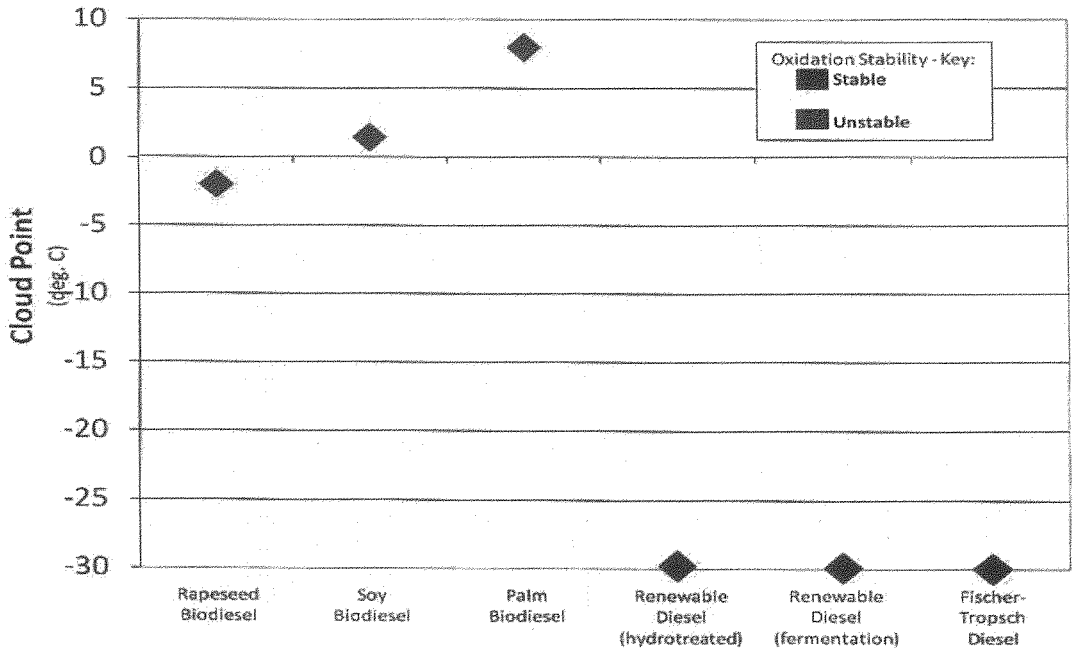
Octane



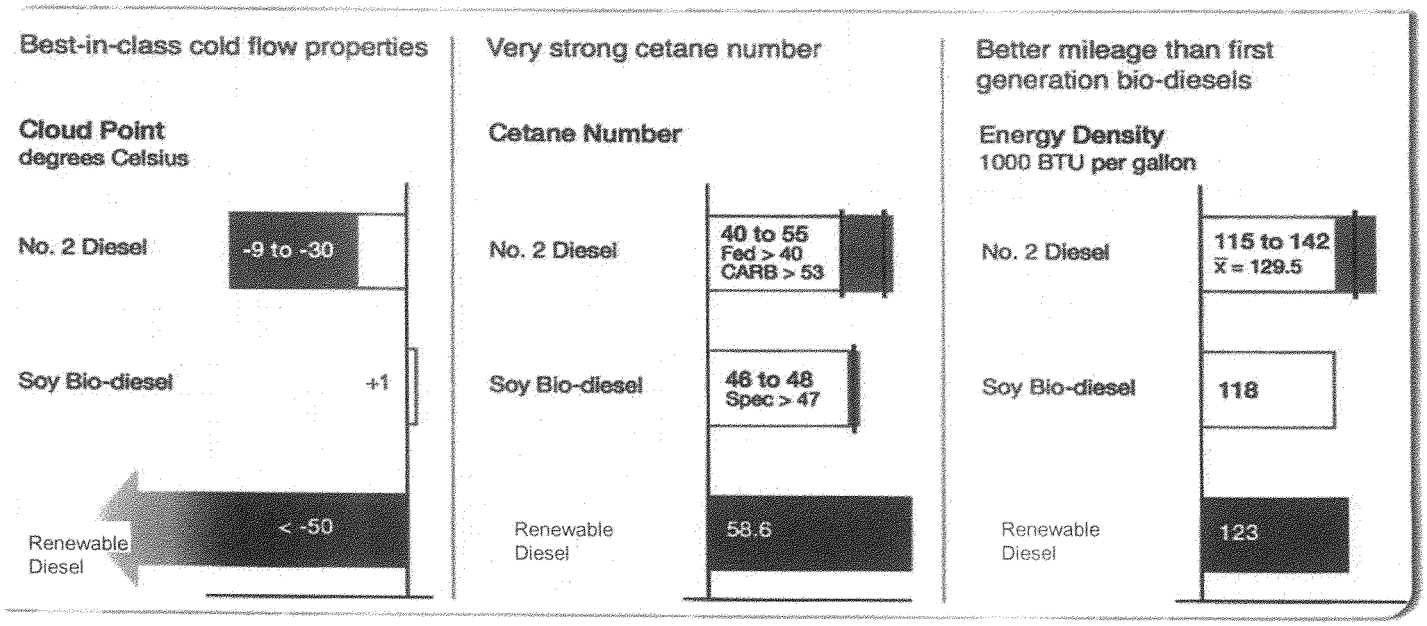
Renewable Diesel Alternatives

Feedstock Preferred	Product	Application	Timeframe
Vegetable Oil	Biodiesel (methyl-ester)	On-Road diesel (splash blend, 2% blend)	Available Today
Animal Fat	Renewable Diesel (uncatalyzed TDP)	Bunker fuel, heating oil	Available Today
Animal Fat	Renewable Diesel (co-processed catalyzed TDP)	On-road premium (pipeline, 10% blend)	Available Today
Animal Fat	Renewable Diesel (stand alone catalyzed TDP)	Jet Fuel, DOD, on-road premium (pipeline, 100% bio)	Available Today
Sugar (corn, sugar cane, cellulose)	Renewable Diesel, Blending component (fermentation)	On-road High Cetane, Jet Fuel (pipeline)	2010
Animal Fats and Oils	Diesel Substitute (Emulsion)	Heating Oil, Distillate, and Marine Diesel, -100%	Available Today
Biomass (animal fat, vegetable oil, litter, wood, chips, etc.)	Renewable Diesel (BTL)	Jet-Fuel, On-Road Highs Cetane (pipeline)	2010

Next Generation Technologies Have Improved Product Attributes (Diesel – Cold Flow & Stability)

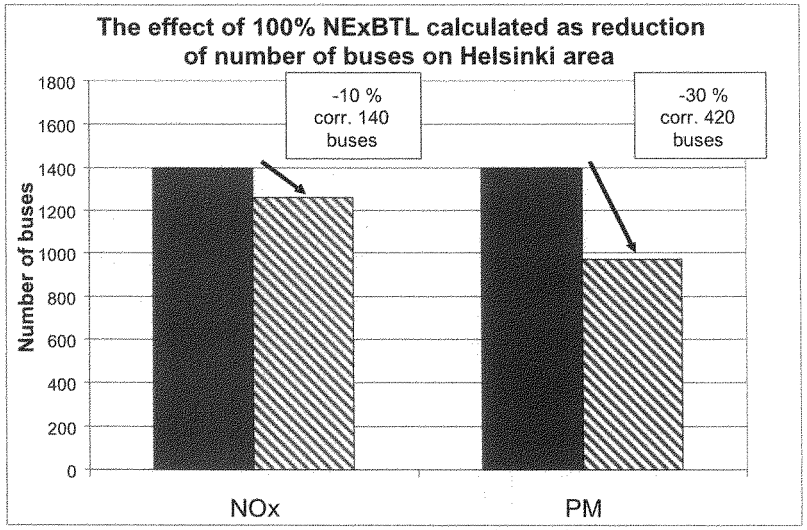


Biodiesel VS Renewable Diesel Performance Attributes



RESULTS 2007-2008

- Average emission reductions with 100% NExBTL diesel (in comparison to 10 ppm S diesel fuel):
  - NOx-emissions approx. -10 %
  - PM-emissions approx. -30 %
  - CO-emissions approx. -35 %
  - THC-emissions approx. -40 %
  - Energy consumption approx. -0,5%
  - Volumetric fuel consumption approx. +4% (as a result of lower density with 100 % NExBTL)



The effect of NExBTL diesel on emissions correlates linearly with the concentration

There are approximately 1400 urban buses in the Helsinki metropolitan area

Senator Barbara Boxer

Mr. McAdams, could you please describe the array of technologies and potential fuels that members in your organization are working to commercialize.

Answer: Chairman Boxer, the Advanced Biofuels Association (ABFA or the Association) represents a wide array of technologies. Currently we represent companies who seek to develop algae oil by photo synthesis, and have one company that modifies algae and uses it as the mechanism for fermentation of sugars to diesel and jet fuels. In addition, we have companies who use biotechnology to create host mechanisms which when introduced into a fermentation process using a sugar feedstock can make a range of hydrocarbon molecules. Importantly, some of these second generation technologies that are drop-in fermentation actors could be used in the existing corn based ethanol plants.

In addition, we represent several corporations which utilize a catalyst technology pathway similar to that found in the refining process today. This technology uses a combination of heat pressure and catalysis agents for a reaction which generally makes a hydrocarbon fuel as if it came from a traditional barrel of oil. We represent four companies that currently utilize some form of gasification technology combined with either fisher tropes, or which utilize an enzymatic technology as the second phase of the process to produce a range of products, from ethanol to jet or diesel. We have other technologies that are looking into the conversion of cellulosic materials to make ethanol or others which would use cellulosic materials or municipal waste by using a catalyst technology or a enzymatic hydrolysis technology to make diesel. Lastly, we have one company that uses food oils with an emulsion technique to make a biofuel which can be used as heating oil of off road applications, as well as another that uses these oils with a thermal deployeramerzation technology to make an on road diesel substitute. Most if not all of these companies are currently operating a small scale pilot plant and manufacture some product at this time but seek funds to move to the demonstration or commercial stage to prove out the scalability of the process.

Senator Tom Udall

1. In New Mexico and other states, several advanced biofuel projects utilizing algae-based technologies are moving forwards and making notable progress. Unlike other biofuels, algae biofuel production does not require arable land or fresh water. Algae also has great potential as a carbon sink. Do you believe that algae is a promising source of biofuel and how would you compare its benefits to other biofuel sources.

Answer: Senator Udall, if you were designing the perfect biofuel it would be scalable, environmentally advantageous, fungible, energy dense and affordable. Algae holds great promise and could potentially address many of these criteria. One of the things some algae producers may be able to do is to provide a low cost oil feedstock for other types of second generation technologies, which can convert it into a renewable diesel or jet fuel. Some Algae technologies seek to make ethanol as a molecule which has fungibility issues and air quality issues.

As you are probably aware, there many different types of algae and many different companies that are exploring different pathways to utilize algae as a potential fuel source. There are challenges for those which chose to grow algae in open ponds in terms controlling the escape to other areas. Others in the algae community claim that, based on the "Redfield ratio," that per unit of fuel produced, algae requires five times as much phosphate as most food plants. Another challenge will be to develop a regulatory framework for genetically-modified algae since the current Coordinated Framework for Regulation of the Biotechnology does not address open-pond cultivation of GMO algae.

In conclusion, our Association is steadfastly technology-neutral and seeks to represent all forms of advanced biofuels. We believe that algae has a bright future and a significant potential to be part of the solution to producing biofuels in America. We also believe that many other advanced biofuels technologies will also be able to address the five major criteria, and that given the need for gallons of fuels and the vast array of feedstocks which we will need to utilize to make American energy independent we will need them all.

2. Cellulosic and biodiesel benefit from a specific biofuel mandates in the Renewable Fuel Standard 17 of the total 21 billion gallons of advanced biofuels required. Should algae based advanced biofuels receive a similar support as cellulosic ethanol and biodiesel? Please explain your answer.

Answer: As you suggest Senator, the RFS as passed creates two subcategories under the Advanced Biofuels Category. First is a one billion gallon mandate which begins in 2009 and tops out in 2012 for biomass based diesel. This category was specifically designed NOT to only be for biodiesel. It was designed to allow a range of second generation technologies to be able to contribute to the biomass based diesel pool with the exception of co-processed renewable diesel. In addition, as you state, a second 16 billion gallon cellulosic pool is created which ends in 2022. The Association took the position that the RFS should be technology neutral and not attempt to pick winners and losers in the biofuels arena. We agreed with the goal of the statute to bring vote higher performing more environmentally sustainable fuels into the 36 billion gallon pool. Therefore we opposed both the carve-outs and would suggest at the current time, given the developments in the market, the categories will be hard pressed to hit the mandated gallons which are called for under the statute. Currently, the National Biodiesel Board, as a result of the land use requirements, is seeking to be exempt from the greenhouse gas reduction requirements under the Biomass based diesel standard. We urge that you oppose such an effort, as it is in direct conflict with the original premise behind creating the category in the first place. In the Association's view, Algae and all advanced biofuels should be allowed to compete and certify with the appropriate requirements for the full 21 billion gallon pool.

Senator James M. Inhofe

1. The current mandates are requiring many billions of dollars to be spent on special infrastructure to accommodate ethanol, since it doesn't integrate easily into the existing fuels distribution network. In your testimony you talk a lot about molecules. If you could pick the right molecule to make from renewable feedstocks, what would it be? Would it be ethanol?

Answer: In a perfect world the right molecule would be affordable, scalable, fungible, zero sulfur, have high energy density and be non reactive to formation of ozone. It could also have high octane and work with the other component molecules in a particular product, be it diesel, jet fuel, gasoline etc. The challenge in the Advanced Biofuels arena is two-fold: 1) the performance of the specific fuel; and, 2) the impacts, availability and cost associated with the feedstock chosen by any given technology which makes biofuels. Technologies that can make hydrocarbon molecules as if they came from a barrel of oil have an advantage in terms of abrogating the need for expensive and multiple large scale infrastructure and vehicle changes. Both ethanol and biodiesel have a tendency to require such changes. More advanced technologies of the future would be able to utilize the sugar streams extracted from abundant cellulosic materials to lower the overall cost and still deliver a diesel, jet or gasoline molecule. This would lower the overall feedstock cost, and depending on the type of cellulosic material, may also avert water issues, fertilizer and pesticide issues as well as all the fungibility cost. In the short term, many conventional sugars may be able to achieve a great many of the advantages as well as some municipal solid waste feedstocks and should be allowed and encouraged. While there may be no perfect fuel depending on which problem you are seeking to address, in the advanced biofuels future there will be many good options to choose from which will present a better more cost effective environmentally friendly set of options than today's ethanol.

2. Could you discuss how far the advanced biofuels industry is from pilot scale and commercial scale production of these fuels. Are these fuels already being produced?

Answer: Senator, the Association represents 21 Advanced Biofuels Companies as of June 10, 2009. To my knowledge, we have four companies that are currently commercially producing some quantities of advanced biofuels. Of the remaining 17 companies, I am aware of pilot plants being operated in all but two of them. Without exception, all of the pilot plants have produced successfully their initial designated fuel product of choice. I am aware that Virent has several running pilot plants and produced a hydrocarbon gasoline and diesel. Amyris has produced both a jet fuel and a diesel as well as a gasoline molecule. Tyson is currently building a 75 million gallon renewable diesel plant with Syntroleum. Neste is producing 60 million gallons a year in Europe with other plants being constructed in the Asia. Ls9 and Solazyme have produced significant batches of biodiesel and jet and Solazyme has also produced a fuel oil. UOP has produced what they refer to as both jet and green diesel. Elevance has made multiple products and is ready to commercialize. Gevo has multiple pilot plants and has produced a number of hydro carbon drop in molecules such as butinol. Still, others are testing and producing from gasification of enzymatic hydrolysis a range of diesel and jet products. For most, the challenge is the regulatory approvals and access to capital in today's tight credit markets.

Senator CARPER. Mr. McAdams, thank you. Thanks for that testimony and for your good work.

Nathanael Greene, welcome. Please proceed.

STATEMENT OF NATHANAEL GREENE, DIRECTOR OF RENEWABLE ENERGY POLICY AND ENERGY DEPARTMENT, NATURAL RESOURCES DEFENSE COUNCIL

Mr. GREENE. Thank you, Senator, and thank you for this opportunity to share some of my views on the opportunities and challenges in implementing the renewable fuel standard.

My name is Nathanael Greene, and I am a Senior Policy Analyst with the Natural Resources Defense Council and our Director of Renewable Energy Policy.

I think this hearing is incredibly timely. While on the face of it, it may seem like not a lot has happened since you held a similar hearing a year ago, actually the renewable fuels standard is at a critical junction right now. EPA has drafted a rule to implement the renewable fuel standard as amended under EISA 2007, but the Administration has yet to put this rule out for public comment.

Some in Congress are pressing the agency to strip out key provisions before there is even a public debate around EPA's proposals. Others are trying to remove the law's critical safeguards before they even go into effect.

Biofuels are probably the most complicated possible solution to global warming. A few numbers help to illustrate the opportunity and challenges they pose. As you no doubt know, transportation makes up about 30 percent of our global warming pollution here in the United States, and light duty vehicle emissions make up about 60 percent of that 30 percent, so 20 percent of the total.

So if, for example, we zeroed out all of the emissions from the rest of the economy and all of the emissions from the light duty vehicle fleet, say through electrification, we would achieve a 90 percent reduction in our overall greenhouse gas emissions.

So can we achieve an 80 percent goal by 2050 without biofuels? Technically, yes. In reality, it would be extremely difficult. On the other hand, it is extremely easy for biofuels to be produced in a way that actually results in more global warming pollution than gasoline and diesel.

For example, if using an acre's worth of corn to make ethanol leads to just one-tenth of an acre of rainforest clearing, then all of the greenhouse gas pollution benefits from gasoline for the first 30 years of production are wiped out.

And while there is much debate about the land use change issue, I have found it helpful to keep asking myself whether it is possible for us to add new demand for corn and soy and wood or any other crop and for there somehow to result in less demand for land. I believe the answer is no. New demand for biomass from the land leads to new demand for land, simple supply and demand.

We can debate the greenhouse gas emissions from bringing new land into production and whether that is small or large, but it must be greater than zero.

So I would urge you to tell EPA to move ahead with a public comment period for its proposed rule and keep the emissions from land use change in its proposal. I would also urge you to protect

the renewable biomass sourcing safeguards in the law and in the proposed rule. These are not guidelines on how to harvest biomass sustainably. They are merely protections against the most destructive sources of biomass. Senator Thune has a proposal that would essentially remove all of these safeguards, and I urge you to oppose that.

