

LEGISLATIVE HEARING ON S. 517, THE CONSUMER AND FUEL RETAILER CHOICE ACT

HEARING BEFORE THE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS UNITED STATES SENATE

ONE HUNDRED FIFTEENTH CONGRESS

FIRST SESSION

JUNE 14, 2017

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ONE HUNDRED FIFTEENTH CONGRESS
FIRST SESSION

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LEGISLATIVE HEARING ON S. 517, THE CONSUMER AND FUEL RETAILER CHOICE ACT

WEDNESDAY, JUNE 14, 2017

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
Washington, DC.

The committee met, pursuant to notice, at 10:05 a.m. in room 406, Dirksen Senate Office Building, Hon. John Barrasso (chairman of the committee) presiding.

Present: Senators Barrasso, Carper, Inhofe, Boozman, Fischer, Moran, Rounds, Ernst, Sullivan, Cardin, Merkley, Gillibrand, Booker, Markey, Duckworth, and Harris.

Senator BARRASSO. Before we start today's hearing, I would like to just say a few words about the shooting at the congressional baseball practice this morning.

Our thoughts and prayers are with all the victims and with their families. Based on initial reports, the skill and the bravery of Congressman Scalise's security detail and the Capitol and local police prevented a much greater tragedy. It is a reminder that we should never take for granted the skill and dedication of those that protect all of us here in the Capitol, in our neighborhoods, and around the world.

Senator CARPER.

Senator CARPER. Some of us have played in the past in the congressional baseball games. I played in it for 10 years, and it is one of those rare opportunities for Democrats and Republicans to join together, not in conflict, not in vitriol, not in back-biting, but actually having fun together, and it is the kind of thing that we need to be doing more of rather than less.

I just want to join in the words of our Chairman. We don't say thanks enough to the Capitol Police and, frankly, to law enforcement officers probably in our own States. It is just a reminder for us to look for the opportunities to say thank you.

I think it was Maya Angelou who used to say people won't remember what we said, they won't remember what we do; they will always remember the way we make them feel. And we need to make our law enforcement officers, including the ones right here, feel appreciated.

Thank you.

OPENING STATEMENT OF HON. JOHN BARRASSO, U.S. SENATOR FROM THE STATE OF WYOMING

Senator BARRASSO. Thank you, Senator Carper.
I call this hearing to order.

Today the Committee is going to consider S. 517, the Consumer and Fuel Retailer Choice Act, introduced by Senator Fischer.

This bill would amend Section 211 of the Clean Air Act, which governs the regulation of fuels. Specifically, the bill would exempt fuels containing gasoline and more than 10 percent ethanol, fuels like E15, E20, and E30, from certain Clean Air Act requirements during the summer ozone season.

The Clean Air Act sets forth standards for fuel volatility to control emissions of volatile organic compounds that evaporate from gasoline. Volatile organic compounds, or VOCs, and nitrogen oxide, or NOx, react in the presence of sunlight to create ground level ozone, or smog.

The Clean Air Act sets forth different standards for fuel volatility for different areas of the Country. In general, the Clean Air Act sets forth more stringent fuel volatility requirements in areas that are not in attainment with the National Ambient Air Quality Standards for ozone, and then less stringent fuel volatility requirements for areas that are in attainment for those standards.

So the principal question at today's hearing will be: What does the bill mean for air quality and for communities trying to comply with the Clean Air Act ozone standards? Another important question at today's hearing will be: Will this bill result in more corn ethanol production? And, if so, what are the impacts of additional corn ethanol production?

According to one of our witnesses, corn ethanol has accounted for about 87 percent of the biofuels used to meet the renewable fuel standard over the last 10 years. Yesterday, the Advanced Biofuels Association wrote that it has deep concerns that the legislation will be detrimental to the future of advanced biofuels in the United States.

I think we also need to ask what does the bill mean for consumers. In addition to exempting fuels like E15, E20, and E30 from certain Clean Air Act requirements, this bill would codify in statute the EPA's 2010 and 2011 decisions to approve E15 for use in model year 2001 and newer vehicles.

In Wyoming, folks want fuel with less, not more, ethanol. They have seen what ethanol does to small engines and boat engines. They worry what fuel with more ethanol will do to their car engines and who will be stuck paying the bill. Consumers, manufacturers, and others are deeply skeptical about EPA's decision to approve E15 for use in the 2001 and newer vehicles. Congress, I believe, should not codify it.

No one should be surprised that I don't support S. 517. But S. 517 deserves a full and fair hearing before this Committee.

I also can't end my remarks without mentioning another part of Section 211 of the Clean Air Act, specifically the renewable fuel standard. Now, I believe the renewable fuel standard is broken, and EPA is not in a position to fix it. The program is causing distortions in the marketplace and damage to the environment. I believe it needs to be fixed.

With that, I will now turn to the Ranking Member of the Committee for his remarks.

Senator CARPER.

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

Senator CARPER. So on this legislation we just mark you as undecided?

Senator BARRASSO. But still your friend.

Senator CARPER. I just hope you will still be Deb's friend too.

[Laughter.]

Senator CARPER. Well, thanks, Mr. Chairman, for pulling this together, and to the Senator from Nebraska for offering this legislation. Giving us something to talk about, something important to talk about.

I want to thank all of our witnesses for joining us today, for sharing your perspectives with us.

Before I really get started, I want to take a moment or two just to remind folks how we got here in the first place. Not in this room, but on this subject.

In 2007, our Nation's energy future was not bright. If you will recall, U.S. consumption of gasoline and diesel was expected to grow exponentially, and the supply of oil to feed that growth was expected to be imported from other nations, many of which, frankly, didn't like us a whole lot.

That is why, in 2007, Congress took a number of steps to try to change our energy future, and in that year Congress increased the fuel efficiency standards for cars, for trucks, for vans for the first time in over 30 years.

As someone who worked very hard with Senator Ted Stevens, with Senator Diane Feinstein, with our colleague, then Congressman Ed Markey, to help us find an agreement, I am very proud of this achievement. Our efforts laid the groundwork for future vehicle efficiency increases by the Obama administration.

In 2007, Congress also amended the Clean Air Act to more than double the domestic biofuel mandate to 36 billion gallons by 2022. We included new incentives for advanced fuels that were intended to be better for the environment and were not derived from the food that we eat or the food our chickens and our cattle eat.

Since 2007, we have seen a dramatic change in the energy trend lines and our energy future looks better, brighter than it has in decades.

Today, thanks to the groundwork laid in 2007, consumers pay less at the pump, vehicles are cleaner and more efficient, and our Nation is no longer a net importer of oil.

I continue to believe that biofuels, if done correctly, can give us an environmentally friendly option, friendlier option to reduce our dependence on fossil fuels and our dependence on foreign energy production. However, we cannot ignore any unintended consequences, be they economic or environmental, of increasing our biofuel mandate.

The bipartisan bill before us today assumes gasoline with ethanol blends greater than 10 percent contribute to ozone pollution no more or no less than gasoline blends with 10 percent ethanol and, therefore, the fuel should be treated the same under the Clean Air Act.

My first and foremost concern is making sure that assumption is correct, and I suspect that everybody feels that way. Representing

a downwind State with ozone pollution problems, I want to make sure that passing this legislation will not increase ozone pollution that would make it more difficult for my State and other States that live at the end of America's tailpipe to reach attainment.

Along this line, States with extreme ozone concerns like my State, Delaware, have the authority to regulate the fuels sold within our borders, and I want to make sure this legislation does not inhibit States' rights to address ozone pollution.

My second concern is in regard to advanced biofuels. I have been told that this legislation would increase market access opportunities for higher blends of ethanol by allowing retailers to sell E15 and other higher ethanol fuel blends year-round. I just want to make sure that advanced biofuels, not necessarily traditional corn ethanol, benefit from this increased market share.

My third and final concern is related to the volatility in the markets used by refineries complying with the renewable fuel standards, known as the Renewable Identification Number, RIN, market. In the past 4 years, spikes in the RIN market have negatively impacted merchant refineries around the Country like one in Delaware City, Delaware, and others along the East Coast. I am interested in learning today what, if any, impact this bill may have on the RIN market and what more we can do to add transparency and certainty to what is really an opaque market there.

I started with a little history lesson. Now let me conclude with just a touch more of history, and that is the history of how this legislation found its way before us today.

I understand that this legislation has come before our Committee as part of an agreement among Republican Senators with respect to Senate consideration of another bill, one that is not this Committee's jurisdiction. So I just want to make clear to my colleagues that I was not privy to that agreement, and at this time I have not committed to any action with respect to this legislation that may have been discussed among our Republican colleagues, nor have I made commitments regarding our Committee's possible consideration of this bill in the future.

Having said that, when you have a bill like this that is an important bill and purports to do and intends to do good things, and is offered, I think, in good intent and with bipartisan support, and I applaud the author of the bill for gathering that kind of support. This is the way we ought to move a bill, work a bill. And when there are differences of opinion, we ought to have a hearing and we ought to have people who can express well all the different opinions, and then we will make our decisions. So this is the right way to do things.

I am happy that we are here and look forward to learning as much as we can.

Thank you all.

[The prepared statement of Senator Carper follows:]

**Statement of Ranking Member Tom Carper
U.S. Senate Committee on Environment and Public Works
Legislative Hearing on S. 517, the Consumer and Fuel Retailer Choice Act**

June 14, 2017, 10:00AM

Before we begin, I'd like to take a few minutes and remind folks how we got here.

In 2007, our nation's energy future did not look good. Consumption of gasoline and diesel was expected to grow exponentially and feeding this growth was oil from other nations – many of which didn't like us very much.

That's why in 2007, Congress took several steps to try to change our energy future. For example, Congress increased the fuel efficiency standards for cars, trucks and vans for the first time in 32 years. As someone who worked very hard with Senators Feinstein and Stevens, and then-Congressman Markey, to help us find an agreement, I am very proud of this achievement. Our efforts laid the groundwork for future vehicle efficiency increases by the Obama Administration.

In 2007, Congress also amended the Clean Air Act by more than doubling the domestic biofuel mandate to 36 billion gallons by 2022. We included new incentives for advanced fuels that were intended to be better for the environment and were not derived from the food we eat or the food our chickens and cattle eat.

Since 2007, we have seen a dramatic change in the energy trend lines – and our energy future looks better than it has in decades. Thanks to the groundwork laid in 2007, today consumers pay less at the pump, vehicles are cleaner and are more efficient, and our nation is no longer a net importer of oil.

I continue to believe biofuels, if done correctly, can give us an environmentally friendlier option to reduce our dependence on fossil fuels and our dependence on foreign energy production. However, we cannot ignore any unintended consequences – economic or environmental- of increasing our biofuel mandate.

The bipartisan bill before us today assumes gasoline with ethanol blends greater than 10% contribute to ozone pollution no more or no less than gasoline blends with 10% ethanol – and therefore the fuels should be treated the same under the Clean Air Act. My first and foremost concern is making sure that assumption is correct.

Representing a downwind state with ozone pollution problems, I want to make sure passing this legislation will not increase ozone pollution that would make it more difficult for my state to reach attainment.

Along this line, states with extreme ozone concerns – like Delaware – have the authority to regulate the fuels sold within its borders. I want to make sure this legislation does not inhibit states' rights in dealing with ozone pollution.

My second concern is in regards to advanced biofuels. I've been told that this legislation would increase market access opportunities for higher blends of ethanol by allowing retailers to sell E15 and other higher-ethanol fuel blends year-round. I want to make sure advanced biofuels benefit from this increased market share, not necessarily traditional corn ethanol.

And my third and final concern is on the volatility in the market used by refineries to comply with the RFS – known as the Renewable Identification Number (RIN) market. In the past four years, the spikes in the RIN market have negatively impacted merchant refineries, like the ones in Delaware City and along the East Coast.

I'm interested in learning today, what, if any, impacts this bill may have on the RIN market and what more we can do to add transparency and certainty to an opaque market.

I started with a history lesson, now I conclude with a little history - history of how this legislation found its way before us today. We see this legislation as an agreement between Republican Senators on another bill that is not this Committee's jurisdiction. I would like to make it known to my colleagues that I was not privy to that agreement, nor can commit to anything that may have been agreed to between parties.

And on that note, I look forward to having an open and thoughtful dialogue with our witnesses and colleagues today.

Senator BARRASSO. Thank you, Senator Carper.
 Senator FISCHER.

**STATEMENT OF HON. DEB FISCHER, A UNITED STATES
 SENATOR FROM THE STATE OF NEBRASKA**

Senator FISCHER. Chairman Barrasso and Ranking Member Carper, I thank you for convening today's legislative hearing to discuss bipartisan legislation that I introduced with Senators Donnelly and Grassley, and that is S. 517, the Consumer and Fuel Retailer Choice Act.

Thank you to my EPW colleagues, Senator Ernst and Rounds, Duckworth and Moran, for supporting this important legislation.

I would also like to thank the witness panel today for their willingness to share their time and experience with our Committee this morning.

When I first arrived in the U.S. Senate, I attended a meeting in Senator Klobuchar's office, and it was to discuss renewable energy and fuels; and several of my colleagues were there, Senator Durbin, Harkin, and Franken, to name a few. It was my first bipartisan meeting in the U.S. Senate. And in that meeting we lay the groundwork for including renewable in our Nation's "all of the above" energy strategy.

We made a strong connection. We all wanted to come together and work across the aisle to advance environmentally friendly fuel options for American families.

The bill before us today, the Consumer and Fuel Retailer Choice Act, is a renewable energy bill. It would extend the 1 pound Reid vapor pressure waiver, more commonly referred to as the RVP waiver, to E15. Extending the RVP waiver would allow this fuel to be sold year-round. Currently, it is illegal for E15 to be sold during the busy summer travel season, from June 1st to September 15th. Consumers who want to purchase it during that time, they can't buy it.

In 1990, the EPA granted a 1 pound RVP waiver to E10. However, this waiver does not apply to E15 during the summer, even though it has a lower RVP and burns more cleanly. As a result, fuel retailers are required to change fuel labels at the pumps before and after the summer season. This leads to increased costs, and it is also greater confusion for consumers.

E15 is a cleaner, higher octane fuel that has been approved by the EPA for use in passenger cars, light duty trucks, and medium duty passenger vehicles built after 2001. Currently, E15 is offered to consumers in 29 States, including Wyoming, South Dakota, Nebraska, Kansas, Oklahoma, Iowa, Arkansas, Illinois, Alabama, Mississippi, and West Virginia.

In Nebraska, we are known for supporting renewable fuel, so it might surprise you that Illinois, West Virginia, Minnesota, Texas, and many other States, well, they sell more E15 than my home State does.

The Consumer Fuel Retailer Choice Act would expand consumer choice and eliminate confusion at the pump. It does so by ensuring a consistently labeled product is offered year-round, which would decrease the occurrence of misfuelings.

S. 517 will also provide relief for our retailers who have been forced to change fuel pump labels twice a year for a fuel that does not change.

Good business decisions rely on accurate information and stability. Providing the RVP waiver for E15 would ensure that retailers have the certainty they need to make sound business decisions that will lead to greater economic growth opportunities in our local communities.

We all want clean air and clean water, and renewable fuels help us protect our world for future generations. Renewable fuels reduce greenhouse gas impacts by an average of 43 percent over gasoline. E15 has lower evaporative emissions than E10. It is a more environmentally friendly burning fuel.

Mr. Chairman, I have letters of support from multiple stakeholders, including the National Association of Convenience Stores, E15 retailers, Prime the Pump, the National Corn Growers Association, and Nebraska agriculture leaders, and I would ask unanimous consent that these letters be included in the record.

Senator BARRASSO. Without objection.

[The referenced information follows:]



June 12, 2017

The Honorable Deb Fischer
United States Senator
454 Russell Senate Office Building
Washington, DC 20510

Dear Senator Fischer:

Thank you for introducing S. 517, the Consumer and Fuel Retailer Choice Act. Due to your strong advocacy and support, the Senate Environment and Public Works (EPW) Committee will hold a hearing on S. 517 on June 14 and plans to markup the legislation in July. The National Corn Growers Association (NCGA) appreciates your leadership on this issue in the EPW Committee.

With funds from corn farmers and state corn associations, NCGA has made investments in fuel infrastructure and in promotion of higher ethanol blends, helping retailers offer more choices to consumers, including E15. S. 517 would remove an unnecessary barrier to selling those fuels year-round.

In addition to allowing fuel retailers to give consumers a choice at the pump that saves them money, enhances vehicle performance and improves the environment, S. 517 will help support additional market access for agriculture during a time when net farm income has dropped 50 percent over the past four years and corn prices have fallen to levels well below average. For corn farmers, who currently sell one-third of their crop for renewable fuel production, eliminating a barrier that discourages many retailers from selling E15 is a no-cost means to increase grain demand that provides significant benefits to consumers as well.

As the EPW Committee considers S. 517 this summer, we ask that you oppose all amendments other Senators may offer to this bill and encourage your colleagues to do the same. Because S. 517 amends the Clean Air Act, we are concerned this narrow RVP correction may draw amendments on a variety of other issues. Like you, we believe S. 517 should be considered separate from other issues in order to maintain its narrow purpose and keep the focus on the technical fix under consideration.

Thank you again for your leadership on S. 517 and your commitment to move this legislation forward. NCGA support S. 517 and your efforts.

Sincerely,

Wesley Spurlock, President
National Corn Growers Association

June 12, 2017

The Honorable Deb Fischer
United States Senate
454 Russell Senate Office Building
Washington, DC 20510

Dear Senator Fischer:

Thank you for introducing S. 517, the Consumer and Fuel Retailer Choice Act. Due to your strong support and advocacy, the Senate Environment and Public Works (EPW) Committee will hold a hearing on S. 517 on June 14 and plans to markup the legislation in July. Your leadership as a member of the EPW Committee continues to be essential to the success of this legislation.

In addition to allowing fuel retailers to offer consumers a choice at the pump that saves them money, enhances vehicle performance and improves the environment, S. 517 also provides additional market access for agriculture during a time when net farm income has dropped 50 percent over four years. Removing a barrier that discourages many retailers from selling E15 is a no-cost means to increase grain demand providing significant benefits to consumers.

As the EPW Committee considers S. 517, we ask that Senators oppose all amendments that would dilute your legislation. Because S. 517 amends the Clean Air Act, we are concerned this narrow Reid Vapor Pressure (RVP) correction may draw amendments on a variety of other issues. S. 517 should be considered separately from other Renewable Fuels Standard (RFS) issues keeping focus on the technical fix under consideration that will bolster greater consumer choice.

Thank you again for your leadership on S. 517 and your commitment to move this legislation forward. Please let us know how we can support your efforts during the hearing process and impending markup.

Sincerely,



David Merrell, Chairman
Nebraska Corn Board



Mike Thede, Chairman
Nebraska Ethanol Board



Dan Wesley, President
Nebraska Corn Growers Assn.



Stephen Nelson, President
Nebraska Farm Bureau



Bob Campbell, Senior Vice-President
Farm Credit Services/Frontier Farm Credit



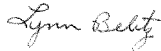
Dennis Fujan, President
Nebraska Soybean Association



Duane Sugden, Chairman
Nebraska Grain Sorghum Board



Brent Robertson, Chairman
Nebraska Wheat Board



Lynn Belitz, President
Neb. Grain Sorghum Producers Assn.



Ted Free, President
Renewable Fuels Nebraska

PRIME THE PUMP FUND

PRIME THE PUMP FUND
15210 103rd Street
West Burlington, Iowa 52655

June 13, 2017

The Honorable Deb Fischer
U.S. Senate
454 Russell Senate Office Building
Washington, DC 20510

Dear Senator Fischer,

I am writing in response to the recent letter submitted by the Petroleum Marketers Association of America (PMAA) to clarify some of their claims regarding E15 and the Consumer Fuel and Retailer Choice Act (S. 517).

Prime the Pump understands that this legislative change would enable the free market to operate as intended, and as such, we fully support the Consumer Fuel and Retailer Choice Act. Treating E15 the same as any other fuel in the United States enables retailers to evaluate adding the new fuel as an option based on the merits of the fuel, and this legislation would not be a mandate for any retailer to offer E15. This is no different than fuel retailers who decide to offer additional non-gasoline fuels like diesel and/or flex fuels like E85.

Prime the Pump has been working closely with more than 10 of the largest retail chains in the nation along with hundreds of single store owners to help expand the availability of E15 to drivers across the country. Collectively, these fuel retailers represent more than 14 percent of the total gasoline sold in the United States. Based on our actual experience, and based on Environmental Protection Agency (EPA) regulations, the PMAA letter makes several incomplete and inaccurate statements regarding equipment compatibility with E15.

First, EPA requires that equipment storing and dispensing E15 be either UL Listed or compatible per manufacturer warranty.

PMAA only disclosed a portion of the necessary EPA requirements. Wayne and Gilbarco are the two most dominant dispenser manufacturers in the United States with market share at more than 90 percent. Based on EPA guidelines, all Wayne dispensers currently in service through the United States carry a warranty for dispensing E15. In addition, all Gilbarco dispensers installed during 2008 and newer carry a warranty for E15.

As for underground storage, the EPA guidelines for storing higher ethanol blends recognizes manufacturer warranties for compatibility. The Petroleum Institute has a public library where these warranties can be accessed. Per the database, most all existing steel storage tanks in service today are compatible with higher ethanol blends like E15. In fact, these documents also mirror our experience helping hundreds of single store owners with adding E15 as a product. Typically, when a retailer does add a tank it is a business decision by the owner to offer more fuel choices to their consumer.

During 2015 and 2016 most of the retailers adding E15 were also adding E85. Because the retailer made the business decision to invest and expand by adding multiple customer choices at the pump,

some groups have tried to use this information to distort the true cost of just adding E15 to a fuel site. In fact, recently, we've worked with retailers adding E15 to hundreds of locations without needing to change underground storage tanks, storage components, or dispensers.

We have worked on more than 800 installations of E15, frequently with single store third generation owners, and all our retail installations meet federal, state, and local regulatory requirements. In addition, we are not aware of a single incident regarding losing liability insurance. In fact, according to Federated Insurance, the largest liability insurance provider for the retail industry, assuming the retailer follows all federal requirements, their existing policy covers liability associated with E15 and the risk is no greater than other fuels they offer.

As for "exclusive" grants that cover the expense of installing E15, in 2016 the United States Department of Agriculture announced the Biofuels Infrastructure Partnership program. Under this program, the USDA made available \$100 million to any retailer interested in adding E15 and/or E85 to their retail locations. This grant program was open to all retailers nationwide, and we are not aware of any exclusive terms only offered to select retailers. All retailers, including PMAA members were eligible for this grant.

In conclusion, Prime the Pump believes that this bill simply gives retailers the choice of offering E15 to their customers year-round. This bill does not mandate the sale of E15 or force any retailer into spending money on infrastructure. Rather, it enables the free market to work as intended.

Thank you for your consideration.

Regards,

Raymond E. Defenbaugh
Chairman
Prime the Pump Fund
15210 103rd Street
West Burlington, Iowa 52655

Office Telephone: 319-753-1100
Mobile Telephone: 309-221-4681
Email: ray.defenbaugh@bigriverresources.com

CC: The Honorable John Barasso, Chairman, Senate Committee on Environment and Public Works
The Honorable Tom Carper, Ranking Member, Senate Committee on Environment and Public Works



PRIME THE PUMP FUND
15210 103rd Street, West Burlington, Iowa 52655



June 12, 2017

The Honorable John A. Barrasso
Chairman
Environment and Public Works Committee
410 Dirksen Senate Office Building
Washington, D.C. 20510

The Honorable Tom R. Carper
Ranking Member
Environment and Public Works Committee
456 Dirksen Senate Office Building
Washington, D.C. 20510

Dear Chairman Barrasso and Ranking Member Carper,

On behalf of the National Association of Convenience Stores ("NACS") I wish to express support for S. 517: the Consumer Fuel and Retailer Choice Act.¹

NACS' members aim to sell lawful products that the public wants to purchase in a lawful manner, including E15. The association's members represent approximately 80 percent of the retail sales of motor fuel in the U.S. As such, NACS members have significant experience with E15 sales.

Currently, the lack of a 1 pound waiver for E15 has created market obstacles, which limit and complicate the sale of a product that is otherwise legally available for sale nine months out of the year. By removing this market impediment, S. 517, would facilitate the sale of E15. In addition, removing the obstacle preventing the sale of this product for all 12 months of the year would minimize consumer confusion about this product. For these reasons, NACS supports S. 517.

Related to the sale of E15 – as well as all other motor fuel products – is the matter of retailer liability for the misfueling of vehicles by consumers. Misfueling occurs when the wrong type of fuel is put into a vehicle, and may occur for many reasons, including retailer or consumer error.

Retailers must comply with strict fuel labeling requirements to prevent consumer misfueling. Yet, even if a retailer properly labels his or her fuel dispensing equipment, consumers may still put the wrong fuel in their vehicles. A consumer's misfueling of his or her vehicle should never, however, be attributed to any failure on the part of a retailer who has properly adhered to all labeling requirements related to the dispensing of fuels. It is essential the law make clear that if a retailer complies with all applicable labeling requirements, then a consumer's misfueling of his or her vehicle cannot result in liability for the retailer.² Of course, if

¹ NACS is an international trade association representing the convenience store industry with more than 2,100 retail and 1,600 supplier companies as members, the majority of whom are based in the United States.

² Today, retailers may be held liable for a consumer's misfueling of his or her vehicle. See e.g., 42 U.S.C. 7604 (citizen suits), 42 U.S.C. 7545 (regulation of fuels), 42 U.S.C. 7524 (civil penalties); see 40 C.F.R. 80.1504; see also EPA, Final Rule, Regulation to Mitigate the Misfueling of Vehicles and Engines with Gasoline Containing Greater Than Ten Volume Percent Ethanol and Modifications to the Reformulated and Conventional Gasoline Programs, 76 Fed. Reg. 44406 (July 25, 2011).

The Association for Convenience & Petroleum Retailing

1600 Duke Street ■ Alexandria, Virginia 22314-3436, USA ■ (703) 684-3600 ■ FAX (703) 836-4564 ■ www.nacsonline.com

a retailer's employee misfuels a consumer's vehicle or if a retailer does not comply with all applicable labeling requirements, the liability may be assessed against that retailer.

NACS appreciates this opportunity to provide comments on S. 517 and retailer liability for a consumer's misfueling. Please do not hesitate to contact the undersigned.

Sincerely,

A handwritten signature in black ink that reads "Paige Anderson". The signature is written in a cursive, flowing style.

Paige Anderson
Director of Government Relations

Senator FISCHER. Thank you, sir.

Renewable solutions are out there to fulfill our Nation's energy needs, and E15 is one of them. American families should be able to decide which fuel they put into their vehicles. Our bill would ensure retailers can offer consumers consistent choices at the pump year-round, with less confusion and red tape.

So I am looking forward to today's discussion and I thank my colleagues for joining me on this legislation.

And thank you, Mr. Chairman, for holding the hearing.

Senator BARRASSO. Thank you very much, Senator Fischer.

We are now going to hear from our witnesses.

Joining us today is Brooke Coleman, who is the Executive Director of the Advanced Biofuels Business Council; Jonathan Lewis, who is the Senior Counsel at the Clean Air Task Force; Mike Lorenz, who is Executive Vice President of Sheetz; Todd Teske, who is the Chairman, President, and CEO of Briggs & Stratton; and Janet Yanowitz, who is the Principal Engineer at EcoEngineering.

I would like to remind the witnesses that your full testimony will be made part of the official hearing record, so please try to keep your statements to 5 minutes so that we may have time for questions. I look forward to hearing the testimony.

Let us begin with Mr. Coleman.

**STATEMENT OF R. BROOKE COLEMAN, EXECUTIVE DIRECTOR,
ADVANCED BIOFUELS BUSINESS COUNCIL**

Mr. COLEMAN. Thank you. Good morning, Chairman Barrasso, Ranking Member Carper, and members of the Committee. My name is Brooke Coleman. I am the Executive Director of an organization called the Advanced Biofuels Business Council. I want to thank you for the opportunity to testify today. We represent worldwide leaders in the effort to develop and commercialize the next generation of advanced and cellulosic biofuels.

I have submitted a fairly lengthy written testimony that I will not read back to you, so I want to just hit on a couple of top-line points.

Our Council represents a wide variety of companies that produce a wide variety of innovative American products, whether it is biochemicals, biogas, biodiesel, cellulosic ethanol. But today's hearing is about ethanol, so I want to focus on the ethanol industry.

This is a very exciting time for the ethanol industry. We have built more than 200 ethanol biorefineries in this Country in little more than 25 or 30 years. We displaced the equivalent of Saudi Arabia, plus, it is probably a smaller OPEC country in terms of foreign oil dependence, and we now are innovating in cellulosic ethanol, which is the industry that I represent. In Iowa, there are commercial scale cellulosic biorefineries in Galva, in Emmetsburg, we call it DSM, and then DuPont's facility, of course, in Nevada. Nebraska is home to the largest advanced enzyme facility in the Country.

But with a growing industry comes industry challenge, and one challenge that new technologies face, whether it is clean energy, renewable energy, or anything else, is regulatory readiness. In fuels, regulations in policy really matter, because we don't have the ben-

enefit of selling to a competitive free market; we have to ask the oil industry to use our product. Our fuels can only go as far as policy and regulations allow them to go.

We all want to get to the point where we have a free market, but we are not there yet.

S. 517 essentially cures a regulatory glitch. Vapor pressure in gasoline is controlled for evaporation, and evaporation contributes to smog. Ten percent ethanol blends are allowed a 1 pound waiver in the summer because our lower tailpipe emissions offset the small increased emissions from smog.

And I won't get into too much detail because Janet is going to do that, I believe, and she is the expert, but the glitch is that higher ethanol blends like E15, while being cleaner and actually lower vapor pressure, are not granted the same waiver.

So while S. 517 will increase the availability of what I think, and I think will be proven, to be a cleaner, cheaper, lower carbon American-made and renewable fuel, it is my job to focus on how important this would be for cellulosic ethanol. And I want to emphasize that a little bit now.

Cellulosic ethanol technology is commercially ready. The issue that we have right now is the market is saturated, and project finance, and I won't try to bore you, at least, but project finance, if you go to a bank or a lender and say you want to build a bio-refinery, it is a back-to-front conversation. You don't go and you say I have all this fuel; can we find a place for it. No one is going to fund that. You go and you say this is guaranteed demand, this is our demand opportunity, this is our market access, and will you finance that.

You can't go and say, well, maybe if they fix the RVP thing, we will have a market opportunity. No one is going to fund that.

So what S. 517 essentially does is it provides market headroom for cellulosic ethanol right at the point where we need it, and roughly 20 companies—I believe a letter was mentioned by the Chairman. There is a point where people who run trade associations, and that includes myself, should be sort of pushed to the side. Twenty company executives signed a letter saying they support S. 517 for the very reason that it will unlock project finance in an industry that is very, very important and growing in this Country.

I think I am going to use the time left to discuss very, very clearly what this proposal is, and in some cases is not.

I have said that the proposal would allow cleaner, cheaper fuel to be available all year. That is true. It would undoubtedly accelerate the commercialization of the lowest carbon fuel in the world. Our fuels are anywhere from 80 to more than 100 percent better than gasoline from a carbon perspective. Think about that. Some of our fuels are carbon sinks. It would further reduce U.S. dependence on foreign oil and most importantly, perhaps, keep American fuel consumer dollars circulating in our Country and our States, instead of going overseas.

But just as important, here is what S. 517 does not do. It does not introduce a new fuel that is alien to consumers. We have used this, as Senator Fischer said, in 29 States. It does not replace current blends and, therefore, does not require small engine manufac-

turers to re-spec their engines, because E10 and E0 will still be available where it is available now. And it does not change current law in reformulated gasoline areas, which does not allow waivers of any kind, and it does not in any way change California law, where they have the special authority to regulate their fuel statewide. They will be making their own decisions with regard to E15.

It is extremely rare, in my opinion, not sure if I have seen it in my 20 years doing biofuel work, to have the opportunity to do so much with such a small and simple regulatory fix.

Thank you for reviewing this proposal, and we humbly ask you to support S. 517. Thank you, and I look forward to your questions.
[The prepared statement of Mr. Coleman follows:]



R. BROOKE COLEMAN

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Brooke Coleman co-founded and serves as the Executive Director of the Advanced Biofuels Business Council (ABBC), a coalition of industry leaders in the advanced biofuels and cellulosic ethanol sectors. Mr. Coleman also advises companies and campaigns in the clean energy sector.

Mr. Coleman has been involved with the energy and environmental sectors at the regulatory and policy levels since 1997. He began his career as the Energy Program Director at Bluewater Network, where he exposed the environmental and public health risks of the gasoline additive MTBE and led a national campaign to ban the chemical in transportation fuels. Mr. Coleman later founded or co-founded several organizations and/or projects, including the Advanced Ethanol Council, the New Fuels Alliance, the California Renewable Fuels Partnership, the Northeast Biofuels Collaborative, the Renewable Energy Action Project (REAP).

Mr. Coleman served as the chief strategist and spokesperson for clean energy advocacy campaigns during the 2008 and 2010 federal election cycles. He has also engaged in several state-level initiatives in recent years. He represented the advanced biofuel industry during the development of the California Low Carbon Fuel Standard (CA LCFS) and spearheaded an initiative in Massachusetts to pass the world's first cellulosic biofuels excise tax exemption.

Mr. Coleman is one of the leading national advocates for advanced biofuels at the state and federal level. He has testified before the U.S. House of Representatives and the U.S. Senate on various issues related to alternative fuels, including performance standards and tax. He has also testified before numerous state legislative committees. He has a deep level of expertise in a number of areas related to energy regulation, including the California Low Carbon Fuel Standard (CA LCFS), carbon lifecycle accounting, the federal Renewable Fuel Standard (RFS), the California and Federal Reformulated Gasoline (RFG) program, energy tax and various other energy-related programs at the federal and state level. He is one of the leading national advocates for advanced biofuels at the state and federal level.

Mr. Coleman is a graduate of Wesleyan University, the Northeastern University School of Law, and is a member of the Massachusetts State Bar. While studying law, he worked on several landmark environmental cases, including the largest ever settlement in Clean Water Act history and a common law climate change lawsuit filed on behalf of eleven state attorneys general.

Written Testimony of:

Mr. Brooke Coleman
Executive Director, Advanced Biofuels Business Council

Senate Committee on Environment and Public Works
United States Senate

Legislative Hearing on S. 517, the Consumer and Fuel Retailer Choice Act

June 14, 2017

Good morning Chairman Barrasso, Ranking Member Carper, and members of the committee. My name is Brooke Coleman and I am the Executive Director of the Advanced Biofuels Business Council (ABBC).

The Advanced Biofuels Business Council represents worldwide leaders in the effort to develop and commercialize next generation, advanced and cellulosic biofuels, ranging from cellulosic ethanol made from switchgrass, wood chips and agricultural waste to advanced biofuels made from sustainable energy crops, municipal solid waste and algae. Our members include those operating production facilities, those augmenting conventional biofuel plants with “bolt on” or efficiency technologies, and those developing and deploying the technologies necessary to make advanced biofuel production a commercial reality.

We are honored to be here today to review S. 517, the Consumer and Fuel Retailer Choice Act. The Council strongly supports passage of S. 517, which will have the immediate effect of opening the U.S. motor fuel marketplace to the increased use of American-made, advanced biofuels.

1. S. 517 provides a simple and long-overdue regulatory fix to Reid Vapor Pressure (RVP) allowances that does not represent a shift in U.S. motor fuel policy with regard to ethanol

The U.S. Environmental Protection Agency (EPA) sets a maximum allowable Reid Vapor Pressure (RVP) for gasoline and gasoline/ethanol blends in the summer months to control fuel evaporation from vehicles (and storage and transfer equipment). Higher RVP fuels evaporate more readily, and fuel evaporation contributes to the formation of smog (ground-level ozone) together with other tailpipe and industrial pollutants.

The addition of ethanol to gasoline increases the RVP of the overall blend by about 1 pound per square inch (psi). The RVP increase is ascribed to the addition of ethanol to gasoline notwithstanding the fact that the RVP of pure ethanol is much lower than the RVP of pure gasoline.¹ Starting in the early 1990s, the 10 percent ethanol/gasoline blends becoming more prevalent across

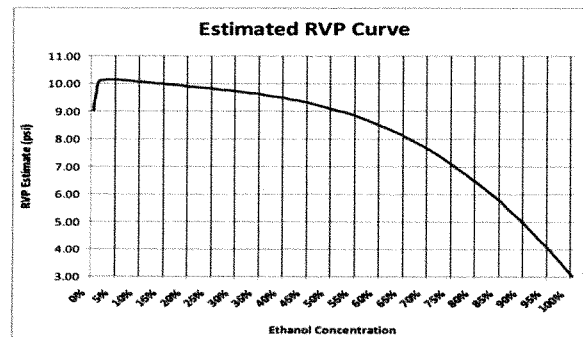
¹ See NREI memo posted: http://www.ethanolrfa.org/wp-content/uploads/2015/09/RVP_Effects_Memo_03-26-14_Final.pdf

the country were (explicitly) granted a “1 pound” RVP waiver to: (a) recognize that adding ethanol to gasoline reduces other ozone precursors that offset the RVP increase; and, (b) ensure that ethanol could be blended into standard gasoline blend stock without exceeding the RVP cap (i.e. ethanol blending would not require gasoline refiners to make a special “sub-RVP” blend stock to facilitate downstream ethanol blending).

Unfortunately, summer month RVP controls are now inadvertently curtailing the use of a motor fuel with higher levels of renewable content that is at least as clean as E10. Because U.S. EPA has not granted the same RVP waiver to E15 that it grants to E10, the use of E15 in the summer would require gasoline refiners to provide a sub-RVP gasoline blend stock. This has not happened. As such, E15 is essentially a 3-season fuel unavailable to mainstream consumers during the peak driving.

This is illogical for several consumer, air quality and public policy reasons:

- **E15 has lower evaporative emissions than E10.** As discussed, adding 10 percent ethanol to gasoline results in an RVP increase of ~1 psi. However, because pure ethanol has a lower RVP than gasoline, adding more than 10 percent ethanol starts to reduce the RVP of the overall gasoline/ethanol blend. As such, holding everything else constant, E15 is a cleaner (lower evaporation) fuel than E10.



- **Increasing ethanol content from 10 percent to 15 percent does not result in higher emissions of other (i.e. non-evaporative) ozone precursors.** As discussed, E10 receives a 1-pound RVP waiver because its use reduces emissions of non-evaporative ozone precursors (e.g. total hydrocarbon, carbon monoxide) as an offset to increased RVP. E15 has essentially the same effect on tailpipe emissions as E10. The most extensive analysis was conducted by the National Renewable Energy Laboratory (NREL), which tested 14 vehicles running E0, E15 and E20. The study found that “blends of 15% to 20% ethanol

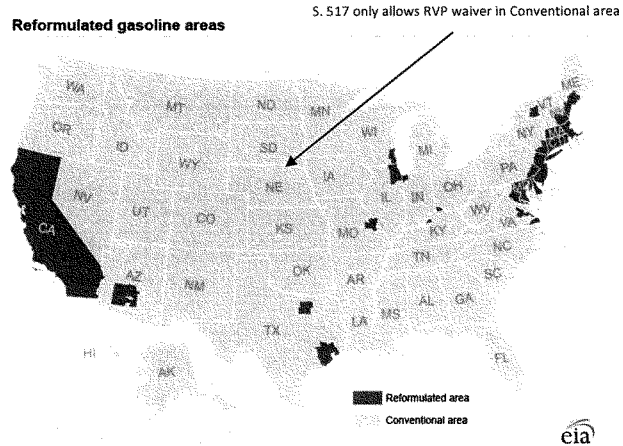
into certification gasoline either produced no change or lowered NMHC and CO emissions for each vehicle tested, relative to the same vehicle tested on ethanol-free certification gasoline. NOx emissions were not statistically different for each vehicle tested on ethanol-containing certification fuels, compared to the same vehicle tested on ethanol-free certification gasoline.”² In addition, NREL conducted a research review of 43 studies on E15 emissions and engine compatibility and found “no meaningful differences between E15 and E10 in any performance category.”³ One of the only studies alleging harm from the use of E15 was a 2012 oil-funded analysis under an industry-funded umbrella group called the Coordinating Research Council (CRC). According to the U.S. Department of Energy, the CRC failed to establish a proper control group, used a test cycle designed specifically to stress engine valve trains in cars with known valve train issues and came up with its own (rather than approved) “leak down” test to determine engine failure.⁴ In critiquing the CRC study, U.S. DOE reiterated that its own 86 vehicle test – in which each vehicle was operated up to 120,000 miles under normal driving conditions – showed “no statistically significant loss of vehicle performance (emissions, fuel economy, and maintenance issues) attributable to the use of E15 fuel compared to straight gasoline.”

- **The 1-pound RVP waiver offered to E10 (but not E15) only applies in conventional gasoline regions, not federal Reformulated Gasoline (RFG) areas where gasoline blends must meet stricter limits due to ozone and other air quality issues.** RVP waivers are not offered for E10 or any other blend in (usually urban) RFG areas, where gasoline is regulated more tightly. S. 517 would only allow RVP waivers where RVP waivers are already allowed for E10 (i.e. in conventional gasoline areas). As such, S.517 would have no effect on gasoline regulations in most coastal urban areas/states, where ground-level ozone (smog) formation is a problem. It would also have no effect on the State of California’s unique authority to regulate its own gasoline statewide.

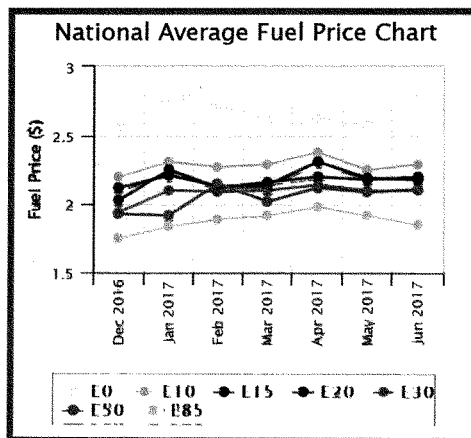
² See <http://www.nrel.gov/docs/fy12osti/55178.pdf>

³ See <http://www.greencarcongress.com/2013/10/20131013nrel.html>

⁴ See <http://energy.gov/articles/getting-it-right-accurate-testing-and-assessments-critical-deploying-next-generation-auto>



- **The ongoing failure to address the ethanol-related RVP waiver situation discourages the use and availability of cheaper, higher octane fuel during peak gas price months.** More than 800 retailer gasoline stations – in 29 states – now sell E15. It is widely documented that E15 is a lower cost fuel than E10, and much lower cost than E0, selling anywhere from 3 to 15 cents cheaper per gallon than E10 and roughly 50 cents per gallon cheaper than E0.⁵ Adding more ethanol – the cheapest source of octane – displaces the need for benzene and other octane enhancers, which are very expensive (and highly toxic).