With regard to Senator Wyden's proposal that the Senator talked about earlier, let me just say I certainly applaud Senator Wyden's interest in environmental sustainability and protections for biomass sourcing. His amendment deserves careful study. NRDC's forestry staff are committed to working with Senator Wyden and all the other Members of Congress to ensure that all biomass legislation meets our shared goals.

Senator Carper, in your opening statement you asked if we are moving too fast with the renewable fuel standard. I think with regards to the blendwall, it is quite possible that we are. Fortunately, you have some of the leading experts on this issue, including my friend Blake here who will tell you more about that, so I will defer to him on that specific issue.

On the broader question of advanced biofuels and whether or not they will be ready, there has often been the joke that cellulosic biofuels are about 5 years out, and they will always be 5 years out. I think now finally we can say that they are actually 3 years out, and hopefully we won't have to wait 3 years to say that again.

But I don't think the technical and economic and public support challenges facing advanced biofuels can be overstated. To address those, I would like to make a modest proposal. We really need advanced biofuels to work from a global warming perspective. But if we are lucky, this year we will produce about 1 million gallons of advanced biofuels from all the pilot projects and demonstration projects out there. And that is if all those projects fund flat out, which is not how they are designed to run.

The real challenge is not getting to 16 billion gallons or 22 billion gallons for advanced biofuels. It is the thousandfold scale-up from 1 million gallons to a billion gallons that needs to happen in the next 5 years. I believe that we need to implement a billion gallon challenge. If we do this right, we cannot only launch a commercial scale advanced biofuels industry, but also reestablish a broad consensus on how to do biofuels right.

I think we can do this by fully funding a range of existing programs and getting the agencies responsible for them to work in a coordinated way so that we have a cohesive package of support from field to fuel. But with significant support must come significant environmental responsibility. We need to make this billion gallons a billion gallons of the best. And this, I believe, is the basis for a new consensus around biofuels.

Finally, we need to stop spending our tax dollars on mature technologies and technologies that cause more harm than good. This means reforming policies like our biofuels tax credits so that they pay for performance.

Thank you for this opportunity.

[The prepared statement of Mr. Greene follows:]

Natural Resources Defense Council

Statement of

Nathanael Greene

Director of Renewable Energy Policy

Natural Resources Defense Council

Before the

Committee on Environment and Public Works

Subcommittee on Clean Air and Nuclear Safety

United States Senate

April 1, 2009

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I. Introduction

Thank you for the opportunity to share my views regarding the opportunities and challenges of implementing the Renewable Fuels Standard (RFS). My name is Nathanael Greene. I'm a senior policy analyst for the Natural Resources Defense Council (NRDC) and our director of renewable energy policy. NRDC is a national, nonprofit organization of scientists, lawyers and environmental specialists dedicated to protecting public health and the environment. Founded in 1970, NRDC has more than 1.2 million members and online activists nationwide, served from offices in New York, Washington, Los Angeles, San Francisco, Chicago, and Beijing.

Mr. Chairman, this hearing is particularly well timed. As you know, we are in uniquely challenging times with the economy in dire straits, the urgency of global warming accelerating, and our energy security as important as ever. In the area of biofuels, these challenges are particularly pressing, but these challenges can also be opportunities if we can get our biofuel policies right. Almost all of our biofuels policies are at critical stages right now and how they develop over the next 6 months to a year will determine whether biofuels will be part of the solution to our multiple challenges or part of the problem. This is true for how we handle the ethanol blend wall and our biofuels tax credits, but it is most critically true with how we implement the Renewable Fuel Standard (RFS).

Sustainably produced biomass feedstocks, processed efficiently and used in efficient vehicles can reduce our dependence on oil for transportation, reduce emissions of heat-trapping carbon dioxide, and contribute significantly to a vibrant farm economy. Pursued without adequate guidelines such as those that Congress wrote into the RFS, however,

biofuels production carries grave risk to our lands, forests, water, wildlife, public health and climate. Unfortunately, the safeguards and standards in the RFS legislation are already under attack before they have been implemented.

If our biofuels policies are to deliver on the promise of biofuels, they must first and foremost be guided by the best science and economics, and they must also focus like a laser on pushing the development of the best biofuels. Fiscally and environmentally, we simply cannot afford to continue to support mature biofuels and those that cause more harm than good.

II. EPA Should Release a Complete Proposed RFS Rule for Public Comment Now

The US Environmental Protection Agency (EPA) has submitted to the Office of Management and Budget a proposed rule to implement the Renewable Fuel Standard, as amended by the Energy Independence and Security Act of 2007. As you know, these amendments established lifecycle greenhouse gas performance requirements for new biofuels and specifically definite lifecycle emissions to include "direct and significant indirect emissions such as significant emissions from land-use changes." It is my understanding that EPA's proposed rule includes a lifecycle analysis with values for emissions from indirect land-use, but unfortunately, the proposal seems stalled at OMB.

I urge this subcommittee to encourage the Obama administration to put this proposed rule out for public comment as soon as possible and to ensure that the proposed rule is robust and includes the impacts of indirect land use change on GHG emissions as required by law. The emissions from land-use change would be best dealt with by regulating land owners, but unfortunately even here in the United States, this is many years off and internationally

it is even further in the future. In the meantime, if we are to use policies such as the RFS to encourage biofuels, we need to include emissions from land-use change. If we don't, by squeezing down on the pollution from transportation, we will cause an increase in pollution from land-use.

NRDC has been following closely the developing science on the contribution of indirect emissions from land use changes and I want to voice our strong objection to the suggestion in recent letters to EPA and OMB that EPA should delay or significantly constrain consideration of indirect land use in the RFS rulemaking. EPA has been engaged in a rigorous rule-making process that has drawn on the best available science and peer-reviewed models, and the public comment period is the best and most appropriate place to continue to improve EPA's proposal and ensure the transparency and scientific basis of the rulemaking process.

Consideration of all of the science in an open and transparent comment process will be key to ensuring that the regulations accomplish the emissions reductions Congress intended when they directed that indirect emissions from land use changes be included. Suppression of this part of the rule, or of aspects of EPA's accounting methodology and results of this accounting, prior to the comment period would severely damage the integrity of the rulemaking process and result in a rule that would almost certainly be legally insufficient.

There is no doubt that using some sources of biomass to make fuels leads to substantial GHG emissions as a result of changing our uses of land around the world and that these emissions can easily make the difference between fuels that reduce or increase GHG

emissions relative to gasoline. There are ongoing debates about the best approach to modeling these emissions, but moving ahead with a rule while delaying or omitting the emissions from indirect land use would be equivalent to assigning these effects a zero value, which is clearly not supported by the science.

A zero value is equivalent to assuming that land is limitless, and that agriculture can expand infinitely without any secondary damage. This flies in the face of common sense and is not a reasonable response to technical uncertainties in the analysis. A zero value for indirect land use would send the wrong signal to the market, and would encourage ventures that increase global warming pollution and that would fail once the lifecycle accounting accurately and completely addresses the impact of land use changes. Encouraging investments in high carbon technology based on intentionally distorted accounting is a dangerous detour for the biofuels industry and would clearly undermine the intent of Congress in establishing minimum greenhouse gas standards for biofuels.

It has also been suggested to EPA that better data will be available over time. We agree, and suggest that inclusion of indirect land use effects at the outset is the best approach for promoting the scientific and data improvements that will inform a robust on-going process of updating the regulations in the future

We are convinced that it is technically practical and environmentally and legally critical for EPA to follow the requirements of the Energy Independence and Security Act of 2007 and to include indirect effects in its analysis of lifecycle GHG emissions from biofuels production. Excluding indirect land use in the RFS would intentionally distort the accounting and undermine the environmental and legal basis for continuing forward with

the RFS rule in general. Even much more delay puts at risk the increased volume requirements for 2010, which is the first year the RFS specifically requires volumes of fuels that must perform better than the lifecycle GHG thresholds. NRDC opposes any further increase in the RFS volume requirements until a robust and legally complete rule has been finalized.

III. The RFS land and wildlife safeguards must be preserved and extended to all bioenergy policy

In addition to the minimum GHG standards, the RFS includes a definition of renewable biomass that provides essential safeguards for wildlife, native grasslands, old-growth, natural forests, and federal forests. While providing this minimum level of protection, the safeguards are broadly inclusive of the kind of material that typically provides the biggest sources of biomass, assuring diverse opportunities for landowner participation and a wide diversity of feedstocks. These are not, as they are sometimes referred to, sustainability standards; these safeguards protect only against the most destructive practices and sources of biomass. These safeguards should be extended to all policies that promote bioenergy including a Renewable Electric Standard, which we hope will soon be enacted into law.

The renewable biomass definition permits the use of:

- All crops and crop residue from current agriculture land and non-forested, fallow land

- All crops and crop residue from any non-forested land cleared prior to the enactment of the Energy Independence and Security Act of 2007 (EISA07), including newly established tree plantations[1]
- All trees and logging residue from non-federal tree plantations, excluding those converted from natural forests after passage of EISA07 (See below)
- "Slash and pre-commercial thinnings" from non-federal natural forests, which, importantly, constitute the lion's share of woody-biomass from natural working forests that are expected to be economically viable options for biofuels, while keeping forests from being converted
- All material removed from the immediate vicinity of homes and communities at risk from wildfire, on federal and non-federal lands
- Animal waste and animal byproducts
- Waste material, including separated yard waste, food waste, and cooking and trap grease

The definition of renewable biomass ensures the RFS does not encourage biomass harvesting from sensitive wildlife habitat. The ecosystems identified by the RFS as off-limits are home to our most rare, threatened, and imperiled wildlife. While tree plantations and young forests are increasing in parts of the United States, older forests that provide critical wildlife habitat and store tremendous amounts of carbon are disappearing faster than they are being regrown, both nationally and globally, and loss of native habitat is the greatest threat to biodiversity here and abroad.

The RFS safeguards also protect against the use of biomass harvested from native grasslands and old-growth and late successional forest. Loss of forests is one of the greatest threats to biodiversity worldwide and a major contributor to global warming.[2]

[1] While I recognize that the term "plantation" carries negative historical connotations, it is used throughout my testimony because "tree plantation" it is a technical term distinct from "tree farm". "Tree plantation" is also the term used in the Renewable Biomass definition legislative text.

The RFS definition of renewable biomass does not by any means exclude woody biomass, but does ensure that federal policy is not making this bad situation worse. The RFS renewable biomass definition includes all biomass from existing tree plantations, new tree plantations established on previously cleared non-forested lands, and "slash and pre-commercial thinnings" from natural forests. In concert, these provisions allow woody-biomass to contribute to biofuels, while protecting against the clearing of forests or the conversion of natural forests to monoculture tree plantations, thus losing their natural ecosystem functions.

It is important to emphasize that we believe the term "slash and pre-commercial thinning" should be interpreted with substantial flexibility - allowing the use of all harvest byproducts, as well as small and low-value trees from natural forests, as long as the forest is naturally regenerated after harvest as opposed to converted into a tree plantation or other crop.

Natural forests are under severe threat from unsustainable logging practices, global warming, and real estate development. While deforestation is the most dramatic example of this growing crisis, equally critical is the conversion of natural forests to single-species tree plantations. Plantations may look like "forests," but they are biological deserts when compared to the natural forests that they replace—lacking the diversity of species, structure, and ecological functions that make natural forests so important.

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[2] Intergovemental Panel on Climate Change, *Climate Change 2007: Synthesis Report Summary for Policymakers*, pg. 5. Available at http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf

Finally, the RFS sourcing safeguards protect our federal forests. These forests represent unique reservoirs of biologic diversity, genetic diversity, significant carbon stores, and many other ecological services, and stand to play a critical role in the face of global warming's growing impacts, including loss of biodiversity, decreased ecosystem resilience, and the spread of invasive species.[3] It is therefore becoming commensurately more important that our federal forest resources are managed and preserved for their numerous non-commodity values and that we assiduously avoid policies that would impose additional pressures on these already stressed, and increasingly crucial, public resources.

In this context, proposals like those contained in H.R. 1190 and S. 636 to use "preventative thinnings" from national forests as a biofuels source make little economic or ecologic sense and should be opposed. (Please see Attachment 1, a letter sent to all Senators opposing S.636 signed by 43 conservation and environmental groups.) First, it is important to understand that preventative thinning—the removal of forest biomass including anything from small brush to large trees to address forest health—is essentially logging and thus not devoid of ecological impacts, such as soil compaction, spread of invasive species, hydrologic disruption, and in the case of associated road building, increased fire risk due to lost resiliency and increased human traffic.[4]

The argument for the production of biofuels from national forest preventative thinnings hinges on three basic assumptions, all three of which would have to be valid for the

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[3] See, for example, Lovejoy, Thomas, *Climate Change and Biodiversity*, Yale University Press, August 2006.

[4] The literature on the ecologic impacts of logging and road-building is extensive. For a collection of independently reviewed material, see http://www.nrdc.org/land/forests/roads/eotrinx.asp. *See also* USDA. "Roadless Area Conservation Final Environmental Impact Statement." US Forest Service. Vol. 1. (November, 2000). pp. 3-116. Eastman, J. C., et al. "Roadless Areas and Forest Fires in the Western United States." American Geographical Union Spring Meeting. (May 29, 2002). Pyne, S. J. *Tending Fire: Coping with America's Wildland Fires*, Island Press, 2004, p. 208.

proposition to be worth the impacts and risks of logging: first, preventative thinnings based biofuels do not negatively impact global warming; second, preventative thinnings will safely and sustainably produce a meaningful volume of biofuels; and third, biomass removal is reliably beneficial to addressing wildfire. Unfortunately none of these underlying assumptions related to producing biofuels from preventative thinnings reflect the best available science or pragmatic, on the ground scenarios. To contribute a negligible amount of fuel, we would have to risk further degraded forests, exacerbating fire risk, reducing carbon storage, increasing GHG emissions, and establishing an unsustainable industrial demand for continued commercial exploitation of vital public resources.

IV. Ethanol Blends and Other Biofuels Policies Need to Be Guided by the Best Science

The Renewable Fuel Standard is hardly the only biofuels policy that needs to be guided by the best available science and an open and transparent process. To quote from President Obama's March 9, 2009 Memorandum on "Scientific Integrity":

> "Science and the scientific process must inform and guide decisions of my Administration on a wide range of issues, including improvement of public health, protection of the environment, increased efficiency in the use of energy and other resources, mitigation of the threat of climate change, and protection of national security."

While others at this hearing will talk about these issues in more depth, the amount of ethanol we allow to be blended into a gallon of gasoline must be based on complete testing to ensure the public's health is protected. Congress should avoid trying to legislate this blending level and EPA's decision about recent requests for waivers from the Clean Air Act standards that governor the level should be based on the best science.

V. Our Biofuels Policies Must Shift to Only Supporting the Best Biofuels

To avoid the worst impacts of global warming, we need to make low-carbon biofuels work. But the best biofuels have yet to make the jump from the lab to the pump. As a first step, policy makers should stop spending tax dollars on the dirty biofuels of yesterday. Instead we need to start paying for performance that is above and beyond the existing safeguards and standards that were adopted as part of the RFS. But paying for performance is not enough. Right now, the best biofuels—the ones that reduce global warming pollution and protect the environment—are still just a promise. Even though biofuels received about $10 billion in taxpayer support in 2008, truly "good" biofuels are not yet produced on a commercial scale. We need to jumpstart the best biofuels and make them work for our economy and our environment.

A. The Billion Gallon Challenge

2009 will likely be the first year that the United States produces 1 million gallons of advanced biofuels, but none of this will come from commercial-scale facilities. Our main existing policy—the Renewable Fuel Standard, which requires the use of 36 billion gallons of biofuels by 2022—provides a nice target, but does not provide economic certainty in the near-term needed to meet to ensure the commercialization of advanced biofuels. The real test for producing good biofuels comes in the scale-up from 1 million to 1 billion. We need to direct all of our biofuels incentives toward these first billion gallons and in return demand that this first billion gallons be the best. I suggest we adopt a "Billion Gallon Challenge." (Please see Attachment 2, a factsheet on the Billion Gallon Challenge.)

A Billion Gallon Challenge would strive for 1 billion gallons of low-carbon biofuels by 2014 produced using feedstocks and conversion technologies that promise scalability and broad

sustainability. These are the fuels that we can all agree will protect our economy and our environment—growing more jobs, more food, and more truly low-carbon fuel. To do this, we need to stitch together existing government programs under a new law to provide support for the whole biofuels system, from field to fuel. The three key pieces of the challenge are:

- ***A realistic scale*** – The goal will be 10 to 20 advanced biofuels projects, assuming 50 to 100 million gallons per facility.
- ***Comprehensive support and environmental standards*** – We need to fully fund a package of existing programs, link them together into a comprehensive and coordinated initiative along with a set of sustainability requirements, and reform our biofuels tax credits to support the Billion Gallon Challenge.
- ***Learning while doing*** – Because we will be learning how to deploy these systems as they are developed, each of these projects should be partnered with a comprehensive research and assessment program drawing on the expertise of agricultural extension services, NRCS researchers, land grant and other universities, our national labs, and others.

B. How to Make it Happen

The first and most important steps are to stop funding bad biofuels and mature conventional biofuels and to maintain the performance standards and minimum sourcing safeguards adopted as part of the Renewable Fuel Standard. Then, to jumpstart advanced biofuels, we need to take advantage of a number of programs that, if fully funded, can help meet the Billion Gallon Challenge.

The Biomass Crop Assistance Program, the Farm Bill conservation programs, the Biorefinery Assistance, the EISA Section 207 grants, the SunGrant Initiative, and the Biomass R&D Act programs should be fully funded to provide full system support including

research and analysis. By coupling these programs with the Section 1705 loan guarantee program established as part of the stimulus bill, which specifically focuses on innovative biofuels systems, we will have dollars available for every stage of an advanced biofuels system.

Adding in the following measures, we will have a roadmap to producing a billion gallons of the best biofuels.

1. Link together the different incentive programs and the agencies that administer them

These programs and agencies need to function as a coordinated whole with a minimum amount of bureaucracy. The crops, the framing practices, the pre-processing and transport, the conversion process and the coproducts should all be developed and implemented in the most sustainable manner, even if they are not all managed by the same facility.