² See <https://e85prices.com/>

2. Immediate passage of S. 517 is critical to the ongoing development of advanced biofuels – particularly cellulosic ethanol, the lowest carbon fuel in the world

The Council represents companies producing a wide variety of advanced biofuels and chemicals, including cellulosic ethanol, biodiesel, biogas and bio-jet fuel. On the ethanol side, we represent some of the largest cellulosic ethanol – and advanced biofuel enzyme – production facilities in the world. The Council's website (AdvancedBiofuels.org) details roughly two dozen advanced/cellulosic biofuel projects in the United States and abroad.

With the industry just breaking through at commercial scale, it is important to note that the scale of opportunity is enormous. According to the Sandia National Laboratory, the U.S. could produce 75 billion gallons per year of cellulosic biofuels (one subset of the advanced biofuel industry) without displacing food and feed crops.⁶ This would be enough cellulosic biofuel alone to displace more than half of gasoline demand. A Bloomberg analysis looked at select regions in the world to assess the potential for next generation ethanol production.⁷ The study found that eight regions -- Argentina, Australia, Brazil, China, EU-27, India, Mexico and the United States -- could displace up to 50 percent of their demand for gasoline by 2030 making cellulosic ethanol from a very small percentage of its each region's agricultural residue supply alone.

Swift passage of S. 517 is critical to first-movers in commercial cellulosic ethanol production for one primary reason: market opportunity. Project finance in the advanced biofuels sector – or any sector – depends very acutely on being able to demonstrate (to outside or in-house investors) the opportunity for market demand if technological/production benchmarks are hit. The biggest challenge emerging cellulosic biofuel producers have is being able to create and demonstrate consistent year-to-year demand against the headwind of manipulated price (see: OPEC discussion below) and more general oil industry disinterest in using more renewable fuel than required by law. The “lowest hanging fruit” opportunity for cellulosic ethanol is E15 due to the blend's approval for all vehicles manufactured after the year 2001 (which now constitute more than 90 percent of all vehicles miles traveled). E15 adoption – as essentially a 3-season fuel – has helped cellulosic ethanol makers demonstrate growing ethanol demand. However, its unavailability in the summer has dampened retailer interest in making the arrangements to offer the fuel at all. And it has thereby dampened enthusiasm on the project finance side due to uncertain market demand.

Some environmental NGOs have argued that the cellulosic ethanol industry does not need a growing overall ethanol marketplace to succeed since second generation ethanol can theoretically displace first-generation ethanol in a constrained marketplace. This is a well-meaning but illogical argument for two primary reasons.

⁶ See <https://sandia.gov/news/resources/news-releases/biofuels-can-provide-viable-sustainable-solution-to-reducing-petroleum-dependence-say-sandia-researchers/>

⁷ See http://www.novozymes.com/en/sustainability/benefits-for-the-world/biobased-economy/while-wheels-on-biofuels/Documents/Next-Generation%20Ethanol%20Economy_Executive%20Summary.pdf

First, as shown in a recent Third Way report, most cellulosic ethanol first movers are also first-generation ethanol producers.⁸ As such, any policy that requires second-generation ethanol production to displace first-generation ethanol essentially requires cellulosic ethanol first movers to cannibalize their current business model. Ethanol companies are not going to innovate to undercut their own existing technology any more than solar and wind companies would invest hundreds of millions of dollars in better panel and turbine technology if they were only allowed to displace existing solar panels and wind turbines. Notably, it is the revenue from first generation technology that is often used to develop second generation technology. And project investors – many of which have existing stakes in these companies – are not going to undercut current assets either.

Second, the primary objective of U.S. ethanol policy – embodied in part by the Energy Independence and Security Act of 2007 – is to reduce the use of foreign oil (i.e. energy independence and security rather than independence from U.S. production of first generation biofuels). Many of the proponents of the replacement of first-generation ethanol with second-generation ethanol cite climate change concerns as the basis of the position (i.e. because cellulosic ethanol has a better carbon footprint than corn ethanol). However, it is unclear how it is more prudent climatologically to displace corn ethanol (recently assessed by USDA to be 43 percent better than petroleum on a full lifecycle basis) rather than petroleum derived from tar sands (~20 percent more carbon intensive than average petroleum) or other increasingly carbon-intensive methods with cellulosic ethanol.⁹

It is important to note that – notwithstanding claims to the contrary by a small number of loud (often oil-funded) voices – independent analysis confirms that most types of first and second-generation biofuels reduce climate change emissions, in many cases by very large amounts. This includes analysis conducted by U.S. EPA, the California Air Resources Board (CARB), the U.S. Department of Energy, the U.S. Department of Agriculture and top energy labs such as Argonne and Oak Ridge National Laboratories.

For example, the latest peer-reviewed analysis coming out of the U.S. Argonne National Laboratory shows that all types of ethanol – the type of renewable fuel usually scrutinized for its GHG emissions – have significantly lower lifecycle greenhouse gas emissions than petroleum, even with penalty for indirect land use change. It is worth highlighting that the Argonne National Laboratory developed the GREET model, which remains the gold standard for modeling carbon lifecycle emissions from fuels (e.g. and is the analytical basis for the California Air Resources Board Low Carbon Fuel Standard as “CA-GREET”). In particular (as S. 517 allows for more ethanol use), all five types of biofuels shown below are ethanol. Many of these biofuels are significantly more carbon reductive than technologies often regarded to be the most innovative (electric drive, hydrogen).

⁸ See <http://www.thirdway.org/report/cellulosic-ethanol-is-being-a-big-loss-for-corn-for-now>

⁹ See <https://www.usda.gov/oc/climate-change/mitigation/technologies/USDAEthanolReport-20170117.pdf>.

<http://www.businessinsider.com/canada-oil-sands-produce-20-more-greenhouse-gases-2015-5>; and, <http://www.bloomberg.com/us-shale-oil-byom-when-it-comes-co2-emissions-not-all-crude-oil-created-equal-1843616>.

**Latest Well-to-Wheels Greenhouse Gas Emissions Reduction
Relative to Average Petroleum Gasoline**

WTW GHG emission reductions	Corn	Sugarcane	Corn stover	Switchgrass	Miscanthus
Including LUC emissions	19–48% (34%)	40–62% (51%)	90–103% (96%)	77–97% (88%)	101–115% (108%)
Excluding LUC emissions	29–57% (44%)	66–71% (68%)	89–102% (94%)	79–98% (89%)	88–102% (95%)

Source: Argonne National Laboratory¹⁰

The carbon benefits of increasing the use of renewable fuels are even greater when you consider real world conditions – i.e. the fact that renewable fuels replace marginal (rather than average) gallons of petroleum. To illustrate, Petrobras chief Jose Sergio Gabrielli has declared that “the era of cheap oil is over.” This means that oil companies are shifting very quickly to an increasing reliance on more expensive and riskier “unconventional” fuels – including tight oil (e.g. the Bakken), deep water (e.g. Gulf of Mexico, Deep Water Horizon) and Canadian tar sands (e.g. Keystone) – to meet the global demand for fuel energy.¹¹

Unconventional oil is harder to find and can result in serious ecological problems (earthquakes, drinking water contamination, ecosystem destruction in the case of the Gulf). But these fuels are also more carbon intensive than the “average petroleum” often used to compare the carbon value of renewable fuels. There are many recent studies that have looked at the real world “marginal” impact of increasing the use of renewable fuels. One of the more extensive is a 2014 analysis conducted by Life Cycle Associates in California, which concluded that today’s first-generation ethanol – assessed by EPA in 2010 to be 21 percent better than 2005 petroleum with regard to lifecycle GHG emissions – is 32 percent better than 2012 average petroleum and 37–40 percent better than petroleum derived from tar sands and fracking. The report notes that using less renewable fuel will increase the use of these “marginal” or unconventional types of oil:

The majority of unconventional fuel sources emit significantly more GHG emissions than both biofuels and conventional fossil fuel sources ... [t]he biggest future impacts on the U.S. oil slate are expected to come from oil sands and fracking production ... significant quantities of marginal oil would be fed into U.S. refineries, generating corresponding emissions penalties that would be further aggravated in the absence of renewable fuel alternatives.” Source: Life Cycle Associates, January 2014

¹⁰ See http://pubscience.lbl.gov/1748/9336/113/015905/pdf/1748_9336_1_015905.pdf

¹¹ See http://www.eia.gov/forecasts/aeo/btif_liquidfuels.cfm#crude_oil

These findings are consistent with recent (lower resolution) assessments by federal agencies. For example, a recent report released by the Congressional Research Service (CRS) found that Canadian oil sands are 14-20 percent more carbon intensive than the 2005 EPA baseline.¹² As such, it is an inescapable reality that any proposal to increase renewable fuel blending is a proposal to reduce U.S. consumption of high carbon intensity, unconventional oil. If the high-carbon-intensity marginal gallon of oil is displaced by cellulosic ethanol, the carbon benefits are enormous.

3. The allegations made about the “unintended consequences” of expanded ethanol use are overblown and in some cases factually incorrect

Ethanol use as a percentage of gasoline demand has risen from roughly 1 percent by volume to just over 10 percent by volume over the last twenty years or so. Some groups allege that the increase in ethanol use comes with unintended consequences. However, we are now at the point in ethanol industry development in which we have the benefit of hindsight. In other words, we can test forecasted theories about ethanol against what has happened in the real world.

While each one of the issues discussed below should be analyzed in greater depth, it makes sense in the context of this hearing to highlight a few issues very briefly:

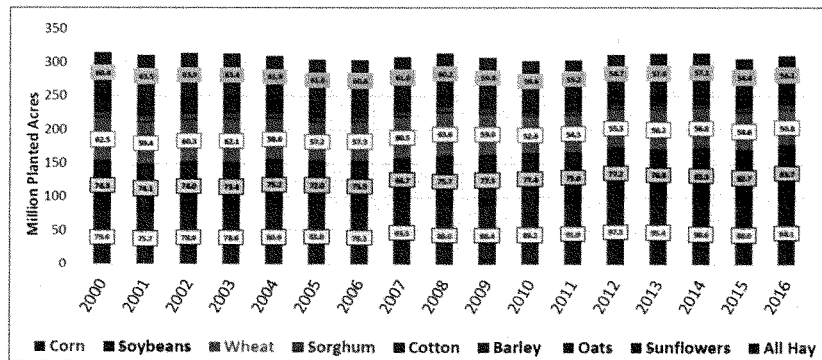
- **Land use change.** Some groups alleged that the increased demand for agricultural commodities (i.e. corn) would result in land use intensification which would expand the U.S. and global agricultural footprint into pristine lands. However, with the benefit of hindsight, we now know that the increase in ethanol production has occurred without expanding the U.S. agricultural footprint. If you look at data reported mandatorily by farmers, it strongly suggests that the increasing demand for corn was met with higher efficiency and some level of crop switching (as opposed to forays into pristine lands; as shown below). More recent analysis from a few NGOs suggests that there is nonetheless more localized and problematic land conversion, even if the national agricultural footprint continues to decline. For example, using satellite data, one study suggested that pristine lands were being plowed in a 5-state region (MN, IA, SD, ND and NE) while another alleged that lands in the immediate vicinity of ethanol plants is being converted from grassland/prairie to corn. However, a closer analysis of actual USDA reported data conducted by Geoff Cooper of the RFA shows that both claims are false. In the case of the 5-state study, Mr. Cooper found that total planted acres were falling in the period analyzed.¹³ So while in some cases more acres were planted to corn due to higher (fetched) corn prices, these acres replaced other crops in a standard crop-switching cycle rather than pristine land. In the case of the “ethanol plant study,” Mr. Cooper examined historical trends for all 180 individual counties where at least one grain ethanol plant was

¹² See <http://www.fas.org/sgp/us/misc/R32531.pdf>

¹³ See <http://www.ethanolrfa.org/2013/02/response-to-recent-land-use-change-in-the-western-corn-belt-threatens-grasslands-and-wetlands/>.

located in 2016. He found that “[c]onsistent with the national trend, cropland in counties surrounding ethanol plants generally fell between 1997 and 2012.”¹⁴ A closer look at the data by county breaks even more sharply from the NGO report: “on an individual county basis, 2012 cropland levels were below the levels recorded in 1997, 2002, or 2007 in the overwhelming majority (84 percent) of the counties with ethanol plants ... [t]he reduction in cropland for these 151 counties averaged 11.8 percent when compared to the highest level of cropland from 1997, 2002, or 2007.” As noted, even the authors of the two “anti-ethanol” NGO studies acknowledge the limitations of using satellite data to make claims about pristine land conversion: “[n]otably, the NLCD [method used] does not distinguish undisturbed grassland (native prairie) ineligible for feedstock production under EISA from eligible grassland types including introduced grass pasture, introduced grass hay, and idle cropland planted to grasses under the Conservation Reserve Program (CRP).” USDA agrees: “[u]nfortunately, the grassland-related categories have traditionally had very low classification accuracy in the CDL.”¹⁵ Essentially, national and region-specific reported USDA data show crop-switching and a shrinking agricultural footprint in the face of low-differentiation satellite data that by its own admission could be mistaking hay planting for grassland.

U.S. Ag Footprint Not Expanding: Sum of U.S. Planted Acres, Major Crops 2000-2016 (USDA)



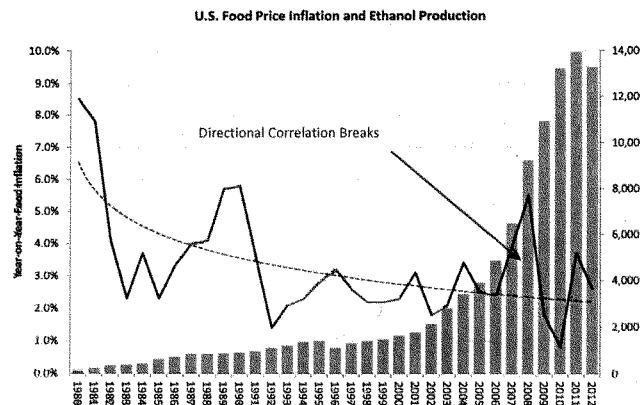
Recent *global* retrospective land use studies show similar effects. A recent analysis by Bruce Babcock (who contracts with U.S. EPA on land use analysis) and others examined actual observed global land use changes in the period spanning from 2004 to 2012 and

¹⁴ See <http://www.ethanolusa.org/wp-content/uploads/2017/04/USDA-Data-show-Cropland-Reductions-in-Counties-with-Ethanol-Plants-from-1997-2012.pdf>.

¹⁵ See U.S. Department of Agriculture, National Agricultural Statistics Service, Cropland and Cropland Data Layers, FACTS [Online] Available at https://www.nass.usda.gov/Research_and_Science/Cropland/carsfacts2.php.

compared the observations to predictions from the economic models used by the California Air Resources Board (CARB) and U.S. EPA to develop land use penalty factors for biofuels. The report concluded that farmers around the world have responded to higher crop prices in the past decade predominantly by using available land resources more efficiently rather than expanding the amount of land brought into production.¹⁶

- **Ethanol and small engines.** E15 and other higher ethanol blends are additional choices at the pump, as opposed to the new baseline ethanol-blended fuel that everyone must use. Small engines and boats are not approved to use E15. E15 is marked with a large orange decal specifically prohibiting use in small engines. Boaters and small engine users can simply fill up their machines with E10 or other approved fuel – while perhaps filling up their vehicle with the cheaper, clean high ethanol blends – to avoid small engine issues.
- **Food prices.** Some groups alleged that the increased demand for agricultural commodities (i.e. corn) would increase corn prices and thereby food prices domestically and globally. The oil and agricultural price spikes between 2008-2013 fueled concern that ethanol was to blame because there was correlation between increased ethanol use and increasing agricultural commodity prices. However, the correlation between ethanol use and corn prices is now broken. Corn prices are lower today than they were when RFS2 was passed by Congress in 2007. In 2013, the World Bank concluded that almost two-thirds of the post-2004 food price increase was attributable to the price of crude oil, reinforcing the near-perfect correlation of oil price and food prices that has occurred since 2000. Even when there was food price inflation in recent years, there was no correlation to ethanol production increases (see below).



¹⁶ http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1000&context=agri_staff_reports

4. CONCLUSION: The ethanol industry is growing and innovating, but motor fuel markets are regulated, largely non-competitive markets; therefore, the trajectory of our success remains tied to key decision-making among regulators and legislators.

The U.S. ethanol industry is little more than a quarter century old. And yet, it is now the one of the largest employers in the U.S. renewable *energy* sector by some estimates. For example, the International Renewable Energy Agency estimates that of the ~ 806,000 Americans employed by the renewable energy sector in the United States, more than 283,000 of them are employed by the liquid biofuels industry (more than any other renewable energy sector including solar and wind).¹⁷ Other analysis shows higher U.S. renewable fuel employment numbers,¹⁸ but the point is the same: the U.S. renewable fuel industry is a vital part of the U.S. manufacturing sector with the potential to do even more to reduce foreign oil dependence, create jobs and commercialize cleaner fuels.

While the first-generation liquid biofuels industry is established, the unfortunate reality is that global oil and domestic oil markets are still not diverse or open enough to operate as price-driven, free markets. Instead, they continue to be price-controlled by openly collusive foreign oil cartels exerting their market position to dampen innovation and hurt competition.

Recent behavior by the Organization of the Petroleum Exporting Countries (OPEC) offers case in point. Certain members of OPEC decided in late 2014 to allow global crude oil prices to slip in part to stop competition from emerging U.S. domestic tight oil production and reclaim market control. In simple terms, colluding to lower the price of oil changes the economics on U.S. oil (and other fuel) production, which struggled to compete with collusively depressed oil prices in the 2014-16 timeframe.

A recent Bloomberg report entitled "OPEC Is About to Crush the U.S. Oil Boom" notes that the strategy worked during that period.¹⁹ And an OPEC September 2015 report openly acknowledged the effort and its effects: "In North America there are signs that US production has started to respond to reduced investment and activity. Indeed, all eyes are on how quickly US production falls."²⁰ As U.S. domestic oil production slowed, dependence on OPEC oil turned directionally and increased again through 2016. The figure below shows how quickly Saudi Arabia recovered market share in the wake of artificially depressed oil prices.

¹⁷ See http://www.irene.org/DocumentDownloads/Publications/IRENA_RE_Jobs_Annual_Review_2017.pdf and <http://m.dailymail.com/story/2017/5/23/1/667659/-U-S-needs-to-accelerate-growth-in-green-jobs-by-treating-climate-change-like-the-crisis-of-WWII>

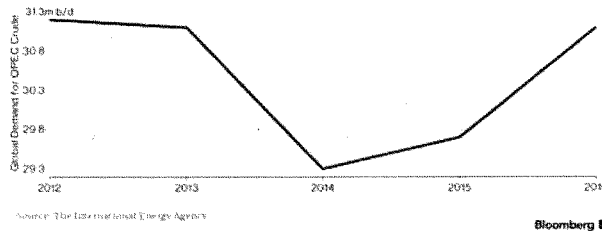
¹⁸ See <https://fuelsamerica.org/resources/fuels-america-releases-new-fuelprint-analysis/>

¹⁹ See <http://www.bloomberg.com/news/articles/2015-10-20/after-year-of-pain-opec-close-to-halting-u-s-oil-in-its-tracks>

²⁰ See http://www.opec.org/opec_web/static_files_project/media/downloads/publications/MOMR_September_2015.pdf

OPEC Loses (and Reclaims) Market Share

U.S. supply ate into demand for OPEC's crude. Now the group is on the rise again.



Fortunately, Congress has already put in place a mechanism to promote renewable alternatives to foreign oil and protect the renewable fuel industry (to a degree) and the U.S. economy from predatory oil pricing – called the Renewable Fuel Standard (RFS). The RFS has worked very effectively over the last decade to provide stable renewable fuel demand in the face of manipulated global oil prices.

However, ongoing biofuel industry growth – particularly in advanced biofuels – will depend on increased synchronization between the broader policy goal of increased biofuel use and the gasoline/motor fuel regulations that restrict or facilitate those outcomes. S. 517 targets and fixes a critical regulatory glitch that is constraining growth and innovation in the ethanol industry. We strongly urge the committee to pass S. 517.

It is both an exciting and challenging time for the cellulosic biofuels industry and the advanced biofuel industry. The technology is commercial ready and the industry is deploying at commercial scale. We are embarking on the process of securing efficiencies that can only be achieved via commercialization (i.e. the “commercial learning curve”) and economies of scale. And yet, we face as much market demand uncertainty as we ever have before, almost always generated or protected by fabricated claims about renewable fuels. It is important to understand that this is happening because of the effectiveness, rather than ineffectiveness, of our industry to develop petroleum alternatives and drive consumer choice at the pump.

Thank you for the privilege of speaking before you today. I look forward to your questions.

Senator BARRASSO. Thank you very much for your testimony.
Mr. LEWIS.

**STATEMENT OF JONATHAN LEWIS, SENIOR COUNSEL, CLEAN
AIR TASK FORCE**

Mr. LEWIS. Good morning. My name is Jonathan Lewis. I am Senior Counsel at the Clean Air Task Force, which is a nonprofit organization that works to help safeguard against the worst impacts of climate change by catalyzing the rapid global development and deployment of low carbon energy technologies through research and analysis, public advocacy leadership, and partnership with the private sector.

I want to thank the Committee for inviting me to testify today and for holding this hearing. Any efforts that could result in amendments to the Clean Air Act should proceed through regular order so that the potential consequences for public health and the environment are fully considered.

The Clean Air Task Force has several concerns about E15, but my comments today focus on two of them: the potential climate impact of additional ethanol production and the possibility that greater use of E15 will increase ozone formation.

Allowing E15 to be used year-round would expand the market for ethanol. Some, maybe most, of that new market space would be filled by corn ethanol. An unfortunate lesson from the renewable fuel standard is that creating a market for advanced, low-carbon ethanol offers no guaranty that such fuels will be developed and deployed in significant volumes.

Ten years after Congress created a huge market for cellulosic biofuels, production levels for cellulosic ethanol remain miniscule. Meanwhile, corn ethanol continues to dominate the RFS program.

Increased corn ethanol production is bad for our climate. According to the Environmental Protection Agency's own data, the additional corn ethanol produced in response to the expansion of the RFS has higher lifecycle greenhouse gas emissions than gasoline.

The National Research Council looked at EPA lifecycle emissions data and reported that corn ethanol produced in 2012 or 2017 has "lifecycle GHG emissions higher than gasoline unless it is produced in a biorefinery that uses biomass as a heat source. Thus, according to EPA's own estimates, corn grain ethanol produced in 2011, which is almost exclusively made in biorefineries using natural gas as a heat source, is a higher emitter of GHG than gasoline."

The ethanol industry argues that EPA's data are flawed and that corn ethanol's lifecycle greenhouse gas emissions are significantly less than those of gasoline.

Nearly all the studies that reach this conclusion dramatically undercut the emissions from RFS-driven land use changes.

We need low carbon liquid fuels to de-carbonize the transportation sector. Biofuels can play a role in this effort, particularly with respect to aviation. But by expanding the use of E15 without first demonstrating the capacity to produce an adequate supply of climate-beneficial biofuels, this bill could undermine climate change mitigation efforts by encouraging additional production of corn ethanol.

We are also concerned by E15's potential impact on ozone formation. Ozone forms in VOCs and NOx, and mix in the atmosphere in the presence of sunlight. Ozone is particularly dangerous during summer months, when sunlight is more abundant and when hotter temperatures can worsen the incidents and severity of diseases that are aggravated by ozone pollution, such as asthma and emphysema.

Adding ethanol to gasoline affects the emissions of both VOCs and NOx. E15 is slightly less volatile than E10, so a switch from E10 to E15 might result in a slight reduction in VOC emissions.

NOx formation is more straightforward. If the amount of ethanol blended into gasoline is increased, the oxygen content of the fuel also increases. Higher oxygen levels typically result in hotter combustion temperatures, which in turn typically result in higher NOx formation.

Modern light duty engines, especially those that have been built since 2007, have computerized fuel injection systems that work with a through-way catalyst to limit the release of NOx from the tailpipe. Older cars that do not have this emission control technology, as well as newer cars in which the emission controls may have degraded, are less effective at capturing the additional NOx that is created when they burn E15.

The potential additional NOx emissions are important because, according to a May 2017 study by EPA, ozone formation in most parts of the Country is much more sensitive to changes in NOx emissions than it is to changes in VOC emissions. The EPA analysis finds that in most cities the impact of NOx reductions on ozone formation is up to five times greater than the impact of comparable VOC reductions. In non-urban areas, EPA found that NOx reductions are over 10 times more impactful than VOC reductions.

Small increases in ozone due to increased NOx emissions from summertime use of E15 might be enough to push or keep some areas over the ozone standard, triggering adverse health impacts and additional control requirements. We have identified 31 potentially impacted areas, including 5 areas in California; 3 areas in Arizona, Wisconsin, Michigan, Indiana, Pennsylvania, and Ohio; and most of the major cities in the northeast United States.

Before legislation that allows the sale of E15 during summer ozone season is considered, we urge that more research be conducted to better understand how the use of E15 affects NOx emissions from a wide range of engine types, engine model years, and engine usage patterns. In other words, we should look before we leap. The last thing that areas that are otherwise on the verge of meeting their ozone targets need is the introduction of additional NOx into their airsheds.

Thank you.

[The prepared statement of Mr. Lewis follows:]



Jonathan Lewis
Senior Counsel, Clean Air Task Force

Jonathan Lewis is an attorney and climate specialist with the Clean Air Task Force (CATF), a nonprofit organization dedicated to reducing atmospheric pollution through research, advocacy, and private sector collaboration. He works with companies, governments, and citizen groups on state, national, and international initiatives to address climate change. Lewis leads CATF's bioenergy project, which seeks to redirect the production and use of biofuels and biomass-based power so that they contribute to decarbonization and climate stability.

Since joining CATF in 2001, Lewis has helped environmental organizations develop state policies for reducing greenhouse gas emissions, and he represented many of those groups in legal challenges against policies that would undermine the United States Clean Air Act. From 2007-2012, he coordinated CATF's effort to accelerate the deployment of climate-friendly energy technologies by facilitating partnerships between cutting-edge energy companies and institutions in China and the United States.

Written Testimony of

Jonathan F. Lewis
Senior Counsel
Clean Air Task Force

Before the U.S. Senate Committee on Environment & Public Works

Environmental Impacts of E15

For a Hearing on S.517, the Consumer and Fuel Retailer Choice Act

June 14, 2017

My name is Jonathan Lewis. I am Senior Counsel at the Clean Air Task Force, a nonprofit organization that works to help safeguard against the worst impacts of climate change by catalyzing the rapid global development and deployment of low carbon energy and other climate-protecting technologies through research and analysis, public advocacy leadership, and partnership with the private sector.¹ I lead the Clean Air Task Force's efforts to limit the negative effects that liquid biofuels and biomass-based power generation can have on climate change and the broader environment.

I want to thank Chairman Barrasso, Ranking Member Carper, and the rest of the Environment and Public Works Committee for inviting me to testify today, and for holding this hearing. It is important to the Clean Air Task Force and others that are dedicated to the protection of the environment and public health that any efforts that could result in amendments to the Clean Air Act should proceed through regular order, so that the potential consequences for public health and the environment can be fully considered.

The Clean Air Task Force has several concerns about E15, including its impact on climate change, air quality, water quality, and habitat protection. These comments focus on two of these concerns: the potential climate impact of the additional ethanol production that could result from S.517 and the likelihood that greater use of E15 will increase ozone formation.

ETHANOL PRODUCTION AND CLIMATE CHANGE

Allowing E15 to be used year-round would expand the market for ethanol, and if history is any guide, much—if not all—of that new market space will be filled by corn ethanol:

¹ www.cattf.us

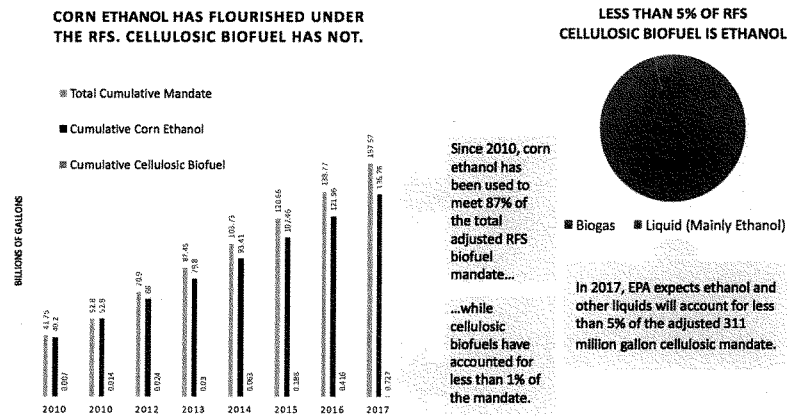


FIG. 1: Corn ethanol and cellulosic biofuel have accounted for 86.8% and 0.5%, respectively, of the total cumulative RFS volume obligations during 2010-2017; EPA projects that cellulosic ethanol will account for about 4% of the adjusted cellulosic biofuel volume obligation for 2017.²

According to the US Environmental Protection Agency's own data, the incremental additional corn ethanol produced in response to the 2007 expansion of the Renewable Fuel Standard (RFS) has higher lifecycle greenhouse gas emissions than gasoline.

The National Research Council looked at the EPA lifecycle GHG emissions data in 2011 and reported that:

EPA found corn-grain ethanol, regardless of whether the coproduct is sold wet or dry, to have life-cycle GHG emissions higher than gasoline in 2012 or 2017 unless it is produced in a biorefinery that uses biomass as a heat source.

And further that:

Thus, according to EPA's own estimates, corn-grain ethanol produced in 2011, which is almost exclusively made in biorefineries using natural gas as a heat source, is a higher emitter of GHG than gasoline.³

² Volume obligation data for corn ethanol, cellulosic biofuel, and total renewable fuel from EPA Renewable Volume Obligation Rules (2010-2017); data for 2017 cellulosic biofuel volume obligation from EPA, Renewable Fuel Standard Program: Standards for 2017 and Biomass Based Diesel Volume for 2018, 81 Fed. Reg. 89746, 89760 (December 12, 2016)

³ Lester Lave, et al 2011 *Renewable Fuel Standard: Potential Economic and Environmental Effects of U.S. Biofuel Policy 221* (Report by the National Research Council Committee on Economic and Environmental Impacts of

For EPA to find a scenario under which incremental additional corn ethanol would achieve a 20% net reduction in life-cycle GHG emissions, it had to start its modeling analysis in 2022, which allowed the Agency to (a) ignore 60% of the land use change emissions that should have been attributed to expanding corn ethanol production; and (b) assume a greater volume of ethanol would be produced in biorefineries that burn biomass to generate process heat.⁴

The ethanol industry argues that EPA's analysis is flawed and that corn ethanol's lifecycle greenhouse gas emissions are significantly less than those of gasoline. But the studies that reach this conclusion dramatically undercount emissions from RFS-driven land use changes—just as EPA did in 2010. Many of the studies (including a 2017 report released by the United States Department of Agriculture⁵) rely extensively on an industry-funded, non-peer reviewed 2014 staff report from Iowa State University that uses questionable data and makes several important methodological errors.⁶

The ethanol industry's defense of corn ethanol's climate impact also ignores the rebound effect. The RFS has increased the supply of motor vehicle fuel in the United States by requiring refiners to add billions of gallons of biofuel into the US fuel supply each year. Fuel markets are influenced by a variety of factors, but higher supply usually begets lower prices. Drivers buy more fuel than they would have, and emit more GHG as a result.

A key factor in determining the RFS's climate impact is the extent to which the mandated biofuels actually displace petroleum fuels. As explained by the University of Minnesota's Jason Hill *et al.*, "increasing the supply of low-carbon fuel only partially displaces fossil fuel. This results in lower GHG emissions only when the savings from the reduction in carbon intensity outweighs the increase in GHG emissions from additional fuel use."⁷

Hill *et al.* generously assume that every 100 gallons of biofuel mandated by the RFS displace 50 energy-equivalent gallons of gasoline or diesel. They also assume (again, generously) that all of the biofuels used to comply with the RFS—even corn ethanol—

Increasing Biofuels Production) (internal citations omitted).
(http://www.nap.edu/openbook.php?record_id=13105)

⁴ See CATF, *Corn Ethanol GHG Emissions Under Various RFS Implementation Scenarios* (2013) (<http://www.catf.us/resources/whitepapers/files/20130405-CATF%20White%20Paper-Corn%20GHG%20Emissions%20Under%20Various%20RFS%20Scenarios.pdf>).

⁵ Flugge, M. *et al.*, *A Life-Cycle Analysis of the Greenhouse Gas Emissions of Corn-Based Ethanol*. Report prepared by ICF under USDA Contract No. AG-3142-D-16-0243. January 12, 2017.

⁶ See Babcock, B. A., & Iqbal, Z., *Using Recent Land Use Changes to Validate Land Use Change Models*. Center for Agricultural and Rural Development, Iowa State University (2014) (*e.g.*, study uses unreliable FOAstat data on planted area and land abandonment, and makes selective use of Brazilian land use data to support the paper's crop intensification narrative while ignoring period extensification was more prevalent; study also makes unsupported assumptions about the drivers behind decisions to double crop and about the relationship between regional and global agriculture markets) (<http://www.cafrd.iastate.edu/publications/files/pdf/files/14st100.pdf>).

⁷ Jason Hill *et al.*, *Climate consequences of low carbon fuels: The United States Renewable Fuel Standard*, ENERGY POLICY 97 (2016) 351-353.

actually achieve the GHG reduction targets set by Congress in 2007. The resulting analysis indicates that the RFS is not a useful tool for mitigating climate change:

Taking this [50%] fuel market rebound effect into account and assuming the biofuels in RFS2 achieve their targeted GHG emissions reductions in all years, RFS2 actually leads to a net increase in GHG emissions of 22 million metric tons in 2022, and of 431 million metric tons cumulatively from 2006 to 2022. In sum, this mandate for the production of less GHG intense fuels actually increases net GHG emissions to the atmosphere relative to no action due to the low amounts of gasoline being displaced. In other words, RFS2 increases GHG emissions instead of reducing them when individual fuel GHG reduction targets are met.⁸

The bulk of the additional greenhouse gas emissions identified by Hill *et al.* is attributable to corn ethanol, which has accounted for 87% of the biofuel used to comply with the RFS over the last ten years.

We need low/zero-carbon liquid fuels to decarbonize the transportation sector. Biofuels can play a role in this effort—particularly with respect to aviation—but we need to move away from policies that promote the use of conventional biofuels and toward policies that support the development and deployment of fuels made from waste, algae, and other feedstocks that do not depend on farmland. By expanding the use of E15 without first developing the capacity to produce an adequate supply of climate-beneficial biofuels, this bill could undermine climate change mitigation efforts by encouraging additional production of corn ethanol.

E15 AND OZONE FORMATION

The United States has made significant progress in tackling ozone pollution, but elevated ozone levels continue to cause or contribute to severe health problems. Reducing ozone pollution must remain a top priority for local, state, and federal authorities.

Ozone forms when volatile organic compounds (VOCs) and nitrogen oxides (NOx) mix in the atmosphere in the presence of sunlight. Ozone is particularly dangerous during summer months, when sunlight is more abundant (therefore allowing more ozone formation) and when hotter temperatures can worsen the incidence and severity of diseases that are aggravated by ozone pollution, such as asthma, emphysema, and chronic obstructive pulmonary disease. Violations of the National Ambient Air Quality Standard (NAAQS) trigger requirements for reducing the emissions of these precursor pollutants through deployment of emissions control strategies and the use of pollution offsets in the affected areas.

Adding ethanol to gasoline affects the emissions of both VOCs and NOx. The VOC impact is complicated:

⁸ *Id.*

- E10, or gasoline that contains 10% ethanol, is more volatile than straight gasoline. The additional volatility causes increased evaporation of VOCs into the atmosphere.
- E15 is slightly less volatile than E10, so a switch from E10 to E15 could result in a slight reduction in VOC release.
- The volatility continues to decrease gradually as the ethanol blend level is increased, but as Dr. Janet Yanowitz and others have shown through their research, gasoline-ethanol blends do not achieve lower volatility than straight gasoline until the proportion of ethanol reaches approximately 50%.⁹

For VOCs, the net result from a shift from E10 to E15 is likely either a wash or slightly decrease in VOC emissions.

The impact of ethanol blends on NOx formation is more straightforward. If the amount of ethanol blended into gasoline is increased, the oxygen content of the fuel also increases. In older vehicles (pre-2007) and newer vehicles that have not been adequately maintained, higher oxygen levels typically result in hotter combustion temperatures, which in turn typically results in higher NOx formation.

There is uncertainty about these effects, but our interpretation of the available research is that while E15 use may be associated with equal or less VOC pollution relative to E10, E15 combustion will tend to produce more NOx than E10 combustion.

Modern light duty engines, especially those that have been built since 2007, have computerized fuel injection systems that work with a three-way catalyst to limit the release of NOx from the tailpipe. Older cars that do not have this emissions control technology—as well as newer cars in which the emissions controls may have degraded—are less effective at capturing the additional NOx that is created when they run on E15. (The current fleet is characterized by a mix of these vehicles and by the miles they are driven.)

The potential additional NOx emissions are important, because in most parts of the country, ozone formation is more sensitive to changes in NOx emissions than it is to changes in VOC emissions. According to a modeling study produced by EPA last month (May 2017),

The model results suggest that a much larger area of the country would experience ozone reductions with NOx emissions reductions compared to an equivalent percentage reduction in anthropogenic VOC. Further, the ozone

⁹ Robert L. McCormick (National Renewable Energy Laboratory) and Janet Yanowitz (Ecoengineering Inc.), *Discussion Document – Effect of Ethanol Blending on Gasoline RVP* (March 26, 2012) (transmitted to Kristy Moore, Renewable Fuels Association) (http://www.ethanolrfa.org/wp-content/uploads/2015/09/RVP_Effects_Memo_03_26_12_Final.pdf)

improvements from NO_x emissions reductions tend to be larger in magnitude than those shown for VOC emissions reductions.¹⁰

The EPA analysis finds that in most cities, the impact of NO_x reductions on ozone formation is 1.5 – 5 times greater than the impact of comparable VOC reductions. In nonurban areas, EPA found NO_x reductions are over 10 times more impactful than VOC reductions.¹¹

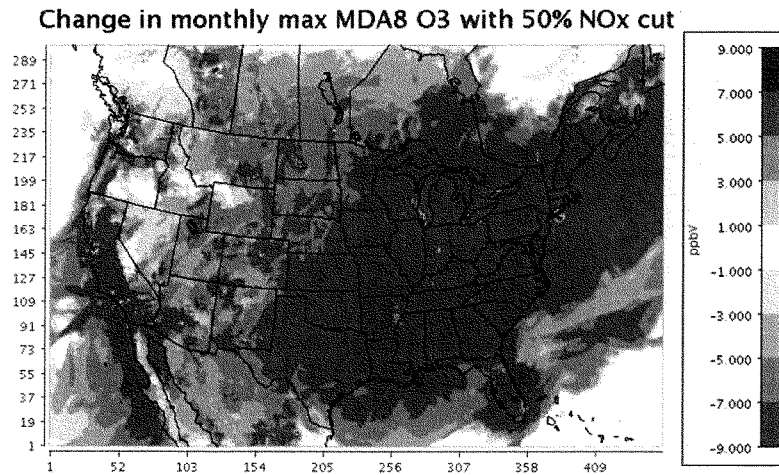


FIG. 2: US EPA conducted ozone modeling for the Continental United States to determine geographic regions sensitive to changes in precursor emissions NO_x and VOCs (EPA 2017). Except for a few isolated areas, peak ozone was more responsive to changes in NO_x emissions, with estimated reductions of over 7 ppb for a 50% emissions cut for virtually all areas of the US designated nonattainment for the 2008 ozone standard.

VOC reductions remain important to public health and the environment, and we should continue to require efforts to drive down VOC emissions. Because of these efforts, the percentage of VOC emissions due to the automobiles has dropped to 13 percent of the total inventory; mobile sources, meanwhile, have become the dominant source of NO_x emissions. When it comes to determining the net impact that increased use of E15 will have on ozone formation, the potential for increased NO_x emissions are the more important factor.

¹⁰ EPA Office of Air Quality Planning and Standards, Air Quality Modeling Group, *Supplemental Information for Ozone Advance Areas Based On Pre-Existing National Modeling Analyses* (May 2017)

(https://www.epa.gov/sites/production/files/2017-05/documents/national_modeling_advance_may_2017.pdf)

¹¹ *Id.*

Although the emissions increases due to introduction of E15 may be relatively modest, several areas of the country experience ozone readings that are just below or just above the level of violation for the ozone National Ambient Air Quality Standard (NAAQS):

CSA/CBSA Name	2013-15 Design Value (ppm)
Salt Lake City-Provo-Orem, UT	0.076
San Jose-San Francisco-Oakland, CA	0.076
Yuma, AZ	0.076
Chicago-Naperville, IL-IN-WI	0.075
Grand Rapids-Wyoming-Muskegon, MI	0.075
Las Vegas-Henderson, NV-AZ	0.075
Philadelphia-Reading-Camden, PA-NJ-DE-MD	0.075
Chico, CA	0.074
Redding-Red Bluff, CA	0.074
Atlanta--Athens-Clarke County--Sandy Springs, GA	0.073
Boston-Worcester-Providence, MA-RI-NH-CT	0.073
Cleveland-Akron-Canton, OH	0.073
Pittsburgh-New Castle-Weirton, PA-OH-WV	0.073
San Luis Obispo-Paso Robles-Arroyo Grande, CA	0.073
Sonora, CA	0.073
South Bend-Elkhart-Mishawaka, IN-MI	0.073
Detroit-Warren-Ann Arbor, MI	0.072
El Paso-Las Cruces, TX-NM	0.072
Manitowoc, WI	0.072
Payson, AZ	0.072
Baton Rouge, LA	0.071
Cincinnati-Wilmington-Maysville, OH-KY-IN	0.071
Columbus-Marion-Zanesville, OH	0.071
Harrisburg-York-Lebanon, PA	0.071
Reno-Carson City-Fernley, NV	0.071
St. Louis-St. Charles-Farmington, MO-IL	0.071
Washington-Baltimore-Arlington, DC-MD-VA-WV-PA	0.071
Flagstaff, AZ	0.070
Milwaukee-Racine-Waukesha, WI	0.070
New Orleans-Metairie-Hammond, LA-MS	0.070
Oklahoma City-Shawnee, OK	0.070

TABLE 1: Excerpt of 2013-15 Ozone Design Values for areas whose pollution levels are near the 2008 and 2015 ozone standards of 0.075 and 0.070 ppm. Modest increases in emissions could prevent some areas currently out of attainment from reaching it or push some areas that just meet the standard back above it.