2. Establish comprehensive gold-standard sustainability requirements for eligibility for financial incentives

For the Billion Gallon Challenge, we should require significant and measurable improvements in a project's production systems according to a broad set of sustainability standards. Verification systems, such as the Roundtable on Sustainable Biofuels, would be the basis for these requirements and ensure we are improving practices that reduce soil erosion, improve water use efficiency and quality, and protect other critical ecological values. The approach will evaluate each project within the context of its existing surrounding landscape, with an objective of finding integrated solutions to our economic and environmental needs.

3. Reform biofuels tax credits

In 2009, the various current biofuel production tax credits will be cost tax payers about $5 billion. However, there exists no federal tax policy designed to reward the increased performance of any kind of biofuels. To remedy this, we propose reforming our federal biofuel tax credits to one technology-neutral, performance-based tax credit. Specifically, I propose that the existing corn ethanol, cellulosic, and biodiesel production tax credits be reformed into a single tax credit worth up to $1.00 per 7600 Btu (the equivalent of one gallon of ethanol) with half of the credit paid based on providing GHG reductions above and beyond those required under the RFS and the other half paid based the ecological performance of fuel and feedstock production. I believe these two measures of performance of different biofuels can be assessed using the GHG accounting currently being developed by EPA and by building off of existing tools that USDA has developed.

VI. Conclusion

Renewable fuels hold great promise as a tool for reducing global warming pollution, breaking our dangerous oil addiction, and revitalizing rural economies, as long as appropriate standards and incentives are used to shape the nascent bioenergy industry to provide these benefits in a sound and truly sustainable fashion. Congress deserves credit for the foresight it showed in starting to build these standards and safeguards into the new RFS. We should build on this foundation by encouraging EPA to release its proposed rule—with a complete lifecycle GHG accounting including emissions from indirect land-use change—for public comment as soon as possible. We should also protect the renewable biomass sourcing safeguards and extend them to all of our bioenergy policies. We urge EPA to be protective of public health by waiting for complete and conclusive science before

allowing higher blends of ethanol and gasoline. And we need to stop paying for mature and environmentally destructive biofuels. Instead, we need to adopt a Billion Gallon Challenge to get 1 billion gallons of the best advanced biofuels into commercial production by 2014. To do this we need comprehensive support for 10 to 20 projects, comprehensive sustainability standards for these projects, and we need to reform our biofuels tax credits to pay for the best performance.

Attachment 1

Allegheny Defense Project * Alliance for the Wild Rockies * American Lands Alliance
Biodiversity Conservation Alliance * Clean Air Task Force
Citizens Action Coalition of Indiana * Conservation Congress * Christians Caring for Creation
Defenders of Wildlife * Earthjustice * Environmental Protection Information Center
Environmental Working Group * Friends of the Earth * The Habitat Trust for Wildlife
***Heartwood * Global Justice Ecology Project * Greater Yellowstone Coalition**
John Muir Project * Kentucky Heartwood * Klamath Forest Alliance
Kootenai Environmental Alliance * The Lands Council * League of Conservation Voters
***Massachusetts Forest Watch * Native Forest Council * National Audubon Society**
National Wildlife Federation * Natural Resources Defense Council * Olympic Forest Coalition
RESTORE the North Woods * Southern Appalachian Forest Coalition
Southern Environmental Law Center * Sierra Forest Legacy * Sierra Club
Spirit of the Sage Council * Swan View Coalition * The West Virginia Highlands Conservancy
WildEarth Guardians * The Wilderness Society * Wildlands CPR * WildWest Institute
Wild South

March 27, 2009

Dear Senator:

On behalf of our millions of members, activists, and supporters we urge you to oppose Senator Thune and Tester's recently introduced bill to amend the Clean Air Act, S. 636. By replacing the current definition of renewable biomass in the Renewable Fuels Standard, S. 636 would roll back critical environmental safeguards that protect important wildlife habitat, at risk forests and grasslands, and our federal forests. These provisions are an essential part of sound biofuels policy and help keep the Energy Bill's 36 billion gallon biofuels mandate from resulting in even more harm than good.

As climate change radically alters our landscape we must preserve our remaining natural ecosystems and ensure they are healthy and resilient. S. 636 would remove vital ecosystem protections in the RFS mandate, replacing the current definition of renewable biomass with a version that lacks any meaningful protections.

The proposed changes would incentivize the loss of critical wildlife habitat, natural forests and grasslands, and the degradation of our federal forests. On federal lands the language the bill uses to restrict old growth logging is vague and confusing and could cause the loss of big trees that provide key wildlife habitat and are the most resistant to forest fires. S. 636 also relies on land management plans that can easily be changed to permit logging in inventoried roadless areas, fragile soils, and steep slopes.

Moreover, the RFS land and forest safeguards work in concert with the RFS's greenhouse gas standards to keep new biofuels production from resulting in deforestation or other land conversion that would release millions of tons of global warming pollution. Deforestation already contributes 20 percent of global GHG emissions and our biofuels policies must assiduously avoid contributing to this problem.

The RFS land and climate safeguards provide for a plentiful supply of biofuel feedstocks without putting important wildlife habitat, natural forests, native grasslands, and public lands in our gas tanks. Stripping these safeguards through legislation like S. 636 would represent a dangerous step backwards for biofuels and climate policy alike.

Once again, we urge you to oppose S. 636 which rolls back the 2007 Energy Bill RFS environmental safeguards.

Sincerely,

Ryan Talbott
Forest Watch Coordinator
Allegheny Defense Project (PA)

Michael Garrity
Executive Director
Alliance for the Wild Rockies (MT)

Randi Spivak
Executive Director
American Lands Alliance

Duane Short
Wild Species Program Director
Biodiversity Conservation Alliance (WY)

Jonathan Banks
Climate Policy Coordinator
Clean Air Task Force

Kerwin Olson
Program Director
Citizens Action Coalition of IN (IN)

Denise Boggs
Executive Director
Conservation Congress (MT)

Mary Beth Beetham
Director of Legislative Affairs
Defenders of Wildlife

Marty Hayden
V.P. Policy and Legislation
Earthjustice

Scott Greacen
Executive Director
Environmental Protection Information Center (CA)

Sandra Schubert
Director, Government Affairs
Environmental Working Group

Eric Pica
Director, Domestic Programs
Friends of the Earth

Doug Doepke
President
The Habitat Trust for Wildlife (NC, CA)

Ernie Reed
Council Chair
Heartwood (IL, IN)

Anne Petermann
Executive Director
Global Justice Ecology Project

Craig Kenworthy
Conservation Director
Greater Yellowstone Coalition (MT)

René Voss
Attorney
John Muir Project (CA)

Jim Scheff
Director
Kentucky Heartwood (KY)

Kimberly Baker
Forest and Wildlife Protection Coordinator
Klamath Forest Alliance (CA, OR)

Barry Rosenberg
Executive Director
Kootenai Environmental Alliance (ID)

Mike Petersen
Executive Director
The Lands Council (WA)

Tiernan Sittenfeld
Legislative Director
League of Conservation Voters

Chris Matera
Founder
Massachusetts Forest Watch (MA)

Tim Hermach
Executive Director & Founder
Native Forest Council (OR)

Mike Daulton
Legislative Director
National Audubon Society

Julie M. Sibbing
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National Wildlife Federation

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Natural Resources Defense Council

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Debbie Sease
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Leeona Klippstein
Executive Director
Spirit of the Sage Council (CA, NC)

Keith Hammer
Chair
Swan View Coalition (MT)

Hugh Rogers
President
The West Virginia Highlands Conservancy (WV)

Bryan Bird
Public Lands Program Director
WildEarth Guardians (NM)

Linda Lance
Vice-President of Policy
The Wilderness Society

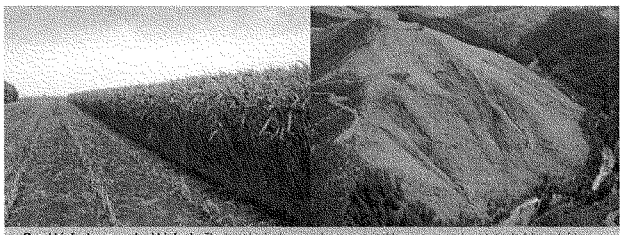
Bethanie Walder
Executive Director
Wildlands CPR (MT)

Matthew Koehler
Executive Director
WildWest Institute (MT)

Ben Prater
Conservation Director
Wild South (S.E.)

Attachment 2

Energy Facts



Good biofuels versus bad biofuels: The best biofuels come from sustainable sources such as triticale (above left), a biomass grown as a winter crop. Bad biofuels can clearcut forests and demolish landscapes (above right).

The Billion Gallon Challenge: How America Can Produce One Billion Gallons of the Best Biofuels By 2014

To avoid the worst impacts of global warming, we need to make low-carbon biofuels work. But the best biofuels have yet to make the jump from the lab to the pump. As a first step, policy makers should stop spending tax dollars on the dirty biofuels of yesterday and start paying for performance, while maintaining our existing safeguards and standards. But that's not enough. We need to jumpstart the best biofuels and make them work for our economy and our environment.

We need a Billion Gallon Challenge.

For more information, please contact **Nathanael Greene** at (212) 727-4482 and visit his blog at **http://switchboard.nrdc.org/blogs/ngreene/**

Transportation makes up about one-third of our global warming pollution. Traditional fuel sources such as oil are putting a strain on our economy and our environment by escalating global warming pollution and leaving us vulnerable to price spikes in foreign oil. Advanced biofuels are a low-carbon solution for helping to solve global warming—if they are done right. But right now, biofuels are incredibly controversial, and for good reason.

Biofuels are a double-edged sword. They can be produced in ways that reduce greenhouse gas pollution or in ways that increase it. Biofuels can help clean up the air, water, and soil and protect wildlife. Or they can degrade our lands and water, threaten biodiversity, and harm public health.

Right now, the best biofuels—the ones that reduce global warming pollution and protect the environment—are still just a promise. Even though biofuels received about $10 billion in taxpayer support in 2008, truly "good" biofuels are not yet produced on a commercial scale.

The Billion Gallon Challenge

2009 will likely be the first year that the United States produces 1 million gallons of advanced biofuels, but none of this will come from commercial-scale facilities. Our main existing policy—the Renewable Fuel Standard, which requires the use of 36 billion gallons of biofuels by 2022—provides a nice target, but does not provide economic certainty in the near-term needed to meet the Billion Gallon Challenge.

The real test for producing good biofuels comes in the scale-up from 1 million to 1 billion. We need to direct all of our biofuels incentives toward these first billion gallons and in return demand that this first billion gallons be the best.

We Need a Billion Gallons of the Best

A Billion Gallon Challenge would strive for 1 billion gallons of low-carbon biofuels by 2014 produced using feedstocks and conversion technologies that promise scalability and broad sustainability. These are the fuels that we can

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March 2009
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Energy Facts

The Billion Gallon Challenge: How America Can Produce One Billion Gallons of the Best Biofuels By 2014

Biofuels: The Good and the Bad

What are the best biofuels?
The best biofuels are those that make it environmentally and economically possible to produce more food and fuel and do it in a way that clearly reduces global warming pollution, conserves and enhances our soil and water resources, protects our fragile wild lands and native ecosystems, and improves the economic welfare of workers and communities.

What do these advanced biofuels look like? Picture perennial grasses growing where land was once degraded; winter cover crops being grown on exposed croplands; and sustainably managed forests that provide a wide range of critical ecosystem services.

Rigorous and independent international sustainability standards, such as those being developed by the Roundtable on Sustainable Biofuels (RSB), hold the best promise for identifying the best biofuels in the future. (See http://cgse.epfl.ch/page65660-en.html)

What are "bad" biofuels?
Bad biofuels are those that degrade the environment, drive up food prices, and make global warming pollution worse. These fuels look like more of the same. Coal-fired corn ethanol plants; rows of corn, soy, or "energy crops" where wetlands, forests, and grasslands stood before; tropical rainforests cleared and burned for palm oil; more run off and pesticides poisoning our rivers and streams; displaced wildlife habitat and degraded water quality as natural forests are cleared for tree-plantations or switchgrass crops; more families around the world struggling to afford a healthy diet; and combined global warming pollution from these biofuels that are even greater than the petroleum their replacing.

all agree will protect our economy and our environment—growing more jobs, more food, and more truly low-carbon fuel.

To do this, we need to stitch together existing government programs under a new law to provide support for the whole biofuels system, from field to fuel. The three key pieces of the challenge are:

- ***A realistic scale*** – The goal will be 10 to 20 advanced biofuels projects, assuming 50 to 100 million gallons per facility.
- ***Comprehensive support and environmental standards*** – We need to fully fund a package of existing programs, link them together into a comprehensive and coordinated initiative along with a set of sustainability requirements, and reform our biofuels tax credits to support the Billion Gallon Challenge.
- ***Learning while doing*** – Because we will be learning how to deploy these systems as they are developed, each of these projects should be partnered with a comprehensive research and assessment program drawing on the expertise of agricultural extension services, NRCS researchers, land grant and other universities, our national labs, and others.

How to Make it Happen

The first and most important steps are to stop funding bad biofuels and mature conventional biofuels and to maintain the performance standards and minimum sourcing safeguards adopted as part of the Renewable Fuel Standard. Then, to jumpstart advanced biofuels, we need to take advantage of a number of programs that, if fully funded, can help meet the Billion Gallon Challenge.

The Biomass Crop Assistance Program, the Farm Bill conservation programs, the Biorefinery Assistance, the EISA Section 207 grants, the SunGrant Initiative, and the Biomass R&D Act programs should be fully funded to provide full system support including research and analysis. By coupling these programs with the Section 1705 loan guarantee program established as part of the stimulus bill, which specifically focuses on innovative biofuels systems, we will have dollars available for every stage of an advanced biofuels system.

Adding in the following measures, we will have a roadmap to producing a billion gallons of the best biofuels.

- **Link together the different incentive programs and the agencies that administer them** so that they function as a coordinated whole with a minimum amount of bureaucracy. The crops, the framing practices, the pre-processing and transport, the conversion process and the co-products should all be developed and implemented in the most sustainable manner, even if they are not all managed by the same facility.
- **Establish comprehensive gold-standard sustainability requirements for eligibility for financial incentives.** For the Billion Gallon Challenge, we should require significant and measurable improvements in a project's production systems according to a broad set of sustainability standards. Verification systems, such as the Roundtable on Sustainable Biofuels, would be the basis for these requirements and ensure we are improving practices that reduce soil erosion, improve water use efficiency and quality, and protect other critical ecological values. The approach will evaluate each project within the context of its existing surrounding landscape, with an objective of finding integrated solutions to our economic and environmental needs.
- **Reform biofuels tax credits.** In 2009, these will be worth about $5 billion. However, there exists no federal tax policy designed to reward the increased performance of any kind of biofuels. To remedy this, we propose reforming our federal biofuel tax credits to one technology-neutral, performance-based tax credit.

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Environment and Public Works Committee Hearing
April, 2009
Follow-Up Questions for Written Submission

Questions for Greene

Questions from:
Senator Barbara Boxer

Question #1

Mr. Greene, is your organization in support of using existing law to study and approve the use of new fuel additives?

Yes. Existing law requires scientific, health based studies of new fuel additives and these requirements should not be abridged or bypassed through legislation.

Environment and Public Works Committee Hearing
April, 2009
Follow-Up Questions for Written Submission

Questions for Greene

Questions from:
Senator James M. Inhofe

1.) If the Administration were to increase the blendwall at this time, do you support providing some sort of liability protection to the industry participants who will be required to blend higher volumes of ethanol?

No. The Administration should only increase the blendwall if scientific studies have shown that it can be done safely, in which case there should be no need for liability protection.

2.) Isn't it true that corn-based ethanol only provides, at best, very marginal benefits in GHG reduction? Does it make sense to greatly increase a biofuels RFS that in effect will be mandating an increase in corn ethanol use of 15 billion gallons per year over the next 10 years before any alternative ethanol production methods like cellulosic can contribute appreciable volumes?

NRDC does not support any further increase in the RFS beyond the levels enacted under the Energy Independence and Security Act of 2007. While the new RFS does grandfather existing and under construction corn-ethanol plants, it also establishes the first ever, Federal lifecycle GHG performance standard. These require all new fuels produced under the RFS to be better than gasoline, which is critical since as you point out, it is possible for corn ethanol (or any biofuel) to provide little or no GHG reductions compared to petroleum fuels. That's also why we support a shift from the RFS to a low-carbon fuel standard, which would force all—petroleum, coal, electric, biofuels, etc.—to compete based on their GHG performance.

3.) Even if producing ethanol from corn in the US can provide some limited GHG benefits, and maybe improvements can be made, isn't it true that the more corn we use for ethanol in the US means that we will be exporting less corn, and so other countries will begin to put more acres into crop production - so won't those additional crop acres in other parts of the world also cause some increases in GHG emissions?

Yes. That is why it was so important that Congress required EPA to include those emissions—so called emissions from indirect land-use change—in the calculation of full lifecycle emissions in the new RFS. We sincerely hope that you and the rest of Congress will protect this aspect of the definition of lifecycle emission. If it is stripped out, food prices, biodiversity and the climate will all suffer.

4.) Does NRDC have any views on projected impacts or contributions of mid level ethanol blends in meeting stricter national ambient air quality standards for ozone, particularly in relation to increased NOx emissions? Does NRDC believe these increases could be "significant"?

Certainly I can imagine scenarios where the use of mid level ethanol blends would make meeting national ambient air quality standards for ozone harder. That is part of why NRDC believes that EPA must have a complete scientific record showing that impacts on public health would be insignificant before approving any use of mid-level ethanol blends.

Senator CARPER. Thank you, Mr. Greene.

Blake Early. Mr. Early, please proceed.

STATEMENT OF BLAKE EARLY, ENVIRONMENTAL CONSULTANT, AMERICAN LUNG ASSOCIATION

Mr. EARLY. Good morning, Chairman Carper. Good morning, Chairman Boxer and Members of the Committee. I am happy to be here on behalf of the American Lung Association once again to talk about the renewable fuel standard.

My testimony will address the use of mid-level ethanol to meet RFS goals. The American Lung Association sees serious limitations in recent studies looking at the impact of the use of mid-level ethanol vehicles and non-road engines in use today, and most critically on the levels of ozone precursors emitted by those vehicles.

We urge that the U.S. EPA take no action to authorize the use of these blends until the impact of these fuels can be fully reviewed in independent peer-reviewed studies. We also oppose legislation that would require mid-level ethanol use.