Small incremental increases in summer ozone due to increased NO_x formation from the introduction of E15 in the summer might be enough to push or keep these areas over the limit, triggering increased adverse health impacts and additional control requirements.

The Clean Air Task Force has been able to find no peer-reviewed, published analysis of the potential impact on ozone levels of allowing the sale of E15 year-round, nor are we aware

that U.S. EPA has analyzed this potential shift. There is considerable uncertainty about the effect of E15 on VOC and NOx emissions, and about the net impact that E15 has on ozone formation. Therefore, before legislation that allows the sale of E15 during the summer ozone season is enacted, we urge that more research be conducted to better understand how the use of E15 affects VOC and NOx emissions from a wide range of engine types, engine model years, and engine usage patterns. In other words, we should look before we leap. The last thing that areas that are otherwise on the verge of meeting their ozone targets need is the introduction of additional NOx emissions into their relevant airsheds, which could result in nonattainment or could trigger the requirement of proving offsetting NOx reductions on other pollution sources.

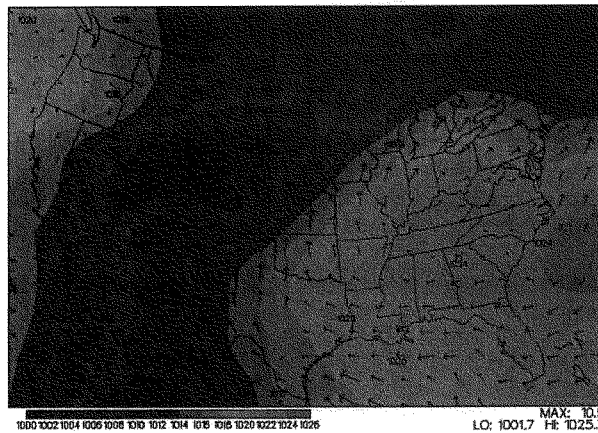


FIG. 3: Classic Bermuda High Pressure wind flow patterns typical of high ozone episodes in the Ozone Transport Region (OTR). Sunny conditions prevail, with emissions transported from the Gulf States through the Midwest, en route to the East Coast Megalopolis.

To summarize, the Clean Air Task Force's best read of the available research is, first, that a shift from E10 to E15 would likely cause an increase in NOx emissions from automobiles, especially from cars and trucks that were built before 2007. Second, because the lion's share of areas experiencing high levels of ozone are especially sensitive to NOx emissions, the detrimental impact on ozone pollution associated with E15's higher NOx emissions is likely to outweigh any beneficial impact that may be associated with E15's lower VOC emissions.

For these reasons, in the absence of further research into the impact of E15 on NOx emissions and ozone formation, the Clean Air Task Force is opposed to changes to the Clean Air Act that would allow increased, year-round use of E15.

Senator BARRASSO. Thank you very much for your testimony.
Mr. LORENZ.

**STATEMENT OF MIKE LORENZ, EXECUTIVE VICE PRESIDENT,
SHEETZ INC.**

Mr. LORENZ. Chairman Barrasso, Ranking Member Carper, members of the Committee on the Environment and Public Works, thank you for the opportunity to testify today in strong support of legislation that allows fuel retailers across the Country to sell a fuel product approved by the Federal Government year-round, just like every other transportation fuel on the market.

My name is Mike Lorenz. I am the Executive Vice President of Petroleum Supply at Sheetz, a family owned convenience store chain based in Altoona, Pennsylvania, with 550 stores in six States. I have spent the last 17 years of my career with Sheetz managing our fuel supply strategy. Prior to joining Sheetz, I worked 22 years at Mobil Oil.

For more than 60 years, our mission at Sheetz has been to meet the needs of the customer on the go; offer them a variety of high quality products and let them choose. We don't create customer demand; we work hard to satisfy it. Their purchases, much like votes, show us which products they prefer strongly.

Recently, we expanded our fuel options, providing customers with the ability to purchase a 15 percent blend of ethanol, known as E15, at more than 190 of our stores, and we are adding more stores each month. We did this on a voluntary basis because we believe that providing more fuel options such as E15, which is lower cost, higher performing, and better for the environment, is what our customers want.

So far, I can tell you that offering E15 at our stores is working. Consumers are purchasing it because it is three to ten cents a gallon less than regular gasoline and is 88 octane instead of 87.

That is what motivates fuel purchases: cost and performance. They don't care about fuel volatility, ethanol concentration, or the public policy behind renewable fuels. And after millions of E15 transactions by thousands of customers purchasing millions of gallons and driving millions of miles, one thing is clear: we have not had a single customer complaint or any cases of misfueling.

But this has been a major challenge, not being able to sell E15 in the summer to the same customers that we sell to the rest of the year. In addition to lost sales during the summer, relabeling will cost retailers roughly \$2 million this year, and possibly \$5 million next year.

The inconsistency creates confusion and undermines the integrity of this product, and could also lead to potential misfueling. Frankly, we think this problem is nothing more than a technicality that can be easily fixed.

This legislation fully addresses this issue, simply providing E15 the same vapor pressure treatment that is given regular gasoline, and ultimately lets the consumer choose what fuel works best for them.

I want to thank Senators Fischer, Ernst, Rounds, Moran, and Duckworth for their leadership on this issue and their support of S. 517, the Consumer and Fuel Retailer Choice Act.

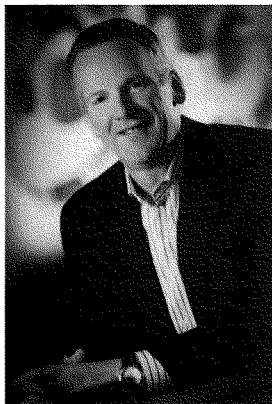
Sheetz is not selling E15 because of ethanol producers. We sell it because there is consumer demand for the fuel. We don't support this legislation because it is backed by corn farmers; rather, we support this legislation because it allows us to sell a legal fuel to customers that want to buy it year-round.

We still offer other fuels, including E10, a fuel specifically warranted for small engines, marine, off-road, and motorcycle engines. We believe adding a lower cost, higher performing fuel to our offer allows Sheetz to provide superior selection and service to those who visit our stores.

I want to again thank the Committee for this opportunity to appear today. I want to close by saying that this bill is simply about fixing a regulation that is almost 30 years old, and prevents retailers like Sheetz from offering a legal fuel year-round, just as we do with regular gasoline.

I would be happy to answer questions.

[The prepared statement of Mr. Lorenz follows:]



Michael Lorenz, Executive Vice President, Petroleum Supply, Sheetz Inc.

Mike is currently responsible for the petroleum supply and trading at Sheetz, a family owned convenience store chain which operates over 550 stores in 6 states. Having worked in the petroleum industry for almost 40 years, Mike has extensive knowledge and experience in refining, domestic and global supply and trading, and wholesale and retail marketing.

Before coming to Sheetz, Mike spent over 20 years with Mobil Oil serving in a wide variety of midstream and downstream roles including international assignments in London and Rotterdam. He started his career as a process engineer at the Buffalo, NY refinery and then moved to the Joliet, IL refinery where he worked in engineering, operations and planning. He then managed to escape the glamorous refinery life when he transferred to New York City where he held positions in international supply, contract administration, crude and product analysis, and term and spot trading. From New York, Mike moved overseas for 4 years as the fuel/feedstocks trader in London and the trading manager in Rotterdam which was responsible for barge trading on the Rhine and Mobil affiliate supply. He also managed the Amsterdam terminal operations including gasoline and distillate blending and third party storage agreements. He returned to Fairfax, VA and held positions in products trading, risk management and new business development.

Mike was awarded the TOBI Award at Growth Energy's 2015 Executive Leadership Conference. The award honors ethanol leadership in retail. He was also recently awarded the 2015 Convenience Store News Alternative Fuels Leader of the Year Award. The annual award honors a convenience store industry executive who demonstrates vision and innovation, and leads the way for his/her company and the industry to take full advantage of alternative fuel solutions. In 2016, Mike received the Paul Dana Marketing Vision Award from the American Coalition for Ethanol. Because of Mike's efforts, Sheetz is currently the single largest retailer of E15 and E85 in the US.

Mike is on the Board of Advisors at the Fuels Institute and is a frequent speaker at industry events.

Mike holds a Bachelor of Science degree in Chemical Engineering from Clarkson University.



Chairman Barrasso, Ranking Member Carper, Members of the Committee on the Environment and Public Works:

Thank you for the opportunity to testify today in strong support of legislation that allows fuel retailers across the country to sell year-round, a fuel product approved by the federal government— just like every other transportation fuel on the market.

My name is Mike Lorenz, and I am the Executive Vice President of Petroleum Supply with Sheetz, a family owned convenience store chain based in Altoona, Pennsylvania. I've spent the last 17 years of my career with Sheetz, managing our fuel supply strategy. Prior to joining Sheetz, I worked for 22 years at Mobil Oil. I started out as a process engineer at the Buffalo refinery, but spent most my career in various supply and trading jobs, including overseas assignments in London and Amsterdam.

For more than 60 years, our mission at Sheetz has been to meet the needs of customers on the go, offer them a variety of high quality products, and let them choose. We don't create customer demand — we work to satisfy it. Their purchases, much like votes, show us which products they strongly prefer.

Recently, we have expanded our fuel product options, providing customers with the option of purchasing a 15 percent ethanol fuel, known as E15, at more than 190 of our stores — and adding more each month. This makes us the largest E15 retailer in the country. We have also expanded our fuel offering to include E85. We did all this on a voluntary basis because we believe that providing more fuel options — in the case of E15, one that is lower cost, high performing, and better for the environment — is appealing to our customers. Much like we offer everything from hot dogs to salads on the inside of our store, we firmly believe that customers like having the ability purchase a wide variety of products on the fuel island too.

So far, I can tell you offering E15 at our stores is working. Even though we have done little to market the product, customers are finding it. They are finding it because it is 3-10 cents cheaper than regular gasoline and is 88 octane instead of 87. That's what motivates fuel purchases — cost and performance. They don't care about fuel volatility, ethanol concentration, or the public policy behind renewable fuels. And, after millions of E15 transactions by thousands of E15 customers purchasing millions of gallons of E15, and driving millions of miles on the fuel, one thing is clear — we have not had a single customer complaint. Our customers like this fuel. And now, they also demand it.

But this has not been without a pretty major challenge — not being able to sell E15 in the summer to the same customers we sell to the rest of the year. Frankly, we think this problem is nothing

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more than a technicality that can be easily fixed with no impact to consumers or the U.S. fuel supply chain.

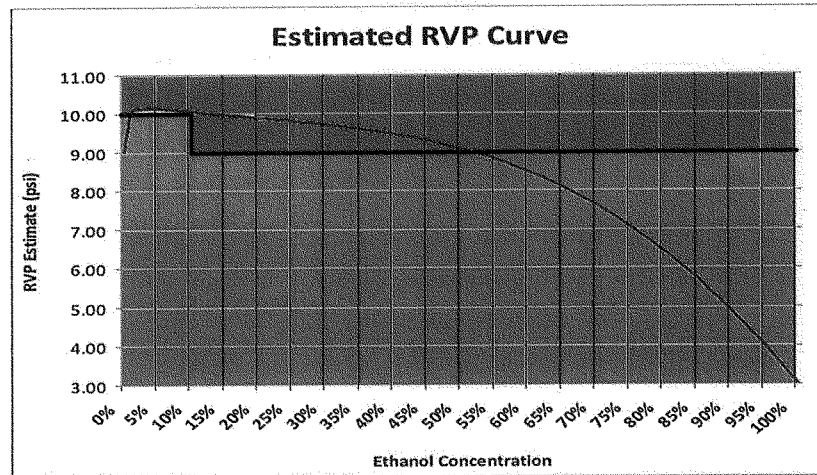
There is a clear option available to the Congress to ensure that this problem is addressed. The Consumer and Fuel Retailer Act (S. 517) lets consumers choose what fuel works best for them and I want to thank Senators Fischer, Ernst, Rounds, Moran, and Duckworth for their leadership on this issue.

There are several areas I'd like to touch on, but I want to make something very clear before I get started. Sheetz is not selling E15 because of ethanol producers; we sell it because there is a consumer demand for the fuel. We don't support this legislation because it is backed by corn farmers; rather we support this legislation because it allows us to sell a legal fuel to customers that want to buy it year-round. This lower cost, higher performing fuel allows Sheetz to provide superior selection and service to those who visit our stores.

What is Reid Vapor Pressure?

Reid Vapor Pressure, or RVP, is simply the term used to measure the evaporative emissions of a fuel. In 1990, Congress codified a previous EPA rule that limited RVP to 9 psi as part of a larger effort to combat smog during the summer fueling season, which in general lasts from June 1 until September 15. Under this provision, the law specifies that fuel blended with 10 percent ethanol (E10) would be granted a one pound per square inch (psi) waiver from Reid Vapor Pressure requirements, allowing E10 to be sold year-round nationwide.

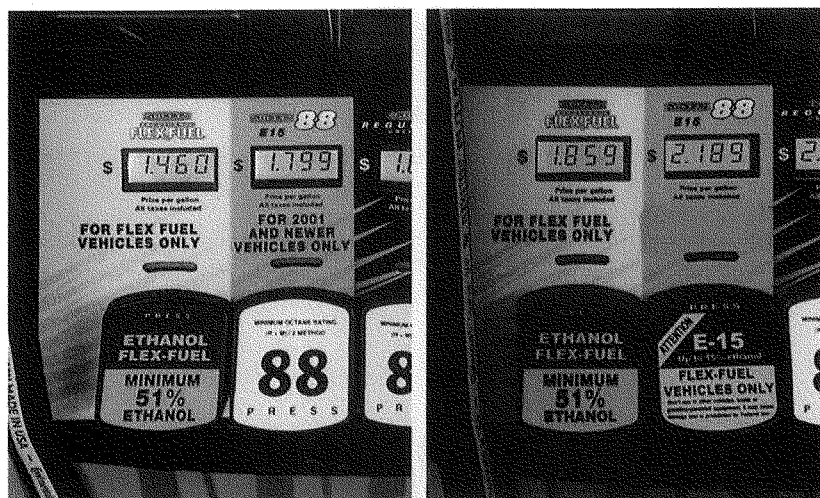
This 1 psi waiver was extended in part because ethanol blended fuels reduce other types of emissions, including carbon monoxide, tailpipe, and particulate emissions. The waiver as implemented by the Environmental Protection Agency (EPA) applied only to ethanol fuel blends E10 and lower, and excluded ethanol blends above 10 percent, even though the overall RVP decreases as the percentage of ethanol blends increases. Therefore, when E15 was approved as gasoline for 2001 and newer vehicles, it did not receive the same 1lb psi waiver that was extended to E10, and E15 cannot currently be sold year-round nationwide.



As you can see in the above graph, the legal requirement on RVP for fuel changes depending on the ethanol concentration. 10 percent and below must meet a 10 psi standard, while anything above 10 percent must meet a 9 psi standard. This illogical and non-uniform treatment does not exist for any other fuel. Worst of all, nothing in the fuel changes from May 31 to June 1, except that on May 31, vehicles 2001 and newer can use E15 (more than 90% of vehicles on the road), but on June 1, retailers either sell E15 to flex fuel vehicles only or stop offering the fuel altogether.

Labeling Conundrum:

No other fuel product on the market is treated like E15. Every other large-scale, commercially-available liquid fuel can be sold the same way year-round. However, in the case of E15, without the technical regulatory fix in S. 517, fuel retailers are forced to change fuels or re-label E15 as flex-fuel only during the summer fueling season (June 1 – September 15).



E15 labeling most of the year.

E15 labeling during summer months.

The number of stations selling E15 is rapidly growing, resulting in more pumps that need to be re-labeled twice a year, at an approximate annual cost of \$200 to switch labels at the beginning and end of the summer fueling season – on every single dispenser. With 830 retail stations in 29 states currently selling E15, it is estimated that roughly 9,960 fuel pumps sell E15. For 2017, this switching cost is almost \$2 million. That is \$2 million in lost revenue for other store upgrades. And that \$2 million nets the U.S. zero additional environmental benefit. Given that there could be 2,000 active E15 stations next year, the switching cost alone in 2018 could be almost \$5 million.

Fuel retailers such as Sheetz who want to give their customers a variety of fuel choices at the pump, are hamstrung by having to relabel E15 during the summer months. We are effectively restricted from being able to offer an additional approved fuel option to our customers at a lower price.

Relabeling E15 during the summer months has also proven to be harmful to our business. First and foremost, the confusion caused by changing labels increases the chances for misfuelling.

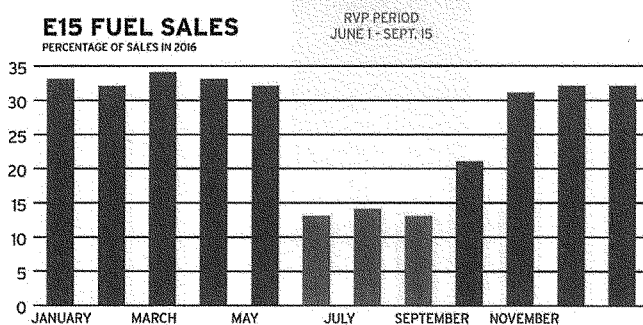
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Our experience during the RVP season is that we lose 40 percent of our pre-June 1 customer base, even after the RVP season ended on September 16. So, without even marketing the fuel, we had solid customer adoption. And because of the confusion caused by the RVP season, we lost 2 out of every 5 customers. Customers want a cleaner, higher-octane and more affordable fuel option regardless of season.

Below is sales data from a Minneapolis, Minnesota, based E15 retail chain. One key strategy they took was to extensively market their E15 fuel coming out of RVP season. While that helped, they still lost a huge number of sales during the summer. It makes no sense to force a fuel retailer to see fuel sales plummet during the summer driving months simply because of an outdated regulation in desperate need of a simple technical fix.



Two Little Words

This bill literally adds two words to law – “or more” – after the portion of the underlying law that specifies that 10 percent ethanol is eligible to receive the one pound RVP waiver. This small, technical fix is simply about allowing greater consumer access for a fuel that is lower cost, higher performing, and better for the environment.

While today’s hearing may get drawn into a number of other issues, one important thing should be clear – this bill allows E15 to be sold year-round, just like every other fuel on the market. Below is a slide illustrating where the largest impacts of the current restrictive policy are located. The second map shows the profound change two little words can have on how E15 is sold in this country.

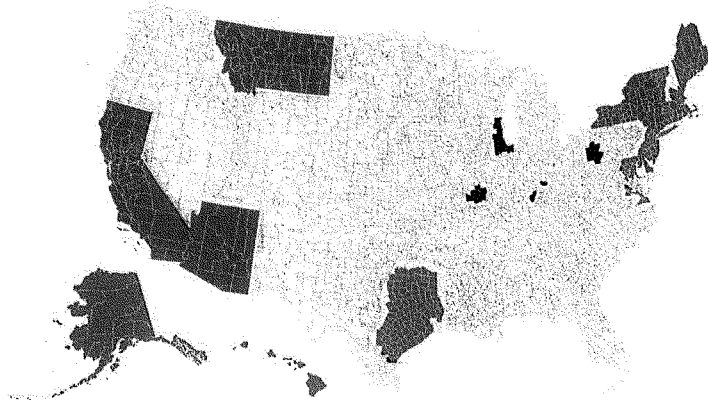


E15 Availability Without RVP Fix:

Green – available year-round

Tan/Yellow – Available September 16-May 31

Red – Unavailable (state restriction)

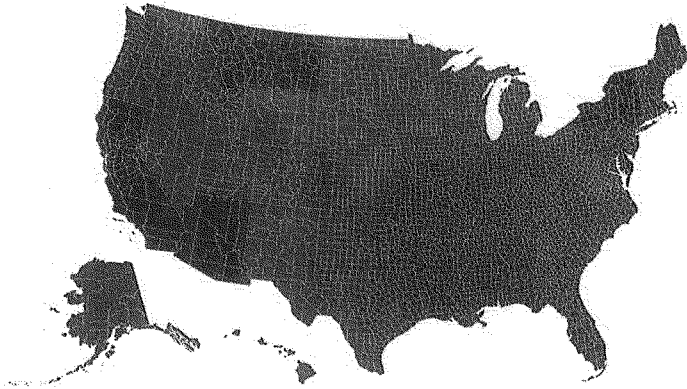


With RVP fix:

Green – available year-round

Tan/Yellow – Available September 16-May 31

Red – Unavailable (state restriction)



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E15 is safe:

E15 works well in modern cars and was approved for use in vehicles 2001 and newer in 2011. In the last 6 years, millions of gallons of E15 have been sold to consumers, and drivers have driven over a billion miles without incident.

In addition, E15 was by far the most tested new fuel approved by the EPA and the Department of Energy's Oak Ridge National Laboratory (ORNL). When the request for E15 to be legalized as a fuel was submitted, ORNL tested 86 low mileage vehicles up to 120,000 miles for a total of six million miles using E15. This testing did not reveal any problems with emissions equipment or engine durability.

Lastly, automakers approve E15 for use in nearly three-quarters of new cars, and EPA approves its use in all automobiles 2001 and newer, roughly 90 percent of cars on the road today.

Environmental Benefits:

E15 reduces emissions, protecting our health and our climate. A few key facts about the RVP waiver legislation:

- This legislation would allow the sale of a cleaner fuel like E15 that reduces smog and other harmful pollutants to occur year-round.
- This fix has no impact on the ability of states to apply Clean Air Act or state specific fuel regulations. In fact, the bill has a specific state-driven decision on the 1 pound waiver.
- Higher ethanol blends reduce emissions of particulate matter and other volatile chemicals.
- Ethanol helps to displace toxic fuel additives associated with cancer and asthma.
- Ethanol cuts carbon emissions by 43 percent compared to gasoline.
- With advancements in technologies, cellulosic biofuels can reduce greenhouse gas emissions by 85-95 percent compared to gasoline.
- Without consumer access to E15, there's little market potential to drive continued innovation in advanced and cellulosic biofuels.
- Global ethanol production and use is estimated to reduce greenhouse gas emissions by an amount equal to removing nearly 20 million cars from the road each year
- Without ethanol in the fuel supply, we are left with more toxic petroleum-based alternatives. Many of these additives have been linked to cancer, asthma, smog, and groundwater contamination.
- A recent study by the Biotechnology Innovation Organization (BIO) found that this legislation facilitating year-round E15 sales would result in significant GHG reductions –

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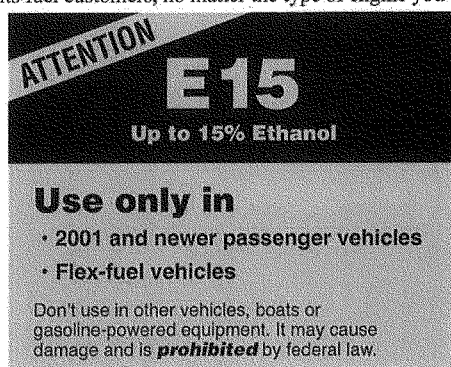


7-10 million Metric tons of CO₂, the equivalent of taking 1.4 – 2.2 million cars off the road over the next ten years.

Non-vehicular engines

Sheetz appreciates the business from all its fuel customers, no matter the type of engine you use Sheetz fuel. Whether you are driving a Porsche or filling up a gas can for your lawnmower, Sheetz takes pride in providing adequate fueling options for their customers. This includes small engines like those made by Briggs and Stratton, as well as marine engines, motorcycles, and other off-road vehicles.

We are agnostic about what fuel is sold to consumers as long as they follow appropriate state and federal laws. At every station where we sell E15, Sheetz goes to great lengths to properly label each pump to indicate that they are for certain vehicles only. E15 is NOT legal for small engines, motorcycles, or other off-road engines. In addition, E15 is an additive option. E10 – a fuel expressly warranted for small, marine, off-road, and motorcycle engines – is still available at all E15 stations across the country. In fact, with most retail configurations using blender pumps, EPA requires a dedicated E10 – or E0 – only hose somewhere on the premises specifically to prevent misfuelling.



Recent data from the Federal Highway Administration calculated how much fuel was used by particular types of engines. This data suggests that less than 3 percent of all gasoline used was burned in boats, lawnmowers, and other recreation and off-road engines.

Our experience is that consumers are not confused about what type of fuel to purchase and we certainly encourage consumers to follow their owner's manual and fuel recommendation. Campaigns by industry

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partners in the small engine, marine, motorcycle, and off-road engine sectors have been very effective at ensuring that the appropriate fuels for these types of engines are used.

Conclusion:

I again want to thank the Committee for this opportunity to testify today. I hope that my thoughts added to the discourse of this issue. I want to thank the cosponsors of this bill for their leadership and foresight in seeking a solution to this problem. And I want to close by reminding the Committee that this bill is simply about fixing an outdated rule that prevents fuel retailers like Sheetz from offering a legal fuel year-round and on the same footing as other gasoline grades.

I'd be happy to take any questions.

Senator BARRASSO. Thank you very much for your testimony. We appreciate you being here today.

Mr. TESKE.

**STATEMENT OF TODD TESKE, CHAIRMAN, PRESIDENT & CEO,
BRIGGS & STRATTON CORPORATION**

Mr. TESKE. Chairman Barrasso, Senator Carper, distinguished members of the Committee, thank you for inviting me here today to discuss the renewable fuel standard and the Consumer Fuel and Retailer Choice Act on behalf of Briggs & Stratton.

My name is Todd Teske. I am Chairman, President, and CEO of Briggs & Stratton. Today I hope to offer insight to our experience with the renewable fuel standard and specifically S. 517. I have provided more detailed written testimony, which I would ask to be included in the record.

Briggs & Stratton is a 109-year-old U.S. manufacturer headquartered in Milwaukee, Wisconsin. We have U.S. manufacturing sites in New York, Georgia, Alabama, Missouri, Kentucky, Wisconsin, and Nebraska. Briggs & Stratton is the world's largest producer of small air-cooled gasoline engines for outdoor power equipment, and we are a leading designer, manufacturer, and marketer of power generation, lawn and garden, turf care, and jobsite products. If you have a garage, you probably have a Briggs & Stratton product in it right now.

We have 5,500 employees worldwide, with approximately 5,100 of them right here in the U.S. We take pride in producing over 85 percent of our products and 72 percent of our sales here in the U.S.

Briggs & Stratton has a longstanding commitment protecting our environment. Since 1995, we have reduced our emissions by 75 percent. In 2007, we pledged with the Department of Energy to reduce our energy consumption by 25 percent over 10 years, and I am pleased to say that we were able to achieve that goal.

Keeping our commitment to the environment in mind, I believe that the environmental goals underpinning the RFS and E15 were laudable. However, it has since become apparent that these goals are unlikely to ever be met and, more importantly, may have significant unintended consequences for consumers.

I would like to briefly outline several concerns I have with the RFS and the increased availability of E15.

Extensive research has shown that the use of E15 in small non-road engines can have harmful and costly consequences, and the EPA has confirmed these findings. We have conducted our own studies that show that as the level in gasoline increases, the level of alcohol increases as well. Alcohol contains inherent properties that cause problems with engines.

By definition, E15 would have an alcohol content of 0 to 15 percent, which would result in great difficulty in engines meeting both emissions and performance requirements. Furthermore, the Department of Energy's testing of E15 in non-road engines found that small engines experienced a variety of difficulties with higher ethanol blends. More than half of the engines tested behaved poorly or erratically, according to the DOE's report, which caused the EPA to exclude small engines from the E15 waiver. This exclusion, how-

ever, has not led to decreased problems due to consumer misfueling.

The EPA has issued a mandatory warning label for pumps that distribute E15. While we appreciate this preventative effort, research has shown that warning labels are not effective in preventing misfueling, and consumers continue to use E15 despite the risks.

Behavioral studies have shown that consumers at the pump overwhelmingly favor the lowest priced fuel. In the 1970's and 1980's, the U.S. made the transition from leaded to unleaded gasoline, and new cars were designed with different fuel tanks that were incompatible with older, leaded gasoline pumps. It was found that even with this physical obstruction in place, consumers would still opt for the lowest priced fuel option in their car. If a physical obstacle could not deter consumers from using the correct gasoline, can we assume that a sticker is going to prevent misfueling?

At Briggs & Stratton, we have partnered with other small engine manufacturers and retailers across the Country to educate consumers on proper fueling. Together, we created the "Look Before You Pump" campaign to assist consumers when purchasing new small engine products. While we are happy to do our part to educate the public on the negative impact ethanol can have on our products, we do not believe that we should solely be responsible for this effort. It is going to take a concerted effort with industry and Government to fully educate the public on the risks of misfueling with ethanol.

Last, small engines and outdoor power equipment are not designed, warranted, or EPA approved to operate on gasoline containing more than 10 percent ethanol. This is why we fully support the development of advanced biofuels as a solution. Biofuels from other feedstock are drop-in fuels. Drop-in fuels, by definition, meet existing gasoline specifications, are not ready to drop in to infrastructure, minimizing compatibility issues. We have conducted extensive testing with a drop-in isobutanol blended gasoline, which demonstrated evidence that such fuels can provide the performance and operational criteria necessary without demonstrating any negative effects.

I strongly support further research into these alternative fuels that are effective and do not damage our products. The Consumer Fuel and Retailer Choice Act would allow retailers across the Country to sell E15 year-round. Under this legislation, it is highly likely that consumers would misfuel small engines with even more frequency. Misfueling would lead to significant economic harm for consumers as these small engines fail. Reliance on warning labels would do little to prevent misfueling, despite our best efforts at education and prevention, and we believe the risk of misfueling would be substantial, and damage to our products would be irreversible. This puts us at risk to lose decades of trust from consumers and negatively impact our reputation.

For these reasons, Briggs & Stratton opposes S. 517 as currently written. We encourage the Committee to work together in a bipartisan way to draft new legislation that protects consumers. We recommend that any reform legislation rescind the partial waiver for E15 and establish gasoline blended with up to 10 percent ethanol

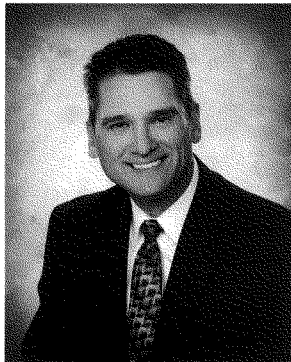
as the general purpose domestic fuel. I also encourage the Committee to pursue policies that encourage research into the next generation of renewable fuels that are safe, proven, and for all types of engines.

Mr. Chairman, Senator Carper, thank you for this opportunity to testify today. I appreciate the Committee looking into the complicated issues dealing with the RFS, and I would be happy to answer any questions you might have.

[The prepared statement of Mr. Teske follows:]



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TODD J. TESKE, Chairman, President & Chief Executive Officer, Briggs & Stratton Corporation (Milwaukee, Wisconsin) October 20, 2010. Prior to this appointment, he served as President and Chief Executive Officer since January, 2010. Other positions include President & Chief Operating Officer from September 2008 to January 2010, and EVP and Chief Operating Officer from September 2005 to September 2008. He previously served as SVP & President of Briggs & Stratton Power Products, Vice President - Corporate Development, Corporate Controller and Assistant Controller.

Prior to joining Briggs & Stratton, Todd worked at Arthur Andersen where he served various clients from small business to international conglomerates; lead and performed several merger investigations and was involved in many public equity and debt offerings.

Todd earned his BBA (Accounting) degree from the University of Wisconsin-Oshkosh and his MBA degree from Northwestern University. He is a member of the American Institute of Certified Public Accountants and the Wisconsin Institute of Certified Public Accountants. Todd serves on the Board of Directors of Badger Meter, Inc., Junior Achievement of Wisconsin, Inc., Lennox International, Inc., The Management Association (MRA), Wisconsin Manufacturer's & Commerce (WMC), Greater Milwaukee Committee (GMC), Metropolitan Milwaukee Association of Commerce (MMAC), Outdoor Power Equipment Institute (OPEI), Chairman of the Board of Trustees for The Manufacturers Alliance for Productivity and Innovation (MAPI) and is on the Business Advisory Board for the University of Wisconsin Oshkosh College of Business and Chairman of MiKE (Innovation in Milwaukee).



**BRIGGS & STRATTON
CORPORATION**

U.S. Committee on Environment & Public Works

United States Senate

Written Testimony of Mr. Todd J. Teske, President, Chairman & CEO, Briggs & Stratton Corporation

June 14, 2017

Chairman Barrasso, Senator Carper and distinguished Members of the Committee, thank you for inviting me to offer Briggs & Stratton's perspective on the Renewable Fuels Standard and specifically to comment on the Consumer Fuel and Retailer Choice Act (S. 517). My statement today, which is submitted strictly in my capacity as Chairman, President and CEO of Briggs & Stratton, will attempt to define the RFS challenges as they pertain to small engine manufacturers and offer suggestions on how to protect consumers from significant economic and environmental damage.

Briggs & Stratton Corporation, headquartered in Milwaukee, Wisconsin, is the world's largest producer of gasoline engines for outdoor power equipment. As a U.S. based manufacturer, our company is proud to be celebrating our 109th anniversary this year and continues to manufacture over 85% of our products here in America with 72% of our sales here in North America. We are a leading designer, manufacturer and marketer of power generation, lawn and garden, turf care and job site products through its Briggs & Stratton®, Simplicity®, Snapper®, Snapper Pro®, Ferris®, PowerBoss®, Allmand™, Billy Goat®, Murray®, Branco® and Victa® brands. Briggs & Stratton products are designed, manufactured, marketed and serviced in over 100 countries on six continents by 5,500 employees. Approximately 5,100 of those employees work here in the United States.

Briggs & Stratton's long-standing commitment to the environment remains a key focus for our business. We continue to manufacture our products with recycled materials that are highly efficient and with reduced emissions. Since 1995, we have reduced our emissions by 75%, and after completing the phase-in of our new product offering, achieved an additional 35% reduction in those emissions in January, 2014. In 2007, we signed a pledge with the Department of Energy to reduce our energy consumption by 25% over 10 years. I am pleased to report that we met this goal. These are just a few of the many examples that demonstrate our commitment to the environment.



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With that in mind, the goals underpinning the enactment of the RFS were laudable. However, not only has it become apparent that the goals are unlikely to ever be met, the RFS and E15 ethanol content have resulted in significant unintended consequences for consumers. Below are five factors that greatly concern me about the RFS and increased availability of E15.

1. Research has shown, and EPA has agreed, that use of E15 in small non-road engines can have harmful and costly consequences on small engines and outdoor power equipment.

Briggs & Stratton has conducted extensive testing on levels of ethanol above 10%. Increasing levels of ethanol in gasoline result in increased levels of alcohol. Alcohol has inherent properties that cause problems with our engines, and they become more acute with increasing alcohol content. Increasing the alcohol in fuel changes the air-fuel ratio (enleanment) in our carbureted engines. E15 fuel, by definition would have an alcohol content ranging from 0 to 15%. Our engines would have great difficulty in meeting both emissions and performance expectations with this type of alcohol range. Enleanment will also result in higher operating temperatures that will lower engine life due to issues such as valve sealing, piston scoring, and head gasket leakage, just to name a few. Ethanol is also hygroscopic (absorbs water). Increased levels of water will cause the engine to run poorly, and will also cause corrosion by means of acidic attack, galvanic activity, and chemical interaction. Ethanol will also cause other problems such as reduced fuel storage life, starting issues and reduced fuel economy.

Furthermore, Department of Energy (DOE) testing of E15 on a representative sample of small non-road engines, including Briggs & Stratton powered generators and power washers, found that small engines experienced a variety of difficulties with intermediate blends of ethanol. Most engines performed worse in several metrics when running on higher ethanol blends – engines often had higher operating temperatures, higher exhaust temperatures, and NOx emission rates. Higher operating temperatures lead to increased wear and tear and more frequent maintenance. Moreover, 7 out of the 11 engines behaved “poorly” or “erratically”, according to DOE’s report, with incidents of unstable speeds, stalling, and clutch engagement at idle. As a result of this testing, small engines were specifically excluded by EPA from the E-15 Waiver.

2. Research on warning label effectiveness suggests that an E15 warning label will do very little to mitigate misfueling.



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In response to our concerns and the concerns of other interested parties, the EPA has issued a mandatory warning label for pumps that distribute E15. Given the body of research on the effectiveness of warning labels, we believe that this warning will not prevent consumers from misfueling their engines with the E15 blend, leaving the equipment owner liable for the damage to their products. Warning labels have been the subject of many research studies, with results often showing little change in consumer behavior. The Association for Consumer Research further reports that warning labels are considerably less likely to be successful when applied to products that consumers use frequently and feel comfortable with, e.g. gas pumps. If consumers visit their local gas station and do not realize that the ethanol blend has been increased, this research would indicate that they are unlikely to heed the warning label on the pump. There has been no testing done by EPA to validate the effectiveness of the warning label, which is not consistent with recognized safety standards such as ANSI.

When the U.S. transitioned from leaded gasoline to unleaded gasoline in the 70s and 80's, new cars running on unleaded gasoline were designed with different fuel tanks to be incompatible with older leaded gasoline in an effort to prevent misfueling. There is no such "transition" plan or tangible differentiation in place for E15 and it is solely up to the consumer to know what fuel is appropriate for their automobile, lawn mower, generator, pressure washer, etc.

3. Behavioral studies of customers at the gas pump conclude that consumers overwhelmingly favor the lowest priced option, regardless of the consequences.

Historical evidence suggests that when faced with a range of prices at the pump, consumers are far more likely to choose the lowest-priced option despite potential damage to their engines. Through our industry association, the Outdoor Power Equipment Institute, we have conducted three Harris Poll Surveys. The latest poll results, conducted in March 2017, show that over three in five Americans assume that any gas sold at fueling stations is safe for all of their cars as well as other, non-road engine products, like boats and mowers (63% up 2017, up from 60 percent in 2016 and 57% in 2015). This year's poll also shows roughly two thirds of Americans believe higher ethanol blends of gas are safe to use in any engine (31 percent). As previously mentioned, when the United States transitioned from leaded gasoline to unleaded gasoline in the 70's and 80's, new cars running on unleaded gasoline were designed with different fuel tanks, to be incompatible with older leaded gasoline pumps. Additionally, car buyers were educated at the point of purchase about the new fuel. Even with those prevention and education measures, the EPA reported that in 1983 – ten years after the



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introduction of unleaded gasoline – misfueling rates remained as high as 15.5%. The New York Times reported that “customers would go out of their way to pump leaded gas if it was just a few cents cheaper. What they gain at the pump they lose at the repair shop in higher maintenance costs.” If high rates of misfueling still occurred when physical obstacles were in place, we believe that a simple warning label next to the pump will not yield better results. Similarly, the National Bureau of Economic Research reports very strong price elasticity of demand in its own study on the use of premium vs. regular gasoline during times of high gasoline prices. When gasoline prices increased, consumers switched to less expensive, regular gasoline even though premium gasoline was recommended for their vehicles. NBER concludes that households are nearly 20 times more sensitive to the income effect for gasoline than to equivalent effects from other sources.

4. Misfueling due to lack of education to consumers regarding the proper use of E15 will be significant.

EPA has instructed stakeholders to “develop a broad public education and outreach campaign that provides both consumers and retailers with the information they need to avoid misfueling.” Briggs & Stratton is already taking steps to educate its customers about proper fueling for its products through its “Look Before You Pump” Campaign and has introduced additives and E-0 gasoline products to assist consumers with selecting the proper fuel. Briggs & Stratton does not feel we, nor the outdoor power equipment industry, should be held solely responsible for educating tens of millions of Americans on the dangers of misfueling, especially when many already own products which are incompatible with E15. In a study previously conducted, AAA found that 95% of Americans had not heard of the new E15 waiver. In a separate study by the National Association of Convenience Stores, it was clear that consumers were confused by E15; many believed that E15 had higher fuel economy than E10. And the study also found that of participants who said they would consider fueling their cars with E15, 60% of them owned cars for which E15 is incompatible and prohibited. Despite our best efforts at education and prevention, we believe the risk of misfueling will be substantial, and damage to our products will be irreversible. We risk losing decades of trust and our brand reputation as a manufacturer of quality, reliable products while owners will not get the value they expected when they purchased the product.

5. The use of Biofuels or “drop-in fuels” has been tested and could prevent misfueling.

Small engines and outdoor power equipment are not designed, warranted, or EPA-approved to operate on gasoline containing more than 10% ethanol. Briggs & Stratton fully supports the development and use of



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biofuels, from any feedstock, which are "drop-in fuels." Drop in fuels, by definition, meet existing gasoline specifications and are ready to "drop-in" to infrastructure, minimizing compatibility issues. These fuels are capable of satisfying the additional growth in biofuel use, while also providing a safe and high performing general fuel for both legacy and newly manufactured small engines and outdoor power equipment. We have conducted extensive testing with a drop-in isobutanol blended gasoline which demonstrated evidence that such fuels can provide the performance and operational criteria necessary, without demonstrating any negative effects. Drop-in fuels had not yet materialized when the RFS was developed in previous market conditions and the EPA was compelled to grant the partial waiver to meet the statutory targets using ethanol. E15 will not provide compliance with current RFS targets and has required EPA to continue to revise fuel standards creating uncertainty in the marketplace and for manufacturers and increasing misfueling risks to consumers. Misfueling will result in economic harm to all parties and void product warranties. Ever changing targets will result in less efficient investment of manufacturing resources and more costly products.

Briggs & Stratton Corporation's reaction to The Consumer Fuel and Retailer Choice Act (S. 517).

The Consumer Fuel and Retailer Choice Act (S. 517) would extend the Reid vapor pressure (RVP) waiver to ethanol blends above 10 percent. It would allow retailers across the country to sell E15 year-round.

Under this legislation, it is highly likely that consumers would misfuel small engines with even more frequency. This misfueling would lead to significant economic harm for consumers as these small engines fail since there is no liability protection for consumers. As mentioned earlier, DOE testing has concluded that higher blends of ethanol (above E-10) result in higher NOx emission rates, which would cause environmental damage. Reliance on warning labels would do little to prevent this misfueling. While the private sector will continue to do its part to educate consumers on the risks of E15, we strongly believe these efforts will not be enough. Despite our best efforts at education and prevention, we believe the risk of misfueling will be substantial, and damage to our products will be irreversible. This puts us at risk to lose decades of trust from consumers and negatively damage our brand reputation. For these reasons, Briggs & Stratton opposes S. 517 as currently written.