The ethanol industry has shifted focus away from E–85. When EISA 2007 was being deliberated and adopted, there was broad consensus that E–85 was the best way to use ethanol because FFVs must certify to the same emissions standards as gasoline. It is lower in evaporative emissions than gasoline, and from a volume perspective, every gallon of E–85 consumers eight times more ethanol than E–10. E–10 would be used while E–85 distribution ramped up, or EPA approved other ethanol blends.

Today, it has become clear that the ethanol industry's strategy for selling ethanol has changed. Their energy and their emphasis appears to have shifted to promoting mid-level volumes of E–12 or higher as the main means of selling ethanol. While the ethanol has not abandoned E–85, most of the money and public discussion appears to be invested in obtaining approval now, just 15 months after passage of EISA, for the use of E–12, 13, 15, or 20.

Unfortunately, this shift in strategy also involve using mid-level ethanol in many millions of vehicles and other engines that were not designed or certified on mid-level ethanol.

My main message today is that we need to look before we leap to mid-level ethanol. We must better understand the effect these blends may have on emissions, on the durability of emissions control systems, and especially on the catalysts themselves and on other engines that use gasoline.

As we move forward to adopt strategies to reduce our dependence on foreign oil, promote clean energy and bolster the farm economy, we must make smart choices that also reduce air pollution. Smart choices are made more urgent by the most recent and disturbing new research showing that ozone pollution can kill. Let me repeat: ozone kills.

Significant scientific evidence shows that high ozone days increase the risk of dying early, and a new study just out this past month found that breathing moderate levels of ozone day in and day out, year after year, can increase the risk of dying from respiratory causes. That troubling new evidence underscores the need for us to clean up ozone pollution now.

Evidence on mid-level ethanol is severely limited. Only one scientifically based study has been done on tailpipe emissions from today's cars operating on E–15 or E–20, and no testing has been done on E–12 or E–13. The only well-conducted peer-reviewed study of emissions has recently been completed by the Department of Energy, and that study raises a number of troubling questions.

DOE applies a statistical measure that ignored as insignificant findings that 9 out of 16 vehicles using E–20 had an increase in NO_x emissions; six vehicles had increases when using E–15. The Department of Energy conducted no testing on catalyst durability and there has been no testing in the U.S. of the impact of ethanol on vehicle engines and emission systems over their useful life.

The DOE study found seven of 13 vehicles experienced significant catalyst temperature increases. According to DOE, 116 million vehicles are registered across the U.S. that are pre-tier II model vehicles, which may be vulnerable to high temperatures in wide open throttle mode. The only study, an Australian study using E–20, two out of five vehicles exhibited catalyst temperature increases and damage to the catalyst, which caused increases of 200 percent in hydrocarbon emissions and 500 percent increase in NO_x emissions in one vehicle.

While very limited, this study demonstrates engine and catalyst durability could be a problem. We need to make decisions about additional ethanol use with full understanding of the impacts on our health and on our vehicles and engines. Too much is at stake.

Clearly, the path forward is to do the needed testing and see under what circumstances and how more ethanol could be used in our gasoline. Based on the current information, E–85 is the safest path forward if we are to use ethanol in our national fleet.

Thank you very much, Mr. Chairman.

[The prepared statement of Mr. Early follows:]

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Testimony of A. Blakeman Early
Presented on behalf of
The American Lung Association
Before the
Senate Environment and
Public Works Committee
Subcommittee on Clean Air and Nuclear Safety

Wednesday, April 1, 2009

Testimony of A. Blakeman Early presented on behalf of The American Lung Association before the Senate Environment and Public Works Committee, Subcommittee on Clean Air and Nuclear Safety

Chairman Carper, members of the Subcommittee my name is A. Blakeman Early. I am grateful to be able to appear before you on behalf of the American Lung Association to discuss the Renewable Fuel Standard (RFS) and our concerns about the premature approval of the use of mid-level ethanol in our nation's gasoline supply.

The American Lung Association sees serious limitations in recent studies looking at the impact of the use of mid-level ethanol—that is, ethanol in the range of 12 to 40 percent or higher in gasoline mixture—on vehicles in use and, most critically, on the levels of ozone precursors emitted by those vehicles. We urge that the U.S. Environmental Protection Agency (EPA) take no action to authorize the use of these blends until the impact of these fuels can be fully reviewed in independent, peer-reviewed studies. We have these specific concerns: the effect of mid-level ethanol blends on ozone and other pollutants is not known; the effect of ethanol on Tier II and older vehicles is potentially harmful; and severely limited evidence has been used to argue that the impact of these blends poses no problems.

Background

When Congress deliberated and adopted the Energy Independence and Security Act, many accepted the aggressive increase in annual volumes of renewable fuel required to sold on the assumption that ultimately the gasoline blend of 85 percent ethanol known as E-85 use would proliferate along with the flexible fuel vehicles (FFVs) that use it. While the production and distribution of E-85 ramped up, ethanol would be sold in lower ratios as ten percent ethanol, or E-10. In addition, bio-diesel and other renewable fuels would grow in share and contribute to meeting the RFS goals. There was broad consensus that E-85 was the best way to use ethanol for three reasons: FFVs must certify to the same emissions standards as gasoline; E-85 is lower in evaporative emissions than gasoline; and, from a volume perspective, every gallon of E-85 consumes eight times more ethanol than E-10.

However, there were recognized limitations on the lower blends of ethanol. As a general matter, placing ethanol in gasoline in lower amounts (10-20 percent) causes tailpipe emissions of hydrocarbons (HC) and carbon monoxide (CO) to go down and

nitrogen oxides (NO_X) to go up. While reducing carbon monoxide is a clear benefit, there is mixed result for ozone, as it lowers tailpipe emissions of one precursor—hydrocarbons—and increases another –nitrogen oxides. Furthermore, evaporative emissions of hydrocarbons due to volatility or permeation go up. These trends are affected significantly by fuel formulation and vehicle technology. As a result of California Cleaner Burning Gasoline and Reformulated Gasoline requirements, evaporation of ethanol-containing gasoline where such fuels are used is well controlled – permeation is not. Nevertheless, since evaporation generates greater HC emissions in conventional gasoline containing ethanol, EPA estimates the biggest impact of ethanol in gasoline is in areas that still use conventional gasoline.

The shift in technology will help over time. With the introduction of Tier II vehicles, both tailpipe and evaporative/permeation emission will be reduced by new technologies to control problems, especially with the use of FFVs.

The Ethanol Industry Has Shifted Focus Away From E-85

Today, it has become clear the ethanol industry's strategy for selling ethanol has changed. Their energy and emphasis appears to have shifted to promoting mid-level volumes (E-12 and higher) as the main means of selling ethanol. While the ethanol industry has not abandoned E-85, most of the money and public discussion appears to be invested in the obtaining approval for use of E-12, E-13, E-15 or E-20. To be sure, the ethanol industry is still pressing the automobile companies to maximize production of FFVs, more than the auto companies want to, but that appears to be because FFVs have few if any problems using E-15, or E-20, E-30, or even E-40.

Unfortunately, this shift in strategy also involves using mid-level ethanol in vehicle and other engines that were not designed and certified on mid-level ethanol. We do not know whether Tier II vehicles, first introduced in 2004 can use these fuels without durability, emissions or other problems. Older vehicles without Tier II technology are more vulnerable to durability degradation and adverse emissions effects of mid-level ethanol.

We need to "Look before we Leap" to Mid-level Ethanol

Much remains to be known about the impact of these mid-level blends. In particular, we need to understand how these blends would affect ozone, the most widespread air pollutant in the nation. We must better understand the affect these blends may have on emissions, on the durability of the emissions control systems, especially on the catalysts themselves, and on other engines that use the gasoline.

As we move forward to adopt strategies to reduce our dependence on foreign oil, promote clean energy, and bolster the farm economy, we must make smart choices that also reduce

air pollution. We cannot ask our children, our elders, our family members who struggle to breathe because of their lung diseases—we cannot ask the most at risk people among us to continue to breathe unhealthy air because of our mistakes in policy decisions on fuel.

We cannot risk increasing air pollution

The American Lung Association is concerned with any policy decisions that risk increasing ozone anywhere in the U.S. The federal government, the states and local governments have fought for decades to cut the precursor emissions to reduce ozone. Still, ozone remains the most widespread air pollutant—and among the most dangerous. Recent research has revealed new insights into how they can harm the body. All in all, the evidence shows that the risks are greater than we once thought.

The most recent and disturbing new research shows that ozone pollution can kill. Let me repeat that: ozone can kill. The National Research Council recently confirmed that the available evidence shows that high ozone days increase the risk of dying early.[1] And most recently, a new study published last month in the *New England Journal of Medicine* found that breathing ozone day-in-and-day-out—that means even when we don't have a "high" ozone day—increases the risk of dying from respiratory causes[2]. That troubling new evidence underscores the need for us to clean up ozone pollution now.

Five groups of people are especially vulnerable to the effects of breathing ozone:

- children and teens;
- anyone 65 and older;
- people who work or exercise outdoors;
- people with existing lung diseases, such as asthma and chronic obstructive pulmonary disease (also known as COPD, which includes emphysema and chronic bronchitis); and
- "responders" who are otherwise healthy but for some reason react more strongly to ozone.

New evidence published last year found that some segments of the population may face higher risks from dying prematurely because of ozone pollution, including communities with high unemployment or high public transit use and African Americans/Blacks.[3]

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[1] Committee on Estimating Mortality Risk Reduction Benefits from Decreasing Tropospheric Ozone Exposure, National Research Council. *Estimating Mortality Risk Reduction and Economic Benefits from Controlling Ozone Air Pollution*, 2008. Available at www.nap.edu/catalog/12198.html.

[2] Jerrett M, Burnett RT, Pope III, CA, Ito K, Thurston G, Krewski D, Shi Y, Calle E, Thun M. Long-Term Ozone Exposure and Mortality. *N Engl J Med* 2009; 360: 1085-1095.

[3] Bell ML, Dominici F. Effect Modification by Community Characteristics on the Short-term Effects of Ozone Exposure and Mortality in 98 US Communities. *Am J Epidemiol* 2008; 167: 986-997.

The impact of even short-term exposure to ozone on healthy adults showed up in a study of lifeguards on the beach in Galveston, Texas. In a study published last year, researchers measured the ability of these healthy young adults at the beginning of their shift and then again at the end. They found that the airways of many lifeguards had greater obstruction when ozone levels were high, even when the levels were well below the national standards. Because of this research, Galveston became the first city in the nation to install an air quality warning flag system on the beach.[4]

Evidence on Mid-Level Ethanol is Severely Limited

With such risks at stake, we need to know much, much more about the impact of mid-level ethanol blends. The lack of well-done research evidence may surprise you.

Only one scientifically-based study has been done on tailpipe emissions from today's cars operating on E-15 or E-20. No testing has been done on E-12 or E-13 on cars or small engines. Most of the recent testing has focused on motor vehicle operability, materials compatibility, and to a lesser extent, tailpipe emissions.

The public statements we have read from Growth Energy tend to conflate the testing of mid-level ethanol in all three categories, which has the effect of inflating the amount of vehicle tailpipe emissions testing that has been done. While the statements imply that 100 vehicles have been the subject of testing (in the last two years), available evidence shows that only 16 non-FFV vehicles have been subject to testing primarily designed to measure the impact on emissions. The U.S. Department of Energy (DOE) completed that study, and has just finalized its report on the 16 vehicles[5]. An additional study, conducted by Minnesota State University and the University of North Dakota looked at both fuel economy and emissions in three 2007 vehicles. However, this study was funded by the ethanol industry and was not peer reviewed.[6]

The DOE study understates the problem

The only well-conducted, peer reviewed study of emissions has recently been completed by the Department of Energy (DOE). However, the DOE study raises a number of troubling concerns about the conclusions it reaches.

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[4] Thaller EI, Petronell SA, Hochman D, Howard S, Chhikara RS, Brooks EG. Moderate Increases in Ambient $PM_{2.5}$ and Ozone Are Associated With Lung Function Decreases in Beach Lifeguards. *J Occcp Eviron Med* 2008; 50: 202-211.

[5] U.S. Department of Energy, Oak Ridge National Laboratory. *Effects of Intermediate Blends on Legacy Vehicles and Small Non-Road Engines, Report 1,* Updated. NREL/TP-540-43543, February, 2009.

[6] Minnesota State University, Minnesota Center for Automotive, and University of North Dakota. *Optimal Ethanol Blend-Level Investigation*, Energy & Environmental Research Center, 2007-EERC-11-02, November, 2007.

The DOE study applies a flawed test to find "significant" emissions increases

DOE reports no "significant" increase in regulated emissions from 16 vehicles tested. However, DOE applies a statistical measure requiring 90-95% confidence for emissions changes after averaging emissions across all vehicles. The use of a statistical measure is inappropriate in this case. Increases in emissions would have had to occur in 13 of 16 vehicles to meet DOE's 95 percent certainty analytical criteria. In their analysis, reductions in emissions of some vehicles were allowed to "offset" increases in others. Of course, we don't breathe air pollution "on average." Much depends on the vehicle fleet mix in a given area, not the mix in the national fleet.[7]

The DOE study reports 56 percent NO_x emissions increase from vehicles to be "insignificant"

The Executive Summary fails to report that nine of 16 vehicles (56 percent) using E-20 had an increase of NO_x emissions, six with increases that reached 25 percent or higher. Six vehicles had increase emissions of NO_x using E-15, four of them of 25 percent or more. Since the magnitude of these increases were off set by decreases in other vehicles, DOE deemed these findings statistically insignificant.[8] We find it hard to understand how DOE could come to that conclusion with results showing that over half—or even one quarter—of the vehicles increased their emissions.

The DOE study found higher catalyst temperatures with mid-level ethanol operated in wide open throttle (WOT) mode—a potential risk to 116 million on-road vehicles

The DOE study found seven of 13 vehicles experienced catalyst temperatures averaging 30 degrees C when operated in "wide open throttle", or WOT, mode with E-20 and average temperature increases of 25 degrees C using E-15 compared to operation with E-0. These vehicles were tested at ambient temperatures of 75 degrees F and not "summertime" conditions. Two of these vehicles were model year 2007vehicles.

According to DOE, 116 million vehicles are registered across the U.S. that are pre-Tier II (model year 2003 or older) which may be vulnerable to higher temperatures in wide-open throttle mode.

It is important to note that engines do not operate with throttles wide open except under very heavy load conditions, such as pulling a trailer up hill. Some smaller vehicles engines may operate at full throttle up steep inclines. It is therefore difficult to estimate the significance of the DOE findings, making further study all the more critical.

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[7] U.S. DOE, 2009. p. 2-6.
[8] U.S. DOE, 2009. Table 3.1, p. 3-4.

The DOE conducted no testing for catalyst durability

Auto companies are required to certify that emissions control systems—principally catalysts—will operate for 120,000 miles. This is accomplished through a process that artificially ages engine systems by running for many hours. **There has been no testing of the impact of ethanol on vehicle engines and emissions systems over their useful life (120,000 miles).**

One study, done in Australia, raises a red flag on this issue. It appears that when pre-Tier II vehicles—model year 2003 and earlier—are operated in wide open throttle mode, the computer does not adjust carburetion to account for the oxygen added to the air-fuel mixture provided by the presence of ethanol in the fuel. As a result, **during acceleration, exhaust temperatures can rise**, as the DOE study found, **damaging the catalyst and engine**.

In this 2004 study of Australian vehicles using E-20, two of five vehicles exhibited the problem and damage to the catalyst after artificial "aging" of only 50,000 miles. One vehicle had 200 percent increase in HC emissions and 500 percent increase in NO_x emissions. The other experienced a 20 percent increase in HC emissions and 150 percent increase in NO_x emissions.[9] This study has several limitations. This study was not peer reviewed, it used Australian vehicles, nor does it necessarily include the same Tier I technology used in the U.S. It does demonstrate that **engine and catalyst durability could be a problem with mid-level grades of ethanol**. Before we risk the engines of 116 million pre-2004 vehicles on the road today, we need to make certain.

Degradation of catalyst efficiency can have a major impact on emissions. For example, if the presence of ethanol increases NO_x emissions 10 percent, AND catalyst efficiency has been reduced 10 percent (from 90 percent to 80 percent) NO_x emissions will rise 100 percent-- not just 10 percent

DOE overstates findings on small non-road engines (SNREs)

There has been almost NO testing on mid-level ethanol used in non-road engines. Even the California Air Resources Board has been unable to estimate non-road emissions increases (mostly evaporative) attributable to increases of ethanol in gasoline (including E-10). While DOE did conduct a "scoping" of Small Non-Road Engines (SNREs), even this part of the study raised many questions.

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[9] Orbital Engine Company. *Market Barriers to the Uptake of Biofuels Study Testing Gasoline Containing 20% Ethanol(E20), Phase 2B Final Report to the Department of the Environment and Heritage.*, May 2004, p. 3. Available online at http://www.environment.gov.au/atmosphere/fuelquality/publications/biofuels-2004/index.html.

The Executive Summary reports that while emissions of NO_x went up, HC emissions went down and regulated emissions (combined $HC+NO_x$) decreased in "most cases". While this statement is true of engines tested when they were new, the DOE durability testing on small engines was dismal. One of four classes of engines (Class IV) could not be operated long enough to test durability. Of the remaining seven engines, all seven when operated on E-0 after durability testing with E-10, E-15, or E-20 experienced emissions increases. Five of seven experienced $HC+NO_x$ increases of 90 to 150 percent.[10] Since the SNRE testing also found a significant exhaust temperature increase in many small engines, these findings are consistent with a potential durability degradation problem as discussed above with vehicle engines.

We need more scientifically-based testing of mid-level ethanol (E-12 or higher) to assure protection of public health

Recently Growth Energy and a number of ethanol companies submitted a "waiver" request to EPA to authorize E-15. Of the seven tests submitted to support the request, only the DOE test and one other were peer-reviewed. The other five lacked proper test protocols and fuel controls and were not peer reviewed. Furthermore, only one was designed primarily to measure emissions. Growth Energy also called for EPA to administratively authorize E-12 or E-13 while submitting no test data. EPA cannot base such an important decision, potentially affecting millions of cars and small engines on such flimsy or non-existent data.