We encourage the Committee to work together in a bipartisan way to draft new legislation that protects consumers. We recommend that any reform legislation rescind the partial waiver for E15, and establish gasoline blended with up to 10% ethanol as the general purpose domestic fuel. The legislation should also



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require that all considerations to increase domestic biofuel levels in the future be subject to the formal EPA rulemaking process whereby the market's ability to safely distribute, retail and consume such fuel is provided. We would also encourage the Committee to pursue policies that encourage research into the next generation of renewable fuels that are proven safe on all types of engines.

Chairman Barrasso and Senator Carper, thank you for holding a hearing on this important issue, and for allowing me the opportunity to testify. I would be happy to answer any questions you and your colleagues have.

Senator BARRASSO. Thank you so much for your testimony.
Ms. YANOWITZ.

**STATEMENT OF JANET YANOWITZ, P.E., PH.D., PRINCIPAL
ENGINEER, ECOENGINEERING INC.**

Ms. YANOWITZ. Chairman Barrasso, Ranking Member Carper, and distinguished Committee members, thank you for the opportunity to speak here today. It is an honor. I am an engineer that has worked on the emissions from biofuels for almost two decades.

Today you are evaluating whether to allow E15, a fuel which is 15 percent ethanol and 85 percent petroleum, to have the same 1 PSI waiver currently permitted for E10. At this time, virtually all the fuel sold in the U.S. is E10, and extending the 1 PSI waiver to all ethanol fuels will encourage the use of E15 in place of E10. I will be discussing the air emissions impact of this change.

As any scientist who has spent time on vehicle emissions will tell you, the issue is complicated and different vehicles can behave quite differently. However, for those of you who are listening for the bottom line, replacing E10 with E15 would be a small change with minimal emissions impacts, according to the best available emissions test data.

On average, the total tailpipe organic emissions and the ozone forming potential of those organics will be expected to decrease or stay the same, and nitrogen oxide, or NOx, which also impact the ozone formation, are expected to be unchanged. Ethanol and aldehyde emissions will likely increase and carbon monoxide and benzene will decrease.

This analysis is based on studies reported in the peer-reviewed scientific literature and by the coalition of petroleum and automobile companies that make up the Coordinating Research Council, or CRC. More information on these studies is included in my written submittal, but I will quickly describe the most significant so you get a feeling for the size of the studies and the results.

In 2008, a team comprised of scientists from three national laboratories conducted emissions testing on 16 vehicles using E0, E10, E15, and E20. They found that increasing the ethanol content resulted in no significant effect on NOx or organic tailpipe emissions, although the acid aldehyde emissions increased. Similar results on three vehicles were reported by Karavalakis and his colleagues at UC Riverside. The CRC also reported that increased ethanol content up to 20 percent ethanol reduced CO emissions, although the same study reported an increase in NOx emissions with higher ethanol content.

An analysis of the 12 2001 newer vehicles included in another DOE study found that non-methane hydrocarbons, carbon monoxide and NOx trended slightly lower with higher ethanol contents. In another study conducted by a subcontractor to NREL, non-methane hydrocarbons and carbon monoxide emissions were either equal or lower for six vehicles aged and then emissions tested on E15 versus E0, and NOx emissions were unchanged.

The total amount of organics emitted provides a rough gage of the overall forming potential of the emissions, but not all organics are equally prone to reacting to form ozone. Thus, studies which considered the reactivity of the specific organics released are more

accurate at determining the ozone forming potential of the emissions. The UC Riverside team did this analysis for emissions from two 2012 model year vehicles and found that the ozone reactivity for emissions from E15 were less than those from E10.

In addition to tailpipe emissions, vehicles emit additional organic compounds to the atmosphere via evaporation. There have been no significant studies comparing evaporation emissions of E15 to E10, but two studies made with E20 and E10 show mixed results, suggesting that increases in evaporative emissions between vehicles using E10 and E15 of the same vapor pressure are small or non-existent.

In another study, limited data from the testing of four vehicles using E0 and E15 showed no significant differences between the two fuels in evaporative emissions.

In conclusion, the available emissions test data indicates that replacing E10 with an E15 of the same vapor pressure will cause a slight decrease in emissions of ozone-forming organic compounds and carbon monoxide, and no change in NO_x.

Thank you.

[The prepared statement of Ms. Yanowitz follows:]

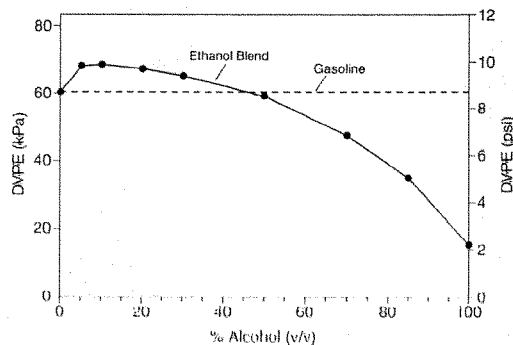
Testimony of
Janet Yanowitz, P.E., Ph.D.
Principal, EcoEngineering, Inc.
The United States Senate Committee on Environment and Public Works
Hearing On S.517, Consumer and Fuel Retailer Choice Act
June 14, 2017

This testimony summarizes the air emission impacts of using E15 (fuel which is 15% ethanol, 85% petroleum based) in place of E10 (fuel which is 10% ethanol, 90% petroleum based). It is provided to the Senate Committee on Environment and Public Works so that they may assess the effects of Senate Bill, S.517, that would allow E15 to have the same 1 psi vapor pressure allowance or waiver currently permitted for E10 (see box next page on regulatory background). At this time virtually all of the fuel sold in the U.S. is E10 and extending the 1 psi waiver to higher ethanol fuels will encourage the use of E15 in place of E10.

This report focuses primarily on the pollutants which impact ground-level ozone, i.e. volatile organic compounds (VOCs) and nitrogen oxides (NOx).

Fuel effects on motor vehicle emissions are difficult to quantify because

Impact of Ethanol on Vapor Pressure. The addition of 10% ethanol to a base hydrocarbon blendstock results in a roughly 1 psi (6.9 kPa) increase in vapor pressure. The addition of 15% ethanol to the same blendstock results in almost exactly the same impact on the vapor pressure. Dry vapor pressure equivalent, or DVPE, is the modern equivalent of Reid vapor pressure, or RVP.



different vehicles can behave quite differently. Nonetheless it can be concluded that replacing E10 with E15 that benefits from the same 1 psi waiver is a small change with minimal emissions impacts according to the best available emissions test data. On average, the total tailpipe organic emissions and the ozone forming potential of those organics will be expected to decrease or stay the same, and NO_x is expected to be unchanged with a move to E15. Ethanol and acetaldehyde emissions will likely increase. Carbon monoxide will decrease.

This analysis is based on studies reported in the peer-reviewed scientific literature and by the coalition of petroleum and automobile companies that make up the Coordinating Research Council or CRC.

Perhaps the most applicable study was done in 2008 by a team comprised of scientists from three national laboratories.¹ They conducted emissions testing on 16 vehicles, model years ranging from 1999 through 2007 using E0, E10, E15 and E20. They found that increasing the ethanol content resulted in no significant effect on NO_x or organic tailpipe emissions although the results varied widely among vehicles; CO emissions were reduced and ethanol and acetaldehyde emissions increased. Some of those results are shown in the figure below.

Regulatory Background. Ethanol and gasoline fuel mixtures are in common use in the United States with E10 (10% ethanol, 90% gasoline blendstock) comprising more than 90% of the retail fuel supply in recent years. In October 2010, the EPA expanded the use of ethanol by granting a waiver to allow the retail sale of concentrations of up to 15% ethanol in gasoline (E15) for use in light-duty on-highway vehicles model year 2007 and later. In January 2011, the waiver was expanded to allow the use of ethanol in older light-duty vehicles, model years 2001 to 2006.

When ethanol was first permitted as an additive in gasoline at concentrations of up to 10% in 1979, its effect on vapor pressure was not regulated. However, beginning with the implementation of the Clean Air Act Amendments of 1990, the United States Environmental Protection Agency (EPA) set the same maximum allowable RVP for both gasoline and gasoline/ethanol blends: for the summer high ozone season, 9.0 psi, with more stringent standards set for nonattainment areas. (The summertime high ozone season has been determined by the EPA to run from June 1 to September 15.)

However, only two years later, new EPA regulations (40 CFR 80.27) provided a 1-psi waiver for ethanol blends that contained between 9 and 10 percent ethanol. The purpose of the 1-psi waiver was to support the emerging ethanol industry. At that time EPA believed it would be difficult to economically justify a separate storage and distribution system for the small amount of lower vapor pressure gasoline needed for ethanol blending, with the result that low RVP fuel for ethanol blending would not be made available. The waiver allowed E10 to be made with the same gasoline distributed as fuel to be used without ethanol addition.

Today the 1 psi waiver is not available for E15. Because it is not, lower cost (i.e. higher DVPE) blendstock can be used with E10 than in E15 with the result that little E15 is marketed.

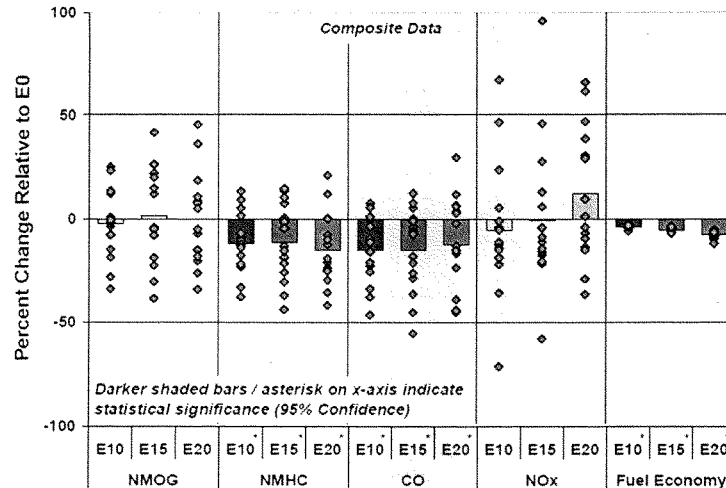


Figure 2. Percentage change in emissions from vehicles using different ethanol content fuels.³ Diamonds are individual emissions measurements, bars are average emission results. NMOG = non-methane organic gas; NMHC = non-methane hydrocarbons.

Similar results on three post 2001 model year vehicles were reported by Karavalakis and his colleagues at UC Riverside (one of which was not tested on E15 but was tested on E20).^{2,3} The CRC also reported that increased ethanol content up to 20% ethanol reduced CO emissions (based on testing of E0, E10 and E20), although the same study also reported an increase in NOx emissions with higher ethanol content.⁴ Air Improvement Resources, Inc.⁵ analyzed the results of the twelve 2001 and newer vehicles included in another DOE study⁶ tested on E0, E10, E15 and E20 and found that non-methane hydrocarbons (NMHC), carbon monoxide and NOx trended slightly lower with higher ethanol contents. In another study conducted by a subcontractor to NREL, NMHC and carbon monoxide emissions were either equal or lower for six vehicles aged and then emissions tested on E15 versus E0, and NOx emissions were not statistically different.⁷

The total amount and composition of the organics emitted provides a rough gauge of the ozone forming potential of the emissions, as not all organics are equally prone to reacting to form ozone. Thus studies which considered the reactivity of the specific organics released are more accurate at determining the ozone forming potential of the emissions. The UC Riverside team

did this analysis for emissions from two 2012 model year vehicles and found that the ozone reactivity for emissions from E15 were less than those for E10 as shown in the figure below.

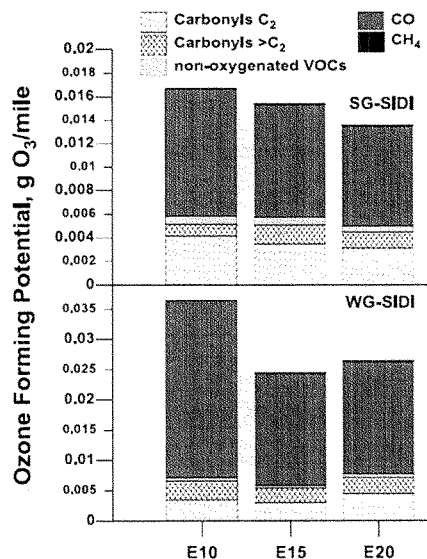


Figure 3. Ozone forming potential of exhaust from vehicles using different ethanol content fuels.⁴

Although, testing on flex-fuel vehicles may not be representative of non-flex-fuel vehicles, it does seem likely that changes in ethanol content would have the same effect on the relative proportion of different organics in the exhaust. For that reason, I also considered the results reported by the CRC in 2011. They found that the ozone forming potential of flex-fuel vehicles did not increase with increased ethanol content in the fuel and in one case decreased.⁸

In addition to tailpipe emissions, vehicles emit additional organic compounds to the atmosphere via evaporation or permeation. There have been no significant studies comparing evaporative emissions of E15 and E10. Two studies^{9,10} made with E20 and E10 show mixed results, suggesting that increases in evaporative emissions between vehicles using E10 and E15 of the same vapor pressure are small or non-existent. In another study, limited data from the testing of four vehicles using E10 and E15 showed no significant differences between the two fuels.¹¹

In conclusion, the available emissions test data indicates that replacing E10 with an E15 of the same vapor pressure will cause a slight decrease in emissions of ozone forming organic compounds and carbon monoxide, and no change in NOx.

¹ Knoll, K., B. West, S. Huff, J. Thomas, J. Orban, C. Cooper, "Effects of Mid-Level Ethanol Blends on Conventional Vehicle Emissions," SAE Technical Paper No. 2009-01-2723, 2009, doi:10.4271/2009-01-2723.

² Karavalakis, G., D. Short, D. Vu, R.L. Russell, A. Asa-Awuku, H. Jung, K.C. Johnson, T. D. Durbin, "The impact of ethanol and iso-butanol blends on gaseous and particulate emissions from two passenger cars equipped with spray-guided and wall-guided direct injection SI (spark ignition) engines, *Energy*, 82 (2015)168-179.

³ Karavalakis, G., T.D. Durbin, M. Shrivastava, Z. Aheng, M. Villela, H. Jung, "Impacts of ethanol fuel level on emissions of regulated and unregulated pollutants from a fleet of gasoline light-duty vehicles," *Fuel* (3 (2012) 549-558.

⁴ CRC E-74b, Effects of Vapor Pressure, Oxygen Content and Temperature on CO Exhaust Emissions, May 2009 https://crcao.org/reports/recentstudies2009/E-74b/E-74b%20Revised%20Final_Report_SR20090503.pdf, accessed June 9, 2017.

⁵ Air Improvement Resources, Effects of E15 Ethanol Blends on HC, CO and NOx Regulated Emissions from On-Road 2001 and Later Model Year Motor Vehicles, July 15, 2011

⁶ Knoll, K., B. West, W. Clark, R. Graves, J. Orban, S. Przesmitzki, T. Theiss, Effects of Intermediate Ethanol Blends on Legacy Vehicles and Small Non-Road Engines, February 2009, NREL/TP-540-43543; ORNL/TM-2008/117..

⁷ Vertin, K., G. Glinsky, A. Reek, Comparative Emissions Testing of Vehicles Aged on E0, E15 and E20 Fuels, SGS Environmental Testing Corporation, Aurora, CO, NREL/SR-5400-55778.

⁸ CRC E-80, Exhaust and Evaporative Emissions Testing of Flexible-Fuel Vehicles, August 2011.

⁹ <https://crcao.org/reports/recentstudies2011/E-80/E-80%20Final%20Report+Appendices.pdf>, accessed June 9, 2017.

⁹ CRC E- 65-3, Fuel Permeation from Automotive Systems: E0, E6, E10, E20 and E85, December 2006, accessed June 9, 2017.

¹⁰ CRC E 77-2, Enhanced Evaporative Emission Vehicles, March 2010, accessed June 9, 2017.

¹¹ Vertin, K., G. Glinsky, A. Reek, Comparative Emissions Testing of Vehicles Aged on E0, E15 and E20 Fuels, SGS Environmental Testing Corporation, Aurora, CO, NREL/SR-5400-55778.

Senator BARRASSO. Well, thank you all for your testimony. We appreciate you all being here today.

Mr. Teske, let me start with you.

Earlier this week, the National Marine Manufacturers Association, the American Sports Fishing Association, Boat USA, Center for Sports Fishing Policy, Marine Retailers Association of the Americas, Theodore Roosevelt Conservation Partnership sent the Committee a letter expressing concerns about how E15 can contribute to engine failure. I don't know if you have seen that letter.

Mr. TESKE. I have.

Senator BARRASSO. Do you share the concerns of these groups?

Mr. TESKE. We do, because ethanol or alcohol does a couple different things to an engine; it doesn't matter whether it is a marine engine or a small lawnmower engine. Basically, it will fail over time if you put E15 in them, in a relatively short period of time. And in many cases, it has to do with the fact that enleanment, which means that the engine will run hotter, will start to distort the components in the engines. So it is no different, really, between any of the engines you mentioned, with marine or our engines at Briggs & Stratton.

Senator BARRASSO. Thank you.

Dr. Yanowitz, I have a couple of studies here that you have put forth in terms of performance, compatibility and environmental impacts of ethanol. Were they funded by the ethanol industry? I am looking at the March 2012 study prepared for the Renewable Fuels Association, funded by the Renewable Fuels Association in May 2015, prepared—

Ms. YANOWITZ. Seems like you have answered your question. Yes, they were.

Senator BARRASSO. OK, thank you.

Mr. Lewis, in your testimony you explained that E15, when compared to E10, may produce lower emissions of the VOCs, but likely to produce higher emissions of NOx. So what does that mean in terms of ozone formation?

Mr. LEWIS. There are some studies that show slightly higher NOx emissions. It is not a large effect, but it is something that we are concerned about because, as I mentioned earlier, in the vast majority of areas of the Country where ozone is a problem, a slight change in NOx emissions or change in NOx emissions is going to have a much more significant impact on ozone formation than a change in VOC emissions.

None of the studies that we have looked at have looked at the full range of different vehicle types, the vintage of those vehicles or the miles that they are driven, and consider what NOx impacts from those vehicles might be on ozone formation, but it is definitely an area of concern for us given the direction that NOx formation has on ozone.

Senator BARRASSO. We had talked earlier in my opening comments about NOx emissions and the potential to push regions of the Country which are currently in attainment with the National Ambient Air Quality Standards for ozone pushing them into non-attainment, Mr. Lewis. So do you believe that these additional potential NOx emissions have the potential to prevent regions of the Country which are currently in non-attainment from getting into

attainment, as we look at the impact of that? And which regions of the Country might be most vulnerable?

Mr. LEWIS. In our written testimony, we identified 31 regions around the Country that are either just above or just below the 2008 ozone standard and the 2015 ozone standard, and in those areas they are making heroic efforts to bring down ozone levels to attain those standards, and slight changes in ozone levels make a significant difference in whether or not they are going to attain. So the areas that we mentioned, there are five of them in California; there are three in Arizona, Wisconsin, Michigan, Indiana, Pennsylvania, and Ohio; Illinois, Maryland, West Virginia, and Nevada each have two of these areas; and they include most of the major cities in the eastern United States.

Senator BARRASSO. So it seems more related to the cities.

Mr. LEWIS. It is a significant concern for cities, particularly since many of the east coast cities are downwind from ozone producing areas. So even if they take significant efforts at home, it won't necessarily solve the problem.

Senator BARRASSO. And I think you mentioned that there are a number of other impacts on air, water, land quality. Could you expand on that a little bit?

Mr. LEWIS. Yes. In addition to the climate concerns that I outlined in my opening statement, we are very concerned about the impact on water quality. Farm runoff is a significant problem, particularly from corn production, and that has led to water pollution and degraded water habitats in streams, rivers, the Chesapeake Bay and the Gulf of Mexico.

We are also concerned about habitat loss. Between 2008 and 2012, studies have found that 7 million acres of range land, wetland, native prairie lands have been converted into crop production, and soybeans and particularly corn have accounted for most of the plantings on that cleared land.

Senator BARRASSO. Thank you. Thank you for your response.

Senator CARPER.

Senator CARPER. So, we were talking, like a sidebar conversation here, and said this really is a good panel, and this is an issue about which people have some real serious differences. But this is the kind of panel we need to help us. And one of the things that I always look to a panel of this nature on an issue that is contentious, bipartisan, but contentious, is to help us find a path to a smart public policy. And I think at the end of the day we want to make sure that what we are doing, if we are going to move from E10 to E15, the effect on the environment, what it does for customers, what it does in terms of reducing our demand on foreign oil. There are a lot of factors out here, and there are some aspects that would suggest that this is a good thing, and then there are others we have to be concerned about.

I flagged in my statement a concern that may not be shared by others, but it deals with something called the Renewable Identification Number, RIN, and volatility in the RINs market. We don't have time to explain well the concern, but the concern is related to the volatility in the market used by refineries to comply with the renewable fuel standard, and it is known as the Renewable Identification Number, the RIN market.

In the past 4 years or so, the RIN market had spikes, the RIN market goes up, it goes down, and those spikes in the RIN market have negatively impacted a number of refineries. We call them merchant refineries because they are not connected to a service station, gasoline stations across the Country. But I am interested in knowing, and maybe I will just come to you, Mr. Coleman.