We need to make decisions about additional ethanol use with full understanding of the impacts on our health and our vehicles and engines. Too much is at stake. Clearly, the path forward is to do the needed testing and see under what circumstances and how more ethanol could be used in our gasoline. Based on the current information, E-85 is the safest path forward if we are to use ethanol in our fleet. . Applying a greater effort to provide ethanol in these markets could consume an additional billions gallons of ethanol and avoid the "blend wall" long enough to conduct needed testing. I suspect these markets have not been reached largely to the lower profitability of supplying them
Allowing the use of an ethanol fuel that ends up degrading the nation's automobiles and small engines is not an acceptable alternative

Thank you for the opportunity to present these concerns.

[10] Orbital Engine Company, 2004. Tables 3.8-3.12, pp. 3-24 – 3-28.

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Nationwide Assembly Speaker

May 22, 2009

The Honorable Barbara Boxer
Chairman
Committee on Environment and
Public Works
U.S. Senate
Washington D.C. 20510

Senator James M. Inhofe
Ranking Member
Committee on Environment and
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Attention: Heather Majors

Dear Chairman Boxer and Ranking Member Inhofe:

Thank you for your follow-up questions regarding my testimony at the April 1, 2009 hearing held by the Subcommittee on Clean Air and Nuclear Safety on the Environmental Protection Agency's Renewable Fuel Standards. My responses to your questions are below.

Questions from Senator Boxer

Question #1: Mr. Early is your organization in support of using existing law to study and approve the use of new fuel additives?

The American Lung Association supports the use of the waiver process in Section 211(f)(4) as the exclusive process for the U.S. EPA to authorize the sale and use of new fuel additives.

Question #2: Mr. Early the Department of Energy has done one study on gasoline blended with 15 and 20 percent ethanol. What are the limitations of this study and will other studies be done later to fill important data gaps?

As my testimony outlines, this study has major gaps regarding vehicle engine curability and does not contain testing representative of non-road engines with regard to emissions or durability. To my knowledge, studies currently under way may fill gaps with regard to vehicle emissions and durability but no additional studies of non-road engines are being conducted.

Questions from Senator Inhofe

Question #1: In your testimony you state that the ethanol industry appears to be shifting its focus away from E-85 to promote mid-level ethanol blends. What are your thoughts on the future of E-85? Is it losing viability?

The American Lung Association supports the use of E-85 as the most effective and environmentally sound way to introduce ethanol as a significant part of the nation's fuel supply. However, current levels of effort and resources are insufficient to enable E-85 to achieve this goal.

Question #2: it appears that with the passage of the 2007 energy bill, congress has pushed too much ethanol too fast. If EPA finds that approval of mid-level ethanol blends will increase air pollution, what next? Does EPA have authority to slow down the mandates?

The U.S. EPA does not have the necessary authority to slow down the mandates for renewable fuel sale and use adopted in EISA 2007. Should the U.S. EPA find that mid-level ethanol cannot meet the requirements of Section 211(f) (4) to authorize its sale and use we believe that Congress must consider legislation to modify the EISA 2007 annual renewable fuel mandates in order to assure renewable fuels are adopted into our nation's fuel supply in ways that fully protect public health and the environment. As stated above, a much greater investment in E-85 infrastructure appears to be the best path forward to responsibly increase renewable fuel use.

Question #3: Shouldn't a coordinated effort focusing on small engines, including marine engines, be supported with the same interest as with the auto sector?

Yes. Non-road engines, including small engines comprise as much as 30% of the emissions inventory that contributes to unhealthy levels of ozone in some areas. Clearly, Section 211(f) (4) requires the effect of mid-level ethanol on non-road engines be examined with the same rigor as vehicles and vehicle engines.

Question #4: Does the American Lung Association have any views on projected impacts or contributions of mid level ethanol blends in meeting stricter national ambient air quality standards for ozone, particularly in relation to increased NOx emissions? Does the American Lung Association believe these increases could be "significant"?

The American Lung Association is concerned that the substantial increase in the volume of both low-level (E-10) and midlevel (E-15 or higher) ethanol that will occur in the nation's fuel supply as a result of the renewable fuel mandates in EISA 2007 may cause an increases in both NOx and VOCs(principally from evaporation and permeation) emissions from vehicle and non-road engines that could make meeting or maintaining stricter national ambient air quality standards more difficult in some areas of the nation. Congress has given the U.S. EPA the mandate to study these concerns and to require measures be taken to reduce such increases, if necessary. We urge Congress to ensure the U.S. EPA follows these mandates in a timely fashion.

Sincerely,

A. Blakeman Early
Environmental Consultant
American Lung Association

Senator CARPER. Mr. Early, thank you very much.

Senator Vitter needs to be on his way to another engagement here in a few minutes, so I am going to ask him just to go first.

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

And first, I would just like consent to submit the following letters into the record as testimony from the National Marine Manufacturers, the Alliance of Automobile Manufacturers, the National Alliance of Forest Owners, and the American Petroleum Institute.

Senator CARPER. I object.

OK, it's April Fools' Day. I don't object.

[Laughter.]

[The referenced materials were not received at time of print.]

Senator VITTER. Thank you, Mr. Chairman.

Since it is clearly a leading issue, let me just ask the whole panel, does anyone on the panel think we know enough to move forward now with mid-level ethanol blends?

Mr. DREVNA. Senator Vitter, no, not until we do the appropriate science and testing to verify that statement.

Mr. MCADAMS. My members would make a fuel that would not need a mid-level blend requirement.

Senator VITTER. Does anyone think we can move forward now? I mean, is it a consensus to say we need to know more about its impacts before we move forward with it?

Mr. EARLY. That's the consensus I give, Senator.

Senator VITTER. Yes. For the record, let me just articulate, since the stenographer cannot take down either nods or blank stares, that that seems to be a consensus of the witnesses.

Mr. Drevna, what exactly do you think we need to focus continuing studies on?

Mr. DREVNA. Well, Senator, there are a number of things. As I mentioned in the testimony and as also my friend, Mr. Early, has suggested that we have—there are a number of unknowns out there. The engines of today, whether they are in what we call the legacy fleet, and which will continue to be the legacy fleet as cars are being manufactured for the next few years, and the off road and power equipment and marine equipment—those have only been designed for E–10. We know what we don't know.

And so the couple of things that we have to do is verify, and if it works, great. But if it doesn't, we have to know that before we add this to the fuel system.

Senator, I think the other thing we need to do, as Ms. Tiller mentioned, and we wholeheartedly agree that ISO '07 says we are going to be bringing on advanced biofuels, including cellulosic. And it is coming and it will come. We are very confident that it will come.

Unfortunately for my industry, and again I am speaking only for my industry in response to your question here, we are here now as far as the industry. We are required, if you look at those charts of the different biofuels that we have to blend, we are required to blend cellulosic now, not later. We are required to use advanced biofuels now in certain quantities.

So our suggestion would be let's suspend the RFS to corn ethanol at where it is right now, take a look-see where we are, and then use an on ramp on biofuels when they are available. We support

biofuels. We need them. We need everything we can get our hands on these days as far as transportation fuels.

But again, let's do it in a systematic process, not a static statutory process that may or may not fit the economics and the realities of today.

Senator VITTER. OK.

Does anyone else want to comment on that? Obviously, Mr. Early spent most of his testimony on that. But anyone else?

OK. A final question, I am concerned that the regulations to implement renewable fuel standards in EISA were required to be finalized last December, and aren't in sight. Isn't it true that without final regulations, obligated parties will be unable to comply with both the advanced and the bio-based diesel mandates in 2009? Can you talk about the impact of that delay, what it is going to mean to parties who are supposed to be doing things this year? That would be a question for anyone.

Mr. GREENE. You are absolutely right. That is why I think there are two particular risks right now. One is efforts to actually take out critical provisions, either through sort of back door politics or through legislative efforts. I think both of those would really undermine the goals of the RFS, but even just simply delaying it, which is what appears to be going on right now, as you pointed out, risks implementing next year's goals which are the first year where you would have volumes that have to comply, particularly with the greenhouse gas standards.

Obviously, you can't comply with that if you don't know how to measure the greenhouse gas standards. And I think to the issues of how do we give the security and certainty to the industry so that investors can know, especially in these economic times, that they can rely on the Federal Government and our policies to stay in place and actually drive forward this technology, if we don't stay on track with this regulation, I think that is going to send a real shockwave through the investment community.

I think it is part of the reason that I would also suggest that we add to our policy portfolio something like the billion gallon challenge, where we really focus efforts on those advanced biofuels.

Mr. MCADAMS. I just would briefly agree with Nathan on the need to get this rule done in these credit markets. If you look at what has happened in terms of investment in the fourth quarter of 2008, at investment, you are going to see the numbers come out for the first quarter of 2009, it is like it has dropped off the cliff. And this is a very key component of driving the markets to continue to fund these advanced biofuels technologies in the short and medium term.

Ms. TILLER. I would just echo that there is a sense of urgency for some certainty in moving forward, and the industry certainly will require that certainty in order to make the progress that we need to rapidly.

Mr. DREVNA. If I may, Senators, my industry needs certainty also, but right now we are certain that we have to go out and find either the ethanol of the RENS to make up the difference. Whether the rule is out now or not, we would love to have the rule, would love to have a sound rule, but whether it is out or not, we still have

to comply with the statutory mandates of volumes, even at the same time as demand has plummeted.

So I believe when Congress wrote the rule, we all, or most thought that gasoline demand would continue to increase. Who would have thought we would be in this economic recession, gasoline demand plummets, but meanwhile the RFS responsibility, as obligated parties, increases.

So right now, we are out chasing RENS that don't exist. And companies are spending upwards of $140 million, $150 million a year not on producing fuel, on buying credits. So we, too need the certainty. And that is why I suggest that the first action is to suspend at least the corn ethanol portion of the RFS where it is, and not use, not use what I call the off ramp rather than the on ramp and have discretionary waivers by EPA because that just creates more uncertainty in the marketplace.

Thank you.

Senator VITTER. Great.

Thank you very much, Mr. Chairman.

Senator CARPER. Thanks a lot. Thanks a lot for being with us and for those questions.

I think I will ask my first question of Mr. Drevna. As you mentioned, reduced fuel consumption is accelerating the industry's approach of the E–10 blendwall. Why this may not be a problem next month or even in 6 months, we could hit the blendwall as early as next year, certainly very likely by 2011.

Describe, if you will, the timeframe that you are envisioning for sufficient comprehensive independent testing of the safety, operational and environmental effects of mid-level ethanol-blended fuel.

Mr. DREVNA. I would suggest it shouldn't take more than a couple of years, no more. Maybe even 18 months to 2 years. I don't see, I believe that should be sufficient to get the job done. But in the meantime, I think the worse thing we can do, Senator, is to roll the dice and subject the consumer to potential equipment failures and hazards that right now would be—they are never necessary, but right now would be counterproductive.

I think we should take a deep breath, and again, I agree with Blake. Let's look before we leap and make sure that we know exactly what the consequences, unintended or not, are of injecting more ethanol into the current gasoline supply.

Senator CARPER. Let me just follow up by asking, to what extent do you think has independent testing already occurred? Do you think we are part way there, halfway there, most of the way there?

Mr. DREVNA. There has been some testing, Senator. From what I understand of the testing, there has been a DOE test on it, and the interesting point about that is that there has been, it was almost like, well, this stuff it is OK if you glance at it and if you look at the executive summary of the DOE testing.

But there is a Dr. Ron Sidhu who has a bachelor of technology from the Indian Institute of Technology, and an M.S. and Ph.D. from California Institute of Technology, Cal Tech, he has taken that report apart and commented on it very, very intensively. He has come up with five, six different red flags, so to speak, that have to be addressed before any of this can even be thought to be put

into commerce, and those include engine reliability, safety and environmental concerns, et cetera.

So again, there have been reports out there, and then of course the ethanol industry has done what they call a test, and it hasn't been peer reviewed. It had a limited number of vehicles tested. I think Mr. Early really talked about some of those.

So let's do it comprehensively. Let's agree to what we don't know and figure out how to answer those questions, and then see if it works. If it works, great. We are ready, but we are not ready now.

Senator CARPER. All right.

Dr. Tiller, in your testimony I believe you stated that, "We are close enough to remove technology as a barrier to startup." You were talking about for cellulosic ethanol. What barriers remain on the path to large scale commercial advanced fuels if not technology?

Ms. TILLER. Well, I think that one of them we have already discussed earlier in this panel, which is the issue of stability in the market. There is going to be significant private investment required and without a clear path forward, it is going to be difficult to achieve that investment and certainty.

But perhaps one equally important, maybe even more important, is developing right now a path to a sustainable quantity of biomass feedstocks that can support this. That is fairly independent of the type of technology that is laid on top of it. But building that entire biomass infrastructure in a way that is sustainable, that does account for greenhouse gases and life cycle balances and all of the considerations that need to be taken into account, that is something that has been assumed to be in place, but certainly we have a long ways to go to make sure that we fully address all of the issues to supply the biomass in the very large quantity that will be required.

Senator CARPER. All right. Why did DuPont pick Tennessee as its partner to establish the pilot scale cellulosic biorefinery? What were some of the reasons that led them to that choice?

Ms. TILLER. I think that DuPont Danisco chose Tennessee as a very good strategic fit for their process technology, largely because of the emphasis and the program we have in biomass. So they recognized that the employment of the technology will require large amounts of biomass. We have a very longstanding program and a comprehensive program that looks at all aspects of the entire supply chain for biomass, and I think they felt that that was a very good fit for long-term growth of the technology that they are demonstrating.

We also had a significant commitment from the State, from Governor Bredesen and the legislature, of more than $70.5 million available for development of this industry, and that was attractive as well.

Senator CARPER. All right. I understand construction is underway and production is expected to begin I think, is it within the year?

Ms. TILLER. That is correct. We expect to be operational by the end of 2009.

Senator CARPER. OK. And any idea what the anticipated output of the refinery would be?

Ms. TILLER. The output? The quantity, it is scaled largely as an R&D facility so it has a lot of the flexibility required to be able to investigate technology improvements over time, and new technology developments in a whole suite eventually of feedstocks and products. But the optimum scale determined for that is between 250,000 and 300,000 gallons annual capacity.

Senator CARPER. All right. Thanks very much.

OK. I think under the early bird rule, I believe, unless Madam Chair, you need to flee, to head out. OK.

It is not every day that you have the entire Senate delegation from Oregon come to a hearing of this Subcommittee. We are honored.

Senator Merkley.

Senator MERKLEY. Thank you very much, Mr. Chair.

And I wanted to follow up on that conversation about the experimental project. If you could describe a little bit to what degree the process being used involves temperature and pressure? Or whether it is primarily an enzyme-based strategy and kind of what is being learned in terms of the consumption of energy in order to produce the ethanol.

Ms. TILLER. Thank you. DuPont Danisco Cellulosic Ethanol's technology package is an enzymatic-based sugar-based, I am sorry, biochemical process and certainly at the stages where we are now ready to demonstrate, there are tremendous opportunities to improve the overall energy and life cycle efficiency within the plant.

That certainly is a focus of the project moving forward, but I think that we are comfortable with the technology and the milestones that we have reached so far that the technology is ready to demonstrate and is at levels that are certainly very attractive at this point with continued opportunity to improve.

Senator MERKLEY. Let me dive in a little bit further. In terms of getting through the cell wall into the sugars inside the cell, what is the strategy being employed to accomplish that?

Ms. TILLER. Well, one effort that I would also point to is that of the DOE's Bioenergy Research Centers, one of which is in the Oak Ridge National Laboratory, and certainly that is the primary focus of that effort. That is funded with a $135 million investment from DOE. So they are looking at the issue of recalcitrance and cell walls really from two different perspectives.

One is making plants and biomass that more readily digests so that those cell walls can be broken down more efficiently, rapidly, with fewer input. And then the second is on developing the technology, the integrated process technology that more efficiently, effectively and cost effectively does the job of breaking down the cell wall.

There have been tremendous advances through that work, through all of those Bioenergy Science Centers, as well as the private companies such as DDCE. And I think that we have lots behind our belt so far, but tremendous opportunity to continue that work as well.

Senator MERKLEY. I want to switch to Mr. Greene, if I could. You made the point that if—and I want to restate this and see if I caught this correctly—that if in the course of producing an acre of a crop in order to produce some form of biomass or cellulosic feed-

stock, you create a demand that results in one-tenth of an acre in Latin America or somewhere else in the world, South America, being converted from jungle to crop land, you have lost 30 years' worth of the value?

Mr. GREENE. That is right. The gasoline that you would avoid, it would produce about—we can get about 400, 420 gallons of ethanol per acre of corn we use today. So if we avoided that much gasoline use over 30 years, we would avoid a fair amount of greenhouse gas emissions from that gasoline. But if we clear land to meet the supply demands for food crops, fiber crops, whatever it is, just a little land clearing can obviate all of those avoided greenhouse gas emissions.

Senator MERKLEY. Then does that kind of accentuate the value of the potential philosophy, if you will, of forest thinning, which Senator Wyden referred to earlier and you referred to it in your testimony. We are looking at second growth forests that are overgrown because they were planted so densely, and they haven't been thinned because it is not cost-effective, but you are not essentially putting new acreage into production. And the fewer trees that are left also grow much fast and absorb more carbon.

Is that a significant advantage, if you will, as compared to food feedstocks?

Mr. GREENE. Absolutely. Any crop, or any source of biomass that we can get that we can collect without putting new demands on our landscape has a real value by avoiding this land use change.

Senator MERKLEY. I believe that I have seen statistics that say currently, not including, if you will, the increase in the effect on crop land or conversion of crop land overseas or so forth, that it takes about 80 percent of the value of the fuel produced in the corn ethanol cycle in order to produce the corn ethanol.

And if you or anyone else would like to comment on that, but I want to compare that to where we stand now with the switchgrass technology. How much, what percentage of the final product, energy, is utilized in the process of making the fuel switchgrass cellulosic ethanol? So if maybe the two of you could comment on that.

Mr. GREENE. Yes. There are two issues there, obviously. There is just the energy balance, which is important obviously from an energy security perspective. And then there is the greenhouse gas balance. Not surprisingly, I am a little more concerned with the greenhouse gas balance from where I sit. But for both of them, it is really important that we distinguish between the renewable energy that is going into the process and the fossil fuel energy that is going into the process.

Obviously, the fossil fuel energy is where we get a lot of greenhouse gas emissions. And so the challenge with corn ethanol particularly is that there is a lot of value in corn kernels, so we don't burn up any of that to drive the process forward. We put the distiller grains into the food market. We put the starch into the ethanol market, and we are not left with anything to drive the process forward.

One of the advantages of going to cellulosic is that there is enough energy there to produce fuel and drive the process forward that is in the biomass itself. So we avoid bringing fossil fuels into the equation.

I am sure Dr. Tiller can be more precise than I.

Ms. TILLER. Yes, that is correct. The lignin co-product that is produced in the biochemical process from switchgrass and other cellulosic feedstocks does allow enough energy to not only operate the entire facility, but to provide some excess energy back to the grid. So it certainly has tremendous advantages.

The high productivity of switchgrass and some of the cellulosic feedstocks is certainly advantageous, as well as their ability to actually store carbon in the soil. We estimate that we can get 1,000 gallons of fuel from one acre of switchgrass using our current technologies, so certainly there are attractive balance economics in that equation.

Senator MERKLEY. Thank you very much.

Senator CARPER. Thank you, thank you.

Senator Boxer, our Chairman.

Senator BOXER. Thank you, Mr. Chairman.

Senator CARPER. Our Chair.

Senator BOXER. Whatever.

[Laughter.]

Senator CARPER. The woman, our leader.

We are glad you are here.

[Laughter.]

Senator BOXER. You are using up all my time.

Senator CARPER. I am sorry.

Senator BOXER. OK.

Mr. Greene, I am going to put you on the spot because I always put—I love your organization and you say it like it is—so forget the politics, forget what is correct, and give me your heartfelt answer to this question.

Mr. McAdams makes a point, he says to the Congress, don't pick winners and losers. I get that. And theoretically I agree with it, however, if we know certain things already, and it gets to Jeff's questions and Tom's questions and everybody's questions, and David Vitter's questions.

If we know that for some of these fuels it takes up a lot of land, and if you figure the life cycle, you are talking about a problem with greenhouse gas emissions which we weren't focused originally on the life cycles. We know we have to look at the life cycle. I think—is it Dr. Early? Mr. Early's point for the health community, we need to think about what this does to our lungs of our citizens.

So I guess what I want to say to you, at this point in the research and in what has gone on, and I am so excited about how much progress has been made here, believe me. Without picking winner and lose, just saying, at this time where do we see the most promise for a substitute here that will not hurt people's lungs, will not have a big impact on greenhouse gases, considering the life cycle? And where do you see that at this time?

Mr. GREENE. Well, I guess I would answer that question in two ways. I think there are technologies that we can identify today as being extremely promising. By technologies, I think it is important to look both at the feedstock technologies, where are we going to get the biomass, and then obviously also the conversion technologies, because you need both of those.

Senator BOXER. Right.

Mr. GREENE. And Dr. Tiller mentioned the logistics to connect them all. So I am happy to go through that in more detail. I think also, though, to get to your question, you also need to think about the policy, where we see the most promise in the policy. And actually, I think your home State really is again setting a real shining example there by taking a low-carbon fuel standard approach, as opposed to a renewable fuels standard approach.

The renewable fuel standard really was groundbreaking in establishing threshold greenhouse gas and trying to really force the industry forward into advanced biofuels. But it still has a fair amount of picking winners approach to it. The low-carbon fuel standard, by design, really forces fuels to compete against each other based on their greenhouse gas performance, and so the best fuels will win. And it encourages electricity to compete against biofuels and natural gas to compete against liquid fuels.

So ultimately, we need the technologies to work, but we also need the right policies to draw out the best from the technologies.

Senator BOXER. But you didn't give me a very straightforward answer.

[Laughter.]

Mr. GREENE. Let me try again.

Senator BOXER. No, I mean, out of all the technologies you have seen, taking into account the true greenhouse gas emissions and other things, where do you think we are headed here?

Mr. GREENE. OK. I would say we need to move to feedstocks that require very little land. I think cover crops are extremely exciting.

Senator BOXER. What is?

Mr. GREENE. Cover crops, crops that we plant during the winter when we often would leave the soil barren. We want to protect it, keep the soil there, keep the nutrients there. I think there are also lots of potential to use marginal lands more productively, lands that we can't really produce food off of that have been degraded by agricultural practices over time.

So the broader category there is feedstocks that don't add to our demand for land.

Senator BOXER. Good. That is helpful.

Mr. GREENE. I think there are specific examples there.

On the conversion technology side, my reading of the science today suggests that the biological processes ultimately they have the biggest room for cost reduction. We know how to do thermochemical conversion better today, so we have a little better sense of what their costs look like. The biological process, there is huge room for advance there, so we think the cost will come down very significantly.

I think the other really critical thing, and Mr. McAdams mentioned it, is that there is a huge amount of potential for developing new fuel molecules. So it is not just how you convert it, it is what you convert it into. And I think ethanol has helped us move in the right direction, but we ultimately are I think very likely to find fuel molecules that integrate into our system better, perform better in our vehicles, avoid some of the public health concerns, and will allow us to move forward more rapidly.

More specific?

Senator BOXER. That was very helpful.

Mr. Chairman, I just, I am going to have to go to another meeting now. I wanted to thank you so much for this because I think what we are learning here is that we have made a lot of progress. More than anything else, we know better now how to approach this.

I wanted to point out that at Senator Alexander's behest in our last bill, we did have a low-carbon standard in the greenhouse gas bill. We put forward the global warming bill.

But thank you for your leadership.

Senator CARPER. You bet. And thank you for yours and for being here today to work with us on this.

Senator Cardin and I, this is our second joint venue today. I started my day with him and we will probably spend a lot of time together today voting into the night. Yes, 10 votes, here we go.

Ben, we are glad you are here. Please proceed.

Senator CARDIN. Thank you, Mr. Chairman.

I want to join our Chairman, Chairman Boxer, and thank you for holding this hearing. I think this is critically important.

Let me make it clear, we need an energy policy in this Country that will provide for energy security and deal with the greenhouse gas emissions and global climate change. The renewable portfolio for fuel standards is going to be critically important in meeting those goals. I am a strong advocate of it.

On the other hand, I agree, Mr. Drevna, with your point that we want good science to judge how we make these decisions. We don't want unintended consequences to undermine the ability to achieve our objectives. The marine industry is very important in Maryland. It is a large part of the history of our State, as well as the economy of Maryland.

So I am going to give you a chance to present more information if you have it here or make it available to our Committee about your concerns on some of these standards as it may relate to the types of engines that are currently available and can be made available, and the blends of ethanol as to whether we have an issue here that needs to be attended to as we develop renewable standards for our fuels.

Mr. DREVNA. Thank you, Senator Cardin. I would be more than happy to address your issue there.

I think to look at this thing now, we have to look a little bit at the history of this. When the first renewable fuels and blending ethanol into gasoline, which again is a good thing, given the right circumstances, the right quantities, the right and proper use. But you know, the first time the EPA had granted the E–10 and certified it, it was fine because there had been some testing and engine manufacturers, both automobiles, light duty trucks, and marine equipment and hand-held equipment, power equipment all said fine. We will warranty these things up to 10.

Right now, if you are going forward with the proposal to breach that blendwall, as I mentioned before, there are four or five issues that have to be addressed. Marine engines, we are getting sued now for E–10. The oil industry, refining industry is being sued for E–10 because of some of the problems with marine equipment.

Anytime water is introduced into the system, and unfortunately marine means water. It has a tendency to separate the ethanol

from the gasoline and cause problems in the engine and cause problems with valves and fittings.

The power equipment, you have to look at increased exhaust temperatures, potentially, which will, if you are using power equipment in a wooded area, whether it is commercial or residential, and there is an increased temperature in the exhaust, that could cause problems with fires. The clutch on some of the handheld equipment, power saws come to mind. They could automatically start it without the operator knowing. That is definitely a hazard.

And the list goes on. Environmental, again the environmental things that both Nathanael and Blake talked about.

So again, we are just urging caution. I think, again, the next statement, I am solely representing NPRA on this issue and perhaps not the other two organizations that I am testifying for today. But I think I have to bring up the point that interestingly, in the petition from the ethanol producers and the energy group, to breach the blendwall, it is just go ahead and do it, just go ahead and do it.

We have to address these issues. We want to make sure that these things don't happen before introducing. One thing that is significantly missing from that petition, and again speaking only for NPRA, is the acceptance of any liability for these kinds of potential problems.

My statement to you, Senators, is petitioners are so confident in their product, then let them accept the liability for these kinds of things, and not foist it on the equipment manufacturer, the engine manufacturers, or the refining industry.

Senator CARDIN. Well, I would suggest that part of this is making a commitment to get the science answers to these questions.

Mr. DREVNA. Absolutely.

Senator CARDIN. Some of these are solvable problems, and let's make a common commitment to find out the answers, and then look at the tradeoffs and make sure it is the right way to go for the goals that we are trying to accomplish. I think you make a good point there.

I want to ask, if I might with the Chairman's indulgence, one additional question, and that is algae is a source of biofuel. It is happening in downtown Baltimore today as a company is working on this issue. I am impressed by some of the preliminary information on it. If any of you have a view on that, I would appreciate hearing it.

Mr. MCADAMS. What is interesting in this area of advanced biofuels is there are a number of different technologies in a lot of the subcategories. So for instance, one of the companies in the Advanced Biofuels Association is a company in California, Solazyme. They are going through over 60,000 different types of algae to create a fermentation process with sugars with a specific algae they are basically engineering, so that they don't even have to use sunlight. And by using that process, they can make a hydrocarbon molecule that can be placed with Charlie's products at the refinery, moved up the pipeline with zero cost in terms of infrastructure, and deliver energy density and performance as if it came from a barrel of oil.

The one that you are speaking about in Baltimore I believe is Algenol. They are looking at a different type of ALO process which would use saltwater to make an ethanol in the desert.

So again, one of the reasons that we advocated for technology neutrality was at this juncture in time, there is a myriad of different technology pathways that are being developed. And as Dr. Tiller has said, it is the combination, just like the EPA over the last 20 years has taken the fuel and the engine and made it into one emissions system. As we move forward, we are going to have to get our feedstock balance correctly with these types of technologies, and it is not going to be one technology. It is going to be a suite of technologies. And some of these technologies are going to combine to make these fabulous molecules.

Senator CARDIN. Thank you. Thank you for the response. I appreciate it.

Thank you, Mr. Chairman.

Senator CARDIN. You are quite welcome. Thank you.

Mr. McAdams, let me stick with you just for a moment. I think we have touched on this. I want to go into it a little bit more though. What do you see is the primary barrier or barriers to commercially viable, next generation renewable fuels, especially advanced biofuels that are not ethanol?

Mr. MCADAMS. Let me talk about one on the policy side, because Chairman Boxer talked about technology neutrality. One of the reasons that our Association supported the Senate bill last year, which called for 21 billion gallons without buckets, was what the bill did was it created a 15 billion gallon choice of corn-based ethanol, and then it created a 16 billion gallon choice for cellulosic.

And one of the challenges that we have with the current administration and the solicitations process is the definitions between what is the USDA biorefining program and the definitions in the solicitations for the biorefining program for commercial and demonstration projects are differing definitions.

Now, I totally understand the political debate we had last summer around food versus fuel. And what we can't do is go to a black or white answer in response to food versus fuel. We need, as the doctor has suggested here, we need to have a very thoughtful discussion about how we transition current available cost-effective feedstocks and develop these technologies.

For instance, I have eight different sugar-based technologies. They are fermentation technologies.

Senator CARPER. When you say you've got them, you mean?

Mr. MCADAMS. I mean in the Association. And so DuPont has one, BP and DuPont have one, for instance. Amherst has one. LS9 has one. Gevo has one. They all have a little different tweak, but what they are basically doing is making the software that could be plugged into an existing ethanol plant. That software package that they are creating today needs sugar-available feedstocks to ramp up their efficiency so that they can come into the market.

On the cellulosic train, as Dr. Tiller suggested, you are trying to develop an enzymatic pathway that reduces the cost so that you can be competitive with $40 or $50 crude oil in a perfect world.

So as Chairman Boxer was suggesting, we would say the other element you need to look at is not only environmental reduction, which we agree with Mr. Greene on. But also the cost——

Senator CARPER. When you say environmental reduction, what do you mean?

Mr. MCADAMS. I mean life cycle reduction, to bring these things down, to bring up the energy density of the individual molecules, to bring fungibility into the marketplace so that you reduce infrastructure cost.

If we bring these molecules in, I have seen numbers as high as $9 billion to create the infrastructure to deliver ethanol from one part of the Country to the next. If we can avert the need for that, think of the savings to consumers. And if we partner with the ideas that Mr. Greene is talking about and we remove the commercial impediments right now so that they have access to developing these technologies under the recovery package moneys that were packaged, then we may really be on an exciting path forward in a very short period of time.

Senator CARPER. All right.

Let me just follow up. Several people have mentioned the need for us to be technology neutral. When we were working in the Finance Committee on some of the energy portions of the—some of the manufacturing components of the—and energy provisions of the tax, the stimulus bill, we talked a lot about being technology neutral, trying to come up with a way to stimulate manufacturing here for sources of electricity, but not to favor solar over wind, over thermal, over nuclear or other aspects.

Several of you talked about technology neutral, and I think you stressed in your earlier comments the importance of Congress supporting a technology neutral approach to fuel technology.

Mr. McAdams, do you believe that the RFS is technology neutral?

Mr. MCADAMS. Yes.

Senator CARPER. All right.

Mr. MCADAMS. And I want to compliment the Finance Committee in at least two applications that really show the desire to move in that direction.

First of all, we began with a dollar one tax provision for cellulosic ethanol. Senator Salazar, Senator Baucus and others changed that provision before it was passed on the Extenders Act last year. It is now a cellulosic biofuel provision. That means that if her technology can develop a jet fuel or a diesel fuel which might have higher marketability value, that it will still receive the production tax credit.

A second area where the Congress made a major change was in what was the renewable diesel tax credit. They have not made that the biomass base diesel tax credit which harmonizes with the RFS, the way that the definition was written for the RFS.

That allows whether it is a thermal depolymerization technology, whether it is biotechnology, whether it is Fischer-Tropes technology, it allows them to make that type of renewable diesel and all receive parity funding. Because in the fuels market, a 50 cent difference in terms of a tax credit will literally take an advanced technology out of the game.

Senator CARPER. Mr. Greene.

Mr. GREENE. On that, particularly on the tax credits because I think they are incredibly important, we will spend probably about $5 billion, or we will forego about $5 billion worth of tax revenue this year through the biofuels tax credit. I think it is important that we shift to a technology neutral approach, but not one that is simply blind to technology, which means we really need to shift to something that pays for performance.

Senator CARPER. We talk a lot about that in health care reform, pay for performance.

Mr. GREENE. Exactly, and it is not totally dissimilar. Right now, our tax credits simply pay for a lot of volume, push as much production through as you can get, as many gallons as you can produce, and that is not a particularly good value for the taxpayer's dollars. We need the tools like the greenhouse gas measurement metrics that are in the renewable fuels standard being developed today by EPA, being developed in California by the Air Resource Board. But we also need to look at the actual performance—I am falling off the table.

Senator CARPER. You are not the first witness who has done that.

[Laughter.]

Mr. GREENE. Look at other aspects, water use, soil protection, wildlife protection. These are the real-world impacts of producing biofuels, and biofuels can add benefit there or cause real harm there. And we should be paying for the benefits. That is how we use tax dollars well.

Senator CARPER. All right.

This is a question for, actually I am going to forego my next question and just yield to Senator Merkley. I have a couple more questions, but it is your turn.

Senator MERKLEY. Thank you very much, Mr. Chair.

I wanted to follow up on the commentary, Mr. McAdams. In your testimony, you refer to, and I think you refer to it in your verbal testimony as well, the volatility parameter. The higher the volatility parameter, the greater potential for a particular renewable fuel to negatively impact environmental performance and backslide under the Clean Air Act on ground level ozone.

Can you address that volatility parameter and how ethanol feeds into that?

Mr. MCADAMS. In your package, there is a slide. What I have done is I have given you a slide with biobutanol versus ethanol.

Senator MERKLEY. Is this the slide you are referring to?

Mr. MCADAMS. Yes, sir.

And what I am trying to just show there is that different levels of concentration, and Charlie can talk to this as well because this really impacts what Charlie's refineries have to spend to be able to blend with gasoline for ethanol at 10 percent. And what you see is that for different compounds, and I am not picking on ethanol, but with different compounds with different volatility parameters at different levels, you have a higher volatility. And that in the summer time when Charlie's refineries have to reduce their volatility to hit the clean air specs, to try to make sure we are in at-

tainment, he has to remove a lot of the lighter ends out of the crude to blend with.

Senator MERKLEY. So for those of us who are non-scientists, I want to get a handle on this.

Mr. MCADAMS. Right.

Senator MERKLEY. The volatility factor here is not the propensity, if you will, to burn, but to off-gas. So if you are standing nearby, you are breathing components of the fuel? Can you explore this a little?

Mr. DREVNA. Senator, can I weigh in a little bit?

Basically, when you mix ethanol with gasoline, after you get to about 2 percent of ethanol and gasoline, you get a spike in volatility. It is one of the most significant contributions to the gasoline evaporating and contributing to smog. That spike flattens out from 2 percent to about 15 percent, and then it starts to go back down. And by the time you get to E–85, the mixture of 85 percent ethanol and gasoline is actually lower in volatility than gasoline by itself. So it is a very complicated curve, but you do have to really pay attention to it because the volatility of gasoline is one of the most important contributors to smog formation.

Senator MERKLEY. And to impact on ground level ozone.

Mr. DREVNA. Exactly.

Mr. MCADAMS. And on cost of the gasoline.

Senator MERKLEY. Great.

Mr. Drevna.

Mr. DREVNA. Well, I mean, exactly what Blake said, and there has been some suggestion, Senator, that well why don't we just bifurcate the system. Let's have an E–10 blend stock for all the vehicles, the legacy vehicles and the legacy equipment, the marine gear and the off-road power equipment. Let's just have those use E–10 or less and let's have the newer vehicles use the new blends.

Well unfortunately, that just causes a morass in the marketplace. The infrastructure complications are probably insurmountable. The cost is way off the charts, and the problem being that the misfueling will be rampant. So bifurcation of the system doesn't work.

What we would have to do as refineries is make two separate blend stocks, one for E–10 and lower, one for above E–10. And you know, put two separate blend stocks into a pipeline, more costs associated with it, as Mike or Blake has mentioned, we have to take the lighter ends out.

I don't think people really understand that even at E–10, when you are making a blend stock for E–10, that is not commercial grade gasoline. At refineries, we are not even making gasoline anymore. If you are going to an E–10 blend stock, you are making a sub-grade gasoline that only could become a certified commercial grade gasoline once the ethanol is blended into it. And the more and more we take out those lighter ends, the more and more costly it becomes to refine the product.

Senator MERKLEY. As I listen to the issues both on the consumption side and the production side, it makes me wonder if we should be bypassing, at least for commuter transportation, this issue in terms of essentially requiring all passenger vehicles to be able to go 40 miles, if you will, on electricity. Of course, you still have to

produce electricity, but it is an interesting set of issues that are being raised.

Thank you, Mr. Chair.

Senator CARPER. You bet. Thanks a lot for being here. Thanks for your very good questions.

Who at the table can give us an update on biobutanol? I think DuPont, BP have been working in biobutanol. I think they are doing some kind of demonstration maybe in Britain. Can somebody give us an update on how that is going?

Mr. MCADAMS. I spoke to BP this morning. They are proceeding with trying to build a demonstration plant at the moment. Their efficiency curves are moving in the right direction, very similar to Dr. Tiller's process which is a different one.

Another company that is looking at biobutanol is Gevo. They are based in Denver, Colorado. They are getting ready to build their first demonstration plant in Missouri. So similar types of technologies, but it is hitting its process timeframes at this time.

Senator CARPER. Good. Thanks.

Anybody else? OK.

What was the name of the company that GM invested in?

Mr. MCADAMS. Coskata.

Senator CARPER. Coskata. Who can tell us what is going on there? Anybody? I understand Coskata has the ability to, or they think they have the technology that allows them to take garbage, allows them to take old tires, and turn it into a biofuels. I understand the energy in this is pretty good, and that it costs about a buck a gallon, they think. Is that pretty much what they advertise?

Ms. TILLER. Well, I certainly can't speak for Coskata, but just in general certainly the thermochemical approach that they have taken has been demonstrated and I think is on track and is near ready for expansion from the small pilots that they are currently demonstrating.

Certainly, one concern long term is costs of some of these compared to some of the alternative advance fuels. And I think that there are some feedstocks that are very well tailored to that, and are probably cost-effective in the long run, such as municipal solid waste. However, for long term——

Senator CARPER. We have plenty of it.

Ms. TILLER. We do, but we also have lots of demand.

Senator CARPER. Yes, OK.

Ms. TILLER. And they are fairly regionally located, those waste are. They are not available at large scale, only in certain places.

So certainly there are some challenges. But again, as has been emphasized earlier, I think that there are a number of different technologies and approaches that can all fit harmoniously and address the large scale problem that we have and contribute efficiently and effectively and meaningfully.

Senator CARPER. All right.

Mr. MCADAMS. Mr. Chairman, just to give you some gallons.

Senator CARPER. Please.

Mr. MCADAMS. For instance, last year Tyson, in conjunction with Syntroleum from Senator Inhofe's State, created a partnership called Dynegy. They are building a jet fuel plant from chicken fats in Geismar, Louisiana. That is going to be a 75 million gallon

plant. It should come onstream third quarter 2010. Neste Petroleum out of Finland has already built a 60 million gallon isomerization process, and is making a 99 cetane zero sulfur neat diesel in Europe. They are looking at the United States. They would like to bring their technology to the United States. That could use a range of feedstocks, primarily oils.

Range in Georgia is looking at things. Another company that is very interesting in Alabama, Cello, has just finished the completion of a 20 million gallon plant that is a catalyst to technology which would make a renewable diesel. They are in the first 2 months of operation. This is a plant, if it hits its goals, could make a very significant material contribution because they are cheap to build, they are quick to build, and he can make jet fuels out of a range of things as far-ranging as tires to grasses to wood pulp.

Senator CARPER. All right.

A question for Dr. Tiller, and maybe ultimately for everybody. But since Tennessee is making an investment in biofuels, is the State also making an investment in E–85 infrastructure?

Ms. TILLER. Yes, sir, we are.

Senator CARPER. Could you talk about that?

Ms. TILLER. Yes. The State of Tennessee, in addition to the $70.5 million committed for developing the biofuels industry, has also invested a significant amount of money in developing corridors and infrastructure for E–85 fueling, largely centered around the interstate system and making sure that that is available on long corridors throughout the State, given especially that Tennessee does have a lot of primary interstates that run both north-south and east-west.

Just yesterday, the Governor announced a policy recommendation that was provided by the State's Energy Task Force, and certainly that, as well as energy efficiency, were very big parts of those recommendations. And I think we will see additional action and funding supporting those going forward.

Senator CARPER. Thanks for that response.

For anybody at the table, what can jump start the E–85 market? Any thoughts? Yes, sir.

Mr. DREVNA. Senator, I think consumer acceptability is going to have to—there are three things that have to happen. One, you have to have consumer acceptability, and I will get to that in a second. Two, you have to have the vehicles out there that can use it. And three, you have to have the infrastructure to put it. Let me go reverse on those.

First of all, the infrastructure doesn't exist today to have E–85 nationwide, the reason being because of the first two. Even though there are about 3 million or 4 million vehicles out there on the road today that are certified as flex fuel vehicles, the vast majority of vehicles coming off the line today are still conventional kind of gasoline vehicles, and it will be for a long time. Even if you double or triple it, it is still not going to make that dent.

The second thing is, E–85 is a great product, but still it is 25 percent to 30 percent less efficient than conventional gasoline, which means the consumer is going to have to fill up 25 percent of 30 percent more often than his neighbor.

So is there a role for it? Yes. Is it the panacea we see out there? Probably not. It is going to take, as a number of us on the panel have said today, it is going to take a mix of things. I would caution that we don't try to put all these proverbial eggs in that one basket because we have seen what that can do with corn ethanol, and let's not repeat those.

Senator CARPER. All right.

Anybody else?

Mr. EARLY. My only remarks is that if we are not going to use ethanol as E–85, then we have a serious problem because most of the discussion today has been on very exciting and exotic new ways of producing the ethanol. Well, we are going to have to use the stuff, and the question is how are we going to use the stuff in a way that does not threaten public health.

And right now, it is not at all clear. When EISA 2007 was enacted, I think a lot of people thought that the path forward was E–85. There was a lot of talk about that. And if Mr. Drevna is right, and that is not happening, then we need to start figuring out how we are going to use all this exciting new ethanol, the non-corn ethanol as well as the corn ethanol, because as far as today's vehicle technology, it doesn't matter whether the ethanol is made from corn or from cellulose or from algae, it still interferes, has the potential of interfering with the operation of the pollution control systems or the engine itself, and we need to figure out what to do about that.

Senator CARPER. Mr. Drevna.

Mr. DREVNA. One more comment. And also, Senator, the two other organizations that I am representing today, the Marine Manufacturers and the Outdoor Power Equipment Institute, you could not use E–85 in those engines. So again, it is going to take a mix.

Senator CARPER. All right. I am going to call on Senator Merkley for another round of questions. But before I do that, let me telegraph my next pitch. Major league baseball season starts in just a couple of days, and so I am going to telegraph a pitch with that in mind.

I am going to ask you, sometimes we have panels before us who are very diverse. There is not much consensus on the issues that we face. One of the things that we have to do legislatively and working with the Administration, EPA and others, we have to come up with a consensus and a path forward that is respectful and reflective of the diverse opinions.

We actually have diversity in your opinions here and your thoughts. But actually, a fair amount of consistency, too, consensus. And one of the things I will ask you before you leave today is I am going to ask each of you to kind of go down the road here and take maybe a minute apiece and give us your sort of like Cliff Notes of how we should be proceeding on this front.

Don't do it yet. I am going to yield to Senator Merkley, but just be thinking about that. Thanks.

Senator MERKLEY. Thank you, Mr. Chair.

Mr. Early, I wanted to follow up on your last comment about the need to proceed with E–85 infrastructure so that we have a way of consuming the ethanol of lower volatility, if you will. You made a reference to the challenge of designing cars, pollution control sys-

tems, other components. Isn't that basically solved under the flex vehicles that are being produced today?

Mr. EARLY. Yes. Flex fuel vehicles are very tight. They don't allow much evaporation. They can operate and meet standards. They are required to certify on both E–85 and E–10. In other words, conventional gasoline. And they are clearly the future and manufacturers are producing a lot of FFVs.

Where the train wreck is coming is that we are not going to have those FFVs replacing what has been referred to as the legacy fleet in the timeframe that the ethanol industry insists they need in order to sell more ethanol.

As I said, we have 116 million vehicles on the road today that are what we refer to as pre-tier II vehicles. We have another 40 million tier II vehicles which may or may not be able to accommodate mid-level. Most experts think they are better able to, but that is a lot of vehicles.

And so the replacement time is a long way out, but the ethanol industry is saying, we have to do mid-level ethanol now. As I said, we just sort of see this train wreck coming if we can't find a way of using ethanol in a way that doesn't harm the environment and public health.

Senator MERKLEY. Your comments about legacy assets takes me back to earlier in the week in the Banking Committee, where legacy assets is now the term being used for the toxic collateralized debt obligations. And so I guess in whatever field it is, legacy assets are a problem.

Say, I wanted to ask you all, whoever would like to comment on two aspects on the algae front. One is the role of DNA engineering in modifying how algae produces the potential for fuel. As I understand it, in some cases the goal has been to directly produce fuel inside the algae cell, and what you see as the breakthroughs that we are close to or that we have already accomplished, and might be on the near horizon.

The second aspect of this is commenting on how the use of algae might also simultaneously play into carbon capture technologies for coal plants.

Anyone who would like to, it would be interesting to get your insights.

Mr. GREENE. I can talk more to your second question than your first question. I know that there is a tremendous amount of work being done on engineering algaes. I know also that we have barely scratched the surface on just discovering the algaes that are out there. And from my perspective, algae falls, particularly for biofuels, somewhere between bioengineered crops, where we are intentionally designing something to put out in nature, and industrial genetic engineering, where we are putting something in a vat under a lot of pressure.

I have deep concerns about putting genetically engineered crops out in the field. We have to be very careful about how we do that. I am much less concerned, though, and I think we still need to take care with industrial products that are under very special conditions.

Algae crops, we are talking about thousands, hundreds of thousands of acres of the stuff, but on the other hand it is likely to be

under relatively unique conditions. So I think we have to be careful there, which is not really what you asked, but what I can talk about.

On the carbon capture side, I think it is particularly important to recognize that while algae does pull carbon out of whatever air is around it and grows much faster if it is exposed to a high CO_2 concentration, it is actually indifferent as to whether that carbon is coming out of the atmosphere or coming out of a smokestack.

And so from a carbon balance perspective, the benefit comes not from sucking carbon out of flue gas, but from leaving oil in the ground. And so if we attach an algae farm to a power plant, we can assign that benefit of leaving the oil in the ground to the algae products or to the power plant, but you can't do it twice.

So we either have a low-carbon algae biofuel or we have a low-carbon electric product, but you can't take the credit twice.

Senator MERKLEY. Would other folks like to comment? One of the questions I am curious about is whether in terms of bioengineering algae, if there is one particular type of fuel that is better fitted, if you will, as the discussion has gone from ethanol to butanol, et cetera, et cetera.

Mr. MCADAMS. Again, the different advanced biofuels all have different properties. What I would say that works for all the members of the Association, particularly in the synthetic biology phase that Dr. Chu is very familiar with because two of the companies I represent came out of Cal Berkeley's labs.

When these gentlemen, including the algae folks, sat back and tried to design the molecule they want to make for whatever process, they asked themselves, what would a good molecule be? A good molecule would be energy dense that carried the same volume of density as if it came from a barrel of crude. That is why we use crude, because it carries energy very effectively.

It would also be environmentally friendly in terms of the footprint that Nathan's been trying to talk to on a life cycle basis, and it would be fungible. You wouldn't have to have E–85 cars and separate tankage and separate fuel systems.

So coming to your specific question, the one company that is in our Association, Solazon out of the Bay Area, California, has a closed loop system which addresses the genetic modification that Nathan is concerned about putting in nature. Not only does it make a fuel, it makes a food. So this is a technology that has been designed to make both food and fuel through fermentation.

Ms. TILLER. If I may, I might add one more criteria to that list of desirables, and that would be that it is also cost-competitive with alternatives, and I think that there are certainly some challenges there with respect to algae.

Senator MERKLEY. Thank you all very much.

Senator CARPER. Well, thank you. Do you have any more questions you want to ask? You are all in? All right.

I telegraphed a pitch earlier, so I just wanted to go to each of you. Maybe we will start with Mr. Early.

Just give us your guidance going forward as we try to address this challenge, but also realize these opportunities that are before us.

Mr. EARLY. Well, obviously, as you know, I have been focusing on the renewable fuels standard. Mr. Drevna has already suggested that we may need to take a time out on the renewable fuels standard because it is sort of relentless in terms of the way it is structured under EISA 2007 in terms of raising the amount of ethanol that must be sold by Mr. Drevna's companies year after year. It goes up, I think it is 11 billion gallons this year. It goes up another 1.5 billion to 12.5 billion, I think, next year. And we just don't know whether we are going to get the testing done in time to know whether we can use ethanol in other ways.

So I think that the Congress really needs to start looking very hard at some kind of time out that would put the renewable fuels standard on hold so we can get the testing done and then proceed. Of course, you are going to hear screams of protest from the ethanol industry, who has made a lot of investment in producing more and more mostly corn ethanol, but I just—it is sort of hard to imagine that the timing is going to work out at this point, although it is conceivable.

Senator CARPER. OK, thank you.

Mr. GREENE. I absolutely agree that we can't afford to sacrifice our public health. On the other hand, we can also ill afford to sacrifice advancing technologies that should reduce global warming. So I think we have to figure out a path forward here.

I think the challenge is made particularly acute because we simply don't know with the policies that we have today that we will get real environmental benefits from biofuels. I think the lack of public consensus and support for biofuels that has really developed over the last year and a half reflects a real challenge to doing biofuels in the right way.

And so that is part of the justification behind the policy idea that I put forward. It is attached to my testimony, this idea of a billion gallon challenge, that let's go out there and figure out how to keep the advanced biofuels moving forward, but attach to them real high bar environmental standards so that we can prove to ourselves that we can do biofuels, advanced biofuels that provide a broad suite of environmental benefits.

I think if we can bring those technologies to the market at a commercial scale and bring them in a way that everyone agrees is good for the environment, then I think we will have the consensus that we need to make the investments to avoid public health tradeoffs. Maybe in that process we also bring alternative molecules to the market. That is great, but if we come to the end of that process and we are still primarily using ethanol, we will need to make the investments to get to E–85.

But right now, there is a certain chicken and egg issue that people are generally reluctant to resolve because we simply don't know if we are going to get what we are bargaining for.

Senator CARPER. All right.

Mr. McAdams.

Mr. MCADAMS. Thank you, Mr. Chairman.

Senator CARPER. I want to mention, just good advice for us. What should we be doing legislatively? What should we be doing in terms of regulations?

Mr. MCADAMS. Well, first of all, we need to get on with the renewable fuels standard. We need to get the rulemaking out in public and we need to have a public discussion where science drives the conclusion to many of the life cycle issues, many of the issues on how we are going to evaluate hitting the targets in the law.

One of the things I would specifically recommend that we consider is that in the RFS 1, we have equivalency standards, so more energy dense fuels receive an equivalency. For instance, biodiesel gets 1.5 to 1; renewable diesel gets 1.7; cellulosic gets 2.5 to 1. We ought to carry that forward in the future because we need to monetize better performance fuels.

The second thing I would say in the short term with the credit issues being tight in the markets, the government has put a lot of money in the recovery package. We need to avail those funds to the widest suite of technologies available. Let's not pick on. Let's not try to fill the gasoline pool with one type of compound. Let's see what kinds and types of molecules develop over the next 3 years.

And last, I would suggest that your comment about the tax code. We should revisit the tax code to try to put things on parity, so that these fuels all come out on an even playing field. And we ought to also look at biofuels in the same vein as we just looked at helping the wind and the solar industries out with an investment tax credit. Perhaps what we should do is put a comma and add biorefining after that investment tax credit because we are suffering the same types of credit issues that the wind and solar folks are.

Thank you for letting me be here today.

Senator CARPER. You bet. Thank you so much for coming.

Dr. Tiller.

Ms. TILLER. Thank you. I agree with a number of the comments that have been made that we need a science-based, balanced approach and that we need something very quickly. Certainly this market has tremendous momentum right now, and in order to sustain that and continue to progress toward our goals I think we need some certainty as rapidly as possible.

With that said, I think that one opportunity is to again, with some neutrality to various technologies and advanced technologies that are still under development, there is a tremendous amount of work that can be supported and done right now today to develop a feedstock infrastructure that will be relevant for any of these technologies.

That certainly is an area that I think we have been slower to make the investments and recognition of the value, but certainly one that can have tremendous long-term potential, and to echo some of the other comments, is one that we can do right or we can do wrong, and now is the opportunity to do that correctly.

Senator CARPER. All right.

Mr. Drevna.

Mr. DREVNA. Again, Senator, thank you. And again, science and technology must prevail. This Congress, this institution cannot let political ideas overcome science and technology on this particular issue, or any issue for that matter.

We are heartened to hear from the refining sector, again, that these advancements in technologies are just around the corner.

Again as I said, we have already made that turn in the refining industry. We need certainty now. We need to do something now so we can be compliant.

So again, we are asking what the Congress can do is please suspend the current RFS mandate, mostly, if not all, corn ethanol on the 2009 level. And as we go forward, as these technologies are developed, as I am sure they will be, that you use an on ramp and not an off ramp. As these things are developed, as the Secretary of Energy and the Administrator of EPA can verify that they are out there in commercial quantities, that they are safe for the environment, safe for the user, let's bring them on.

But the refining industry and engine manufacturers can't keep saying, OK, we are listening, it's coming, be patient. So again, an on ramp is very I think instrumental in getting his done right.

And last thing, Senator, I don't know if I am sorry that Senator Boxer is not here or glad she is not, but I must talk about the LCFS just a bit, the low-carbon fuel standard. That is one of those things again that sounds great. Let's just do a low-carbon fuel standard. And the euphoria of the passage of the bill in California, but the reality, the implementation has yet to happen, and there are significant problems with it.

We have to be very careful on what we call a low-carbon fuel standard, what it really means, and what impact it is going to have on infrastructure and on the ability of Americans to get from point A to point B and for this economy to grow again.

We are willing to work with anybody on that issue, but it is a lot more than a phrase and a slogan. Thank you.

Senator CARPER. Thanks for that conversation. I think Senator Boxer, I just heard her come in the door in the anteroom.

We haven't talked much about the effect of the cost of oil. When we had our last hearing here about 6 months ago on biofuels, I think the price of a barrel of oil, maybe it was close to $140 a barrel, but down to $40. For me that's just like the 800-pound gorilla in the room. We have not really talked about the effect on all these efforts that you represent. Would somebody want to talk about that?

I was talking to a friend the other day, and he said, we are not always going to be buying gas for $1.80 or $1.85, $2 a gallon because demand in this Country, because the economy is going to come back, people start traveling again, and China and India and places like that, they are building their own domestic auto industry now, and where they may only have now a million or 2 million people driving cars on the road, trucks on the road, that is going to change rapidly, and there will be a lot of demand for petroleum to allow people to drive those vehicles. So he said don't worry, eventually demand will come back and prices will go up.

We hear from folks who build cars, trucks and vans—Chrysler, GM, Ford—that they are concerned, they are fearful that they are going to be building vehicles to meet our CAFE standards, more energy-efficient vehicles, and that if the price of fuel stays down, then it is going to be harder to convince people to buy those. But I suspect that the drop in the cost of oil is a reprieve, but probably not going to be with us forever.

But your thoughts with respect to the cost of oil, dramatic stop in the price of oil, and sort of looking ahead as to how that factors into the demand and the relevance of biofuels.

Mr. EARLY. Senator, I apologize, but I have to bow out now. I have an appointment that I cannot miss.

Senator CARPER. Do you want to say anything before you leave in answer to my question?

Mr. EARLY. I appreciate it very much. Really, it is not my area of expertise. I will let these other experts kind of give you their wisdom.

Senator CARPER. All right. Enjoy the rest of this day. Thanks a lot for joining us and for your testimony and input.

Anybody? Yes.

Mr. DREVNA. Senator, one thing that I have learned over some 38 years in the energy business is that the last thing anyone should do is predict where the price of anything is going to be. If I were to have sat here in July 2008 and told you that in March, 2009 we would be looking at $35 or $40 barrel of oil, you would have summarily dismissed me.

But that being said, we can't control, and when I say we, not anybody on this panel specifically, but generally in this Nation, we cannot control what the price of crude is going to be. What we can control is how to operate within a wide range of prices. And to do that, we need policies that instill stability, not uncertainty.

And we can't be changing the rules every 2 years, every 4 years because investments have to be made now, today, on 15, 20, 30-year kinds of projects.

So if I can suggest that, if I knew how to control the price of oil, that would be pretty good, I guess, but we can't. And again, we have to have a system in this Country that is open for all fuels: petroleum, coal, nuclear, biofuels, everything, renewables.

As this Country grows, and we will grow, we will get out of this mess, we are going to need it all. It is just how we are going to use it, where it is going to be used, and the best way to use it. And that is all we are asking for is certainty.

Mr. MCADAMS. Just on a practical application matter, let me just give you a couple of data points. Again, Dr. Tiller, she said one of the key components of biofuels moving forward is cost. So what happened last year? What happened last year when we entered the year was we had about a $1 margin between RBOB and ethanol. And so everybody was blending it. And when we came into the last 3 months of the year, with the price of crude collapsing, the margins collapsed.

So if you look at the RIN credits, the RIN credits topped out at an all time high at the end of the year last year. They went to 16 cents. Now, they are back to 12 cents. So the practical effect was, with the price of crude dropping, a lot of folks who wanted to blend ethanol didn't want to blend it anymore because it was not advantageous in the marketplace on the street. And so you saw production capacity drop the last couple of months.

On the finance side, and if you would like I will submit for the record some of New Generation Finance's charts, and it shows you the drop in investment in ethanol plants, biodiesel plants and other

technologies, because it will just help you track the very significant reduction.

Senator CARPER. All right.

Mr. Greene.

Mr. GREENE. I would just argue that, actually agree with Mr. Drevna that we need stability and certainty in the market, but draw a very, I think, different conclusion than he seems to be suggesting, which is we do need stability and certainty, and the biofuels industry needs that.

We adopted the renewable fuel standard knowing that it was a technology-forcing standard, and the low-carbon fuel standard is a performance-forcing standard. And you know, I would choose performance over technology, but either way we are trying to provide long-term stability as to where we are going.

And the only question, the only real challenge I think we have right now is whether we want to hold onto that stability and certainty, how we want to provide that. And the only reason I think we are questioning ourselves is because we are not certain we are actually going to get the performance, the environmental benefits that we want from the rules that we have right now.

So I don't think the answer is to simply back off and let the oil industry decide how much we will use and when we will use it. But on the other hand, I do think we need to really figure out how we are going to make sure we get the benefits, the environmental benefits that drove us to want to improve our energy mix and our greenhouse gas performance.

Senator CARPER. OK.

Mr. DREVNA. Senator, if I may respond to Mr. Greene's comments.

Senator CARPER. Sure.

Mr. DREVNA. I didn't suggest that the oil industry said the oil industry should decide when and how much to use. We have rules on the books. My thought is that as—and if these are technology or process-driven, let's wait until the technology and the process is commercially available before we enact legislation that forces us to use something that doesn't exist today, and write checks to the U.S. Treasury because we can't do it any other way. That by no means is energy security in our estimation.

Again, there is nothing wrong, we believe, with an on ramp. When it is out there, when it is commercially available, and when it is competitive, let's use it.

Senator CARPER. Make sure you button is on.

Mr. GREENE. That sort of undermines the whole purpose of a technology forcing approach, which is to force the technology into the marketplace. If you have to wait for the fish to jump into your boat, then you are not going to get a lot of fish.

Mr. DREVNA. My response, and I guess I know we shouldn't be getting into a debate with a panelist here, but it is April Fools' Day.

Senator CARPER. This reminds me a little of ping-pong, you know?

Mr. DREVNA. Yes, right.

Senator CARPER. Dr. Tiller will probably have to leave and you guys can just carry on. But go ahead.

Mr. DREVNA. But as these new technologies, these technology-forcing legislation and regulations come on or at least right now, aren't on, what is the refining industry to do? Are we to just continue in search of RINs? Are we to continue to write checks when we are not producing any fuel? There is nothing wrong with technology-forcing legislation, but give it a timeframe. Once it is there, make it enacted. But again, I just ask the question: what do you want us to do today?

Senator CARPER. All right.

Dr. Tiller, anything for closing?

Ms. TILLER. Well, I have just one other comment, and that is that the volatility that I think we expect certainly going forward. I don't think we expect that this is a permanent price and even a narrow band. But I think what is important to recognize, too, is that volatility has real costs in the marketplace, that the instability that it causes has real costs associated with it, and that by moving to a domestic renewable home grown solution for energy, it is certainly an opportunity to reduce that volatility and to have more control over our destiny and improve the opportunity for performance in the market.

Senator CARPER. All right.

You all have been very generous with your time. We certainly appreciate that. We are going to leave the record open for a while. For what, a week or so? A week or so for folk, for other Members of the Committee to be able to ask questions that they weren't able to ask here today. We would just ask that if you receive those questions, please try to respond to them in a prompt manner.

I will just close by saying that I represent Delaware. We have not a lot of land, but we have a lot of chickens. We have 300 chickens for every person, in fact, who lives in our State. We didn't get into whether or not you could create electricity or a biofuel from chicken manure, but there has been a fair amount of effort to do that.

I have been interested in this issue for a couple of reasons. One, I hate the fact that we have these huge trade deficits, a lot of which is attributable to imported oil. I don't like the fact that we send our money to—I know we send our money when we fill up our cars, trucks and vans with gasoline, we send our money to countries in some cases to people who don't have our best interests at heart. I am convinced they use our money to try to harm us.

I am always looking for ways to try to keep farmers on the land so that we don't end up, with all respect to Joni Mitchell, we don't want to pave paradise and put up a parking lot all over Delaware or all over this Country, so we want to make sure—and I always like to look for market forces as the way to drive good public policy. So if a farmer is going to actually make more money by not just selling kernels of corn to make popcorn or whatever we want to make with it, but also be able to take the cornstalks and the leaves and the corn cobs, at least part of them, and put some of them back into the land, but the rest, if we can turn it into energy, that would be a very good thing.

I like the idea of developing these technologies, and your Association, Mr. McAdams, is doing some really exciting stuff to develop technologies that we cannot only use to put people to work, but

hopefully do some good things for the environment and reduce our dependence on oil and fossil fuels, but also create products that we can sell, technologies that we can sell around the world to address our economic needs.

All that makes sense. One of the roles of government, not the only role of government, but one of the roles of government is to, not to be a lapdog for businesses or industry, but I think to provide a nurturing environment for job creation and job preservation. And we want the businesses to play by the rules. We want them to be good stewards, including stewards of the environment.

And one of the things I learned a long time ago was that businesses have a need for consistency, for predictability. We have heard those words here over and over again. And we have this expectation for EPA to promulgate some regs, and I understand the regs have been drafted and they are over at OMB awaiting action. I wish I had thought about this yesterday because we hosted a meeting of centrist Democrats here in the Capitol. We hosted Peter Orszag, our OMB Director. I would have asked him what is going on with those regs.

One of the things I think we will do is draft a letter and ask my colleagues to consider joining us in a letter to the Administration saying, about those regs. We have been rattling their cage on regs involving offshore wind, with the Marine Service. We are going to be reaching out to the Administration to say let's see if we can't get these regulations moving, and finally we will have some certainty.

A lot of people have mentioned science. The only person I have heard mention science more than this panel is probably the President. Several people have said, guided by science. I am reminded of an old song called Blinded by Science. We don't want to be blinded by science, but we do want to be guided by science. I think what you are saying is actually consistent with where this Administration is coming from, I think, for most of us.

I don't know that we have answered all the questions that need to be answered. We have asked a bunch of them, and you all have provided a number of the answers that we need and I think better equipped us to go forward in a way that is important for all our Country.

Thank you very much and we look forward to working with you.

With that, this hearing is adjourned.

[Whereupon, at 12:20 p.m. the committee was adjourned.]

[Additional statements submitted for the record follow:]

STATEMENT OF HON. JAMES M. INHOFE, U.S. SENATOR FROM THE STATE OF OKLAHOMA

I'd first like to thank the Chairman for holding today's hearing. On a jurisdictional matter, I hope that the Chair will agree with me that we need to aggressively exercise our jurisdiction over the Renewable Fuel Standard (RFS) which is in desperate need of a thorough evaluation on a host of issues.

With the passage of the 2007 energy bill, Congress doubled the corn based ethanol mandate despite mounting questions surrounding ethanol's compatibility with existing engines, its transportation and infrastructure needs, its economic sustainability, and numerous other issues. Then as now, I argued it was just too early to significantly increase the mandate and that the fuels industry needed more time to adapt and catch up with the many developing challenges facing corn-based ethanol. From everything we have witnessed over the past year, I was right. These mandates allow

no room for error in a fuels industry already constrained by tight credit, dwindling capacity, environmental regulation, and volatile market conditions.

This overly aggressive ethanol mandate has also led to consumer backlash in parts of the country. In my home State of Oklahoma, one convenience store chain experienced a 30 percent drop in fuel sales once they began selling fuel blended at E–10 levels. The New York Times reported this growing consumer discontent in Oklahoma City last summer:

OKLAHOMA CITY.—"Why Do You Put Alcohol in Your Tank?" demands a large sign outside one gas station here, which reassures drivers that it sells only "100% Gas."

"No Corn in Our Gas," advertises another station nearby.

Along the highways of this sprawling prairie city, and in other pockets of the Country, a mutiny is growing against energy policies that heavily support and subsidize the blending of ethyl alcohol, or ethanol, into gasoline.

Many consumers complain that ethanol, which constitutes as much as 10 percent of the fuel they buy in most States, hurts gas mileage and chokes the engines of their boats and motorcycles.

As we examine issues surrounding the blend wall, I am deeply interested in the EPA's implementation of RFS 2. Few could dispute that Congress erred in pushing too much ethanol too fast. In this light, I encourage the EPA to reject calls to short-circuit its regulatory obligation and instead fully utilize sound science to determine the feasibility of mid-level ethanol blends.

Despite the drawbacks of today's corn-based ethanol mandates, I do support a role for both ethanol and other biofuels. The idea that we can grow and produce biofuels all over the Country—not just in the Midwest—is something worth pursuing and that's why I support research into cellulosic, algae, landfill waste, and other biofuel options.

I have long said that America's energy supply should be stable, clean, diverse, and affordable. I believe we must utilize all domestic energy resources. Continued development of home grown biofuels translates into energy security and keeps jobs and dollars on American soil and in American pockets.

On that note, I look forward to working with each of you to determine if these new mandates are even achievable and to explore the many potential ramifications of and solutions to the Renewable Fuel Standard.

STATEMENT OF HON. CHRISTOPHER S. BOND, U.S. SENATOR FROM THE STATE OF MISSOURI

Our Nation is facing a number of challenges right now.

Families have been dealing with the collapse of housing prices, high gas prices, high food prices and spiraling health care and college tuition costs.

Now, in the aftermath of this fall's financial crisis, people are worried about their retirement funds, their savings, and especially, their jobs.

A lot of the talk in Washington has been—how do we stimulate the economy?

Well, our folks in the farm community can point to one sure-fire success, particularly in the Midwest: the renewable fuels standard.

Thanks to the RFS, in 2007, the increase in economic activity resulting from ongoing production and construction of new capacity supported the creation of more than 200,000 jobs in all sectors of the economy.

These include more than 46,000 jobs in America's manufacturing sector—American jobs making ethanol from grain produced by American farmers.

These are impressive numbers as much of the economic news has been job loss.

In addition to job creation, in 2008, the Missouri E–10 mandate saved consumers $285 million at the pump. That's $285 million that will stay in our local economies rather than heading to foreign oil companies.

In addition, ethanol has had a positive impact on our Missouri rural economies. Thousands of farmers in Missouri and across the Nation have invested large sums, pursuant to the congressional ethanol mandate, to develop the infrastructure in order to produce alternative energy sources. To repeal the mandate now would be a major break of faith with all of these small investors, cause our imports to rise, and increase the amount of pollution coming from other petroleum sources.

Furthermore, the Department of Energy has stated that the increased use of ethanol has been good for the environment. The production and use of 6.5 billion gallons of ethanol in America's automobile fleet in 2007 resulted in the reduction of carbon dioxide and greenhouse gas emissions by 10 million tons, the equivalent of removing more than 1.5 million cars from the American roads.

I propose that we not only continue to produce corn ethanol, but also explore other resources we have in Missouri. The RFS placed a great emphasis on cellulosic eth-

anol production, and Missouri can be a national leader. In addition to thousands of grassland acres, Missouri has 1.4 million acres of scrub timber waiting to be turned into fuel.

I agree that we should thoroughly research the potential and impacts of using ethanol. But we must conduct this study without breaking the promise we made to our rural economies.

[Additional material submitted for the record follows:]

United States Senate
WASHINGTON, DC 20510

December 4, 2007

President George W. Bush
The White House
Washington, D.C. 20500

Dear Mr. President:

We write to urge your Administration to carefully evaluate and respond to unintended public health and safety risks that could result from the increased use of ethanol as a "general purpose" transportation fuel. You have called for a national effort to reduce consumers' demand for gasoline by 20 percent in ten years, in part through increased use of renewable transportation fuels such as ethanol. In addition, the Senate, as part of its pending energy legislation, has adopted language that would significantly increase renewable fuel use – particularly the use of ethanol – over the next two decades.

Currently, under federal law, the maximum level of ethanol permitted to be blended with gasoline for use in conventional gasoline-powered vehicles, equipment and engines is 10 percent – so-called E10. There is an interest in increasing ethanol blends to 15 percent (E15), 20 percent (E20), or even 30 percent through an expedited process at the Environmental Protection Agency (EPA) pursuant to a fuels waiver under Section 211(f)(4) of the Clean Air Act. Currently, there is little available data on the emission, air quality, public health, or safety impacts of mid-level ethanol. Therefore, to avoid unintended harm to air quality, to consumers and to gasoline-powered vehicles and equipment, the following concerns must be addressed before EPA takes such a step:

- On-road and non-road engines, vehicles, and equipment (other than flexible fuel motor vehicles) are not designed to be operated on ethanol blends higher than E10. The available evidence indicates that lawn mowers, chain saws, snowmobiles, recreational boats, motorcycles, and non-flex fuel motor vehicles will produce higher evaporative and engine exhaust emissions if ethanol blends higher than E10 are used.

- Ethanol blends higher than E10 are more corrosive on certain metals and plastics used in many of these products and will cause many gasoline-powered engines to run hotter and at higher RPM levels. In turn, this will result in adverse impacts on starting, durability, operation, performance, and operator safety, due to the degradation of critical components and safety devices.

To ensure there will not be damage to air quality or to consumers or their gasoline-powered products, there must be a comprehensive and scientific analysis of the impacts of ethanol blends higher than E10 in all gasoline-powered on-road and non-road engines, equipment, and vehicles. As part of any Section 211(f)(4) waiver decision for ethanol blends higher than E10, the EPA analytical process must, at a minimum, include the following:

- Testing of a representative and diverse mix of all gasoline-powered engines, vehicles, and equipment – on-road and non-road, large and small -- in which these higher ethanol blends will be used to assess potential increased emissions and long-term durability;

- Coordination of the analytical process by EPA with representatives of all stakeholders in this process, including at a minimum renewable fuel producers and marketers, on-road and non-road vehicle, equipment, and engine manufacturers, and public safety and environmental protection advocates;

- An analysis of the ability of the current wholesale and retail motor fuel distribution system to accommodate different levels of ethanol blends if blends higher than E10 are not suitable for use in all on-road and non-road gasoline-powered engines;

- Public notice and comment of all proposed EPA actions to consider or approve ethanol blends higher than E10, including, if necessary, public hearings; and,

- Final action by EPA to either approve or deny a petition to introduce into commerce ethanol blends higher than E10, along with publication of the agency's rationale for its decision.

We request information on all EPA's and the Department of Energy's (DOE) proposed or existing test programs and evaluations of the impacts of operating gasoline-powered on-road and non-road vehicles, engines, and equipment with ethanol blends higher than E10. Before these test programs and evaluations are implemented, EPA and DOE must provide a meaningful opportunity for comment and input from all stakeholders.

We look forward to working with you on these important issues. Thank you for your consideration of this request.

Sincerely,

Jack Reed

James M. Inhofe

Benjamin L. Cardin

Bernard Sanders

Susan M. Collins

cc: Administrator Johnson
Secretary Bodman