What impact will this bill have on RIN markets? We think they are too opaque. We need more certainty. We need more predictability. We need less volatility. Otherwise, some of these refineries are going to be driven out of business, and that would be a great tragedy.

Please.

Mr. COLEMAN. Thank you, Senator Carper. So the RIN markets are essentially renewable fuel standard credit markets, and the oil industry buys credits when it cannot put more renewable fuel into the marketplace. So, in other words, RIN prices go up when demand for those credits increases when the usability of renewable fuel, in this case ethanol, is restricted. What we are asking for is an alleviation on the restriction to use ethanol. It will provide a place for the ethanol to go and RIN prices will come down.

The last point, of course, is that we are at 15 billion gallons. We are at the capped amount for corn ethanol, and we should see alleviation in those credit prices.

Senator CARPER. All right. Someone mentioned, I think, isobutanol, and we have had a real interest in biobutanol in the State of Delaware. DuPont has worked on this forever and along with, I think, BP and I think the Navy. They have a partnership and share views, markets and provided the products to markets in maybe Great Britain. I think I understood one of the panelists to say isobutanol does not have the problems that the corn ethanol has. Would you clarify that for us, isobutanol versus biobutanol versus corn ethanol? Again, this was with respect to small engines.

Mr. TESKE. Correct. Yes, that is correct, Senator. We have done extensive testing on isobutanol, and it has characteristics that are much more like gasoline, so it is much more like a drop-in fuel.

Senator CARPER. I understand it travels better in pipelines.

Mr. TESKE. Yes.

Senator CARPER. It passes better with gasoline and it has better energy density, I think.

Mr. TESKE. Yes, correct. So you can use existing infrastructure along the way, all the way from pipelines all the way to convenience stores. And then when you ultimately use it in small engines, it has the same characteristics as gasoline, so it performs very well in our engines.

Senator CARPER. We have been talking about this for a long time. In terms of market, making an impact on the markets, having this stuff being sold commercially in this Country, other countries, what is going on? Anybody. This is for anybody.

Mr. Coleman?

Mr. COLEMAN. Yes. Look, the way you get isobutanol is you basically cook the biofuel more, so you inject more energy in the production process, and you can actually make it look more like gasoline. We support the production of those fuels. To date, those fuels are more expensive than ethanol. Ethanol is the lowest cost solu-

tion. And I am a little bit confused about the Briggs component of this because Brazil uses two times as much ethanol as we do and that company sells small engines into Brazil, to my knowledge, without problem. So other countries are ahead of us. They certainly have small engines in Brazil, so that is one confusion that we have.

Senator CARPER. All right, my time has expired. Thank you so much.

Senator BARRASSO. Thank you, Senator Carper.

Senator INHOFE.

Senator INHOFE. Thank you, Mr. Chairman.

I am going to do something a little bit different. I have questions for our witnesses, but I also have a statement I want to start with. I appreciate the opportunity that this hearing brings for us to address the wider issue of renewable fuel standards.

I understand the supporters of the bill believe that the Reid vapor pressure issue should be a separate consideration from RFS, but I can't separate the two as this bill provides another win for ethanol at the expense of other forms of energy. The bill is more than a mere technical fix, more than mere regulatory reform. The bill would expand the waiver to E15 and beyond.

If we are to revisit the provision of the Clean Air Act, which was intentional, we must also look at the many other issues that have arisen since the mandate was created. Congress enacted the RFS in 2005 and expanded it in 2007. I opposed both efforts. The world of liquid fuels has changed since then and we produce more oil here, import less and consume less gasoline and emit fewer emissions from oil-based fuels. Most of the rationale originally justifying the RFS has disappeared. All we have left is an unstable program rooted in EPA waiving entire portions of annual requirements, allowing imported soybeans and ethanol from South America to count toward RFS in regularly missed deadlines.

The mismanagement of the RFS has hurt every party involved. Oklahomans understand that the RFS is a bad deal. Our pork producers, our cattlemen understand that to drive feed prices up, Oklahoma drivers understand the ethanol blends add wear and tear on their engines. Oklahoma gas stations across the State advertise gasoline without ethanol.

There we go. I took those myself.

[Laughter.]

Senator INHOFE. Unfortunately, it is going to get harder for Oklahomans to burn clean gas because the RFS only gets worse from here.

Yet, regardless of demand and other concerns, the previous EPA pushed increased ethanol blends to levels that can corrode engines and void vehicle warranties. These are just a few of the reasons why I continue to oppose the RFS, which I have done since its creation in 2005. And because of these concerns and those addressed by the Chairman, I believe any discussion of a waiver under the Clean Air Act should not be made in a vacuum. I welcome the opportunity to explore these concerns.

Now, Mr. Teske, back when I enjoyed life, I was a builder and developer along the coast in south Texas. Texas didn't have options for the small engines out there. They were surprised to find out in Oklahoma we don't have that problem. In fact, it is hard to find

anything with an ethanol blend where you actually have the small engines in our lake areas. And I have to remind people sometimes that Oklahoma has more miles of freshwater shoreline than any of the 50 States, and we know what we are doing there. But down in Texas they don't have that option.

Now, here is what I hear from the guys down there. You are in the engine business, so you are in a position to understand this. They are upset because of the effects on their warranties. They will go ahead and be using the blends that they are required to use because there is no option along the coast in their small engines. Then, when something happens, they come back against the manufacturer, that would be you, and have a lawsuit in many cases as a result, when in fact it was really just the blend that caused it.

Is this all new to you or is this something you have been aware of?

Mr. TESKE. It is certainly not new to us. We warrant up to E10, and our engines are fine running up to E10. But the issue is that when there is misfueling there are opportunities for dealers to determine how much ethanol is in the fuel. There are testing kits and other things that are out there, which is why they oftentimes will do that test and then reject the warranty claim along the way. So what happens is the consumer is left with a damaged product.

Senator, if I could just clarify one thing in Brazil. The comment was made on Brazil. Brazil has a different type of ethanol; it has a sugar cane based ethanol. You have to remember that when you are talking about performance of a small engine, we are talking about a tradeoff that happens between emissions regulations and performance. Well, down in Brazil it is different. So it is sugar cane based. And I can tell you we have a pretty good carburetor business down in Brazil because of the fact that they get replaced all the time.

But to your original question, yes. This is not——

Senator INHOFE. And I was aware of the situation down there. That was going to be my next question to ask you, so I appreciate it. But I don't want my time to completely expire.

I have been with this issue probably longer than anyone at this table has, with the whole ethanol issue, and I remember when Al Gore invented it all.

[Laughter.]

Senator INHOFE. Well, I am serious about that. He did it with the idea that this is better for the environment and all that, and I think, Mr. Lewis, if I judge from your statement, it sounds to me like Al Gore was wrong. Do you think he was?

Mr. LEWIS. Yes, we do. We don't think much of ethanol.

Senator BARRASSO. Thank you, Senator Inhofe.

Senator MERKLEY.

Senator MERKLEY. Thank you, Mr. Chairman. The Ranking Member noted this was a good exploration of public policy, and, Mr. Chairman, I would just like to ask you the question are we holding this hearing in order to gain the diverse perspectives and develop better public policy in this area?

Senator BARRASSO. Well, that is the goal.

Senator MERKLEY. Thank you.

I just want to note that I think this is extremely valuable. We have heard that these fuels create a carbon sink, and we have heard that they create more global warming gases. We have heard they damage engines; we have heard that they don't damage engines. We have heard that there is no misfueling problem and that there is a misfueling problem.

Just as we are having this exploration, it is incredibly important that we have this type of public process on any bill having a significant impact in America, and that is why I want to encourage my colleagues, all my colleagues on this Committee, Democratic and Republican, to insist that before a health care bill goes to the floor of the Senate, that it gets a full public hearing.

The current plan we have heard from the Republican leadership is to put that bill on the floor with no hearing, and that would be an extraordinary violation of due process, would shortchange American citizens, who have every right to see this bill and to comment on it; it would certainly shortchange the legislative process, in which all 100 Senators should be able to see that bill, weigh in with their constituents, hear their constituents' responses, test the ideas against the testimony of experts and against the opinions of their colleagues; and something affecting hundred millions of Americans should absolutely not be considered in the Senate without a hearing of this type and a chance to mark up the bill.

I hope my colleagues of both parties will agree and fight for that principle of legislative deliberation.

Now I want to turn to my first question to Mr. Coleman.

You referred to the fact that often you can create a biofuel that is a carbon sink, in which case it means it captures more carbon dioxide than it emits. Can you expand on that? Why is there such a big contrast between that point of view and the point of view expressed by another individual on the panel that says you are going to increase global warming gases?

Mr. COLEMAN. So, to clarify the witness to my left, Jonathan, he is making that claim about corn ethanol, and I will talk about that in a minute.

The carbon sink fuel cellulosic ethanol, the cellulosic ethanol that is coming out of the first round of commercial biorefineries, as I said, is anywhere from 85 to sort of 126 percent better than gasoline. What that essentially means is that in the process of making the fuel, as it absorbs CO₂ and sunlight, there is more CO₂ and energy going in from a carbon perspective than is emitted when that fuel is burned. And this is an independently certified pathway, and it is pretty extraordinary because a lot of the fuels that are regarded to be the most innovative, like electric drive, hydrogen fuel cells, etcetera, do not approach this level of carbon reductions. And if we are concerned about climate change, there is an opportunity with these high-end fuels to actually pull down on our carbon inventories.

On the corn ethanol side, and I don't represent that industry, I have to say that notwithstanding the fact that Jonathan and I are from the same town in Boston, we don't agree on this. If you look at the agencies that actually say corn ethanol is reductive, they include USDA, EPA, notwithstanding his statement, Department of Energy.

Sixty-five percent of the credits under the low carbon fuel standard in California are actually produced by the corn ethanol industry, and what the organization did was they cherry-picked data out of EPA data and changed the system boundary around what EPA did on corn ethanol to come up with their conclusion. And that is not the conclusion, by the way, that EPA actually had, which is that corn ethanol reduces carbon emissions.

Senator MERKLEY. And you are speaking lifecycle to lifecycle?

Mr. COLEMAN. Inclusive of indirect land use change, yes.

Senator MERKLEY. And, Mr. Lewis, you came to a different conclusion. If you could just, in one or two sentences, what is the huge difference here in your calculations?

Mr. LEWIS. The difference is that the analysis that EPA published, the analysis that Brooke is referring to, looks at a future hypothetical production scenario that begins in 2022 and assumes production technologies that have not been adopted by the industry. The analysis that we are looking at, that EPA also did, looked at current production technologies and found that there was a higher GHG emissions than from gasoline.

Senator MERKLEY. Mr. Coleman, you are shaking your head. What is the difference?

Mr. COLEMAN. I am shaking my head because in order for EPA to measure the carbon impact of biofuels, they had to go out into the future, because they wanted to do land use change. And to check land use change, you have to shock a model out into the future with a high level of biofuels. What EPA then said was, if we are going to go out into the future system boundary-wise, we are going to credit biorefining efficiency that we see every single year out into the future. It is either the future or the present.

What this organization did was they went out into the future on land use change and went to the present on biorefinery. So they picked the negatives out of the future and then picked the negatives out of the present, put them together and said, well, that is not as good. That is why there are system boundaries when you do scientific analysis, and that is a distorted outcome.

Senator MERKLEY. Thank you both.

Senator BARRASSO. Senator Fischer.

Senator FISCHER. Thank you, Mr. Chairman.

As a cattle rancher, I just can't let my dear friend, Senator Inhofe's, comments pass without me weighing in on what ranchers think about ethanol and ethanol plants and byproducts. As a cattle rancher, we have mother cows on our ranch. We live in the Nebraska Sand Hills, and we use, as our neighbors use, the byproducts from ethanol plants. We are also very fortunate in Nebraska, we bypass Texas, to my dear friends from Texas, with Cattle on Feed, and we do so because of those byproducts from ethanol plants. So there is a direct benefit to cattle ranchers, people in the livestock industry, and I wanted to point that out.

Before I begin my line of questioning, I would also like to bring to the Committee's attention two surveys that were conducted by Quadrant Strategies that illustrate consumers' knowledge and confidence about the different types of gasoline available to purchase. The first survey found that 96 percent of motorcyclists say it is easy to figure out the type of gasoline to put in their engines. The

second survey found that 94 percent of boat owners are confident that they know the right gasoline to use in their boats. And I too put my faith in consumers who can pick out the right kind of gasoline to put in their engines.

Mr. Chairman, I would ask unanimous consent to place these two surveys into the record.

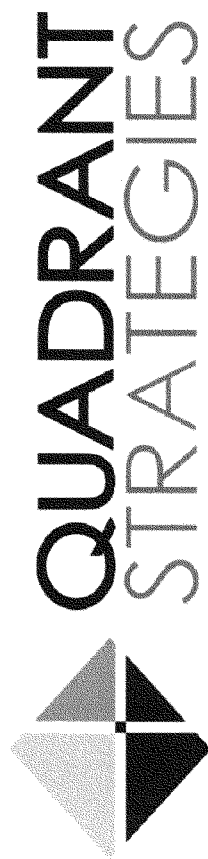
Senator BARRASSO. Without objection. I would note also that about 89 percent of all drivers consider themselves in the best one-third of all drivers.

[Laughter.]

Senator FISCHER. There again, Mr. Chairman, I am sure that Nebraska rated higher.

[Laughter.]

[The referenced information follows:]



June 2017 Growth Energy
Motorcyclists Poll Findings Deck



We surveyed motorcyclists across the United States

- ▶ We conducted a quantitative online poll from June 1 – June 3, 2017 among 500 randomly-selected motorcycle owners to understand their experiences filling up their engines with gasoline, as well as gauge the opinion of ethanol and reaction to facts about gas that contains ethanol.
- ▶ Motorcyclists interviewed use unleaded gasoline in their engines.
- ▶ The overall margin of error was +/- 4.38% and is smaller for sub-audiences.

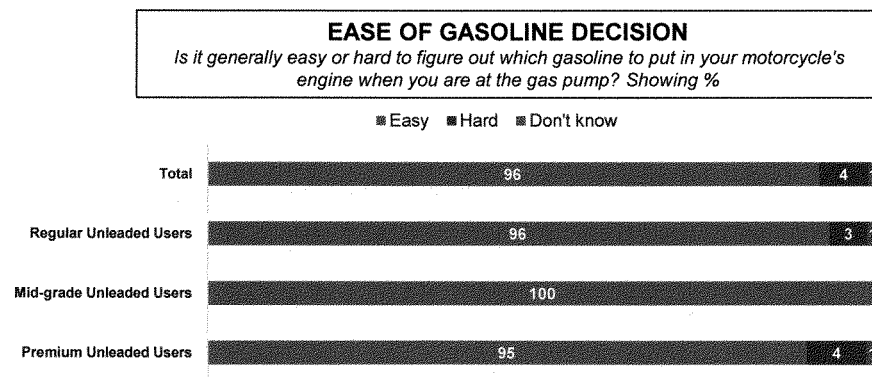
METHODOLOGY		
Audience	Sample Size	Margin of Error
Motorcycle owners nationwide	500	+/- 4.38%
Regular unleaded users	220	--
Mid-grade unleaded	56	--
Premium unleaded users	206	--

The findings could not be clearer:

1. **Gasoline-choice confusion is a virtually non-existent issue** for motorcyclists.
2. **Motorcyclists are almost universally satisfied with the gasoline they choose** – including Regular Unleaded, which contains 10% ethanol.
3. Almost all small engine owners – **nine out of 10 – want choice at the gas pump.**

Motorcyclists think it's a simple choice at the pump.

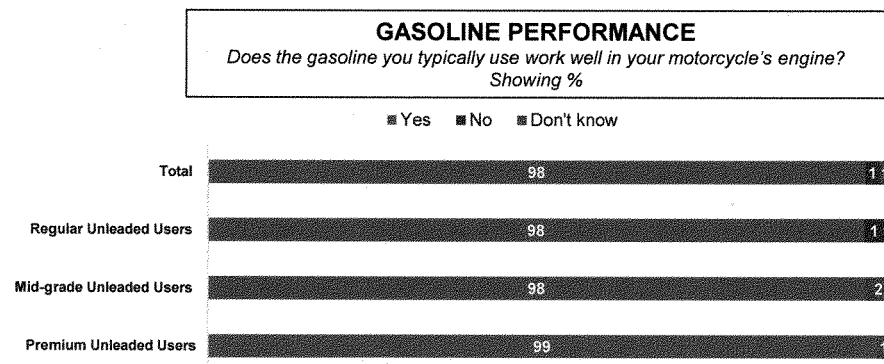
Almost all of them say it's easy to figure out the type of gas to put in their engine.



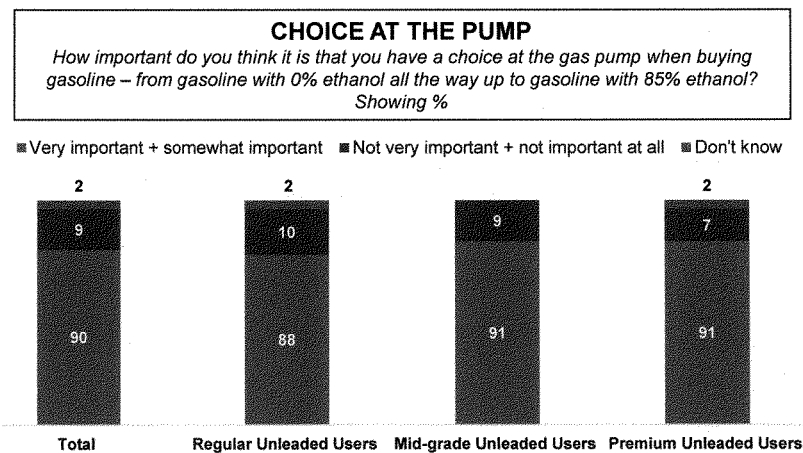
83

And the gasoline they use – including Regular Unleaded – is working well.

Nearly all are satisfied.



9 in 10 motorcyclists think it's important to have a choice at the pump.



85

Appendix: Messages

We gave them a number of facts about ethanol to consider.

FACTS WE TESTED	
Title	Full Text
American-made	Ethanol is an American-made biofuel, and using it in our gasoline means we are less dependent on foreign oil.
Cleaner air	Ethanol makes the air we breathe cleaner and reduces carbon emissions from engines by 43% or more.
Warranties	All major motorcycle manufacturers cover the use of gasoline with 10% ethanol in their warranties.
Octane booster	Ethanol is a high-powered octane booster for gasoline - pure ethanol has a 126-octane rating.
Replaces chemicals	Ethanol replaces chemicals in gasoline like MTBE, which contaminate water supplies and bodies of water where people fish.

Accurate information about how ethanol is American-made and has important environmental benefits makes them even more positive toward using ethanol. In particular:

- 1) Ethanol is an American-made biofuel
- 2) Ethanol makes the air we breathe cleaner and reduces emissions

FACTS ABOUT ETHANOL <i>Does knowing this make you think more positively or negatively about having 10% ethanol in regular unleaded gasoline?</i> <i>Showing % (much more positively + somewhat more positively)</i>				
	Total	Regular Unleaded Users	Mid-grade Unleaded Users	Premium Unleaded Users
American-made	85	87	80	85
Cleaner air	85	86	80	85
Warranties	79	82	79	78
Octane booster	78	78	71	80
Replaces chemicals	78	77	77	81

88

June 13, 2017

The Honorable Deb Fischer
U.S. Senate
454 Russell Senate Office Building
Washington, DC 20510

Dear Senator Fischer:

We appreciate your leadership and introduction of S. 517, the Consumer and Fuel Retail Choice act. As some of the nation's leading independent retail stores and the market leaders in the sales of E15, this legislation is vital so that we can merely offer a fuel consistently year-round. Without this important legislation, retailers are forced to change labeling and marketing of fuel twice a year at thousands of pumps across the country thoroughly confusing consumers and expanding potential opportunities for misfueling. Whether you agree or disagree about renewable fuels, our stores need immediate clarity so that we can offer a fuel that our customers want to purchase today.

Enactment of this legislation will level the playing field, reduce burdensome regulations without adverse environmental impact, and simply allow our stores to sell a legally approved fuel that we want to offer to our customers.

Sincerely,



CC: The Honorable John Barasso, Chairman, Senate Committee on Environment and Public Works

The Honorable Tom Carper, Ranking Member, Senate Committee on Environment and Public Works



TO: **Growth Energy**
 FROM: **Quadrant Strategies**
 DATE: April 12, 2017
 RE: Boaters poll findings memo

At the end of the last boating season (between August 11 and August 15, 2016), we conducted a poll of 500 randomly-selected boat owners across the United States. We asked about their knowledge of and confidence about using the different types of gasoline available to them for their boats.

METHODOLOGY		
Audience	Sample Size	Margin of Error
Boat owners nationwide	500	+/- 4.38%
Owens 1 boat	334	+/- 5.36%
Owens 2+ boats	166	+/- 7.61%
Owens boat < 5 years	216	+/- 6.67%
Owens boat > 5 years	282	+/- 5.84%

Here's what we found.

KEY DATA

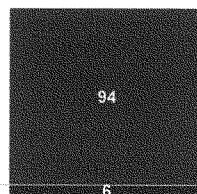
The poll reveals that boat owners know what they're doing when they go to fill up the tank. They aren't confused by the different gasoline options available to them.

1. **Almost unanimously boat owners are confident about knowing the right gas to use.** Over 90 percent are confident, not confused, at the gas pump.

CONFUSION AT THE PUMP (OVERALL)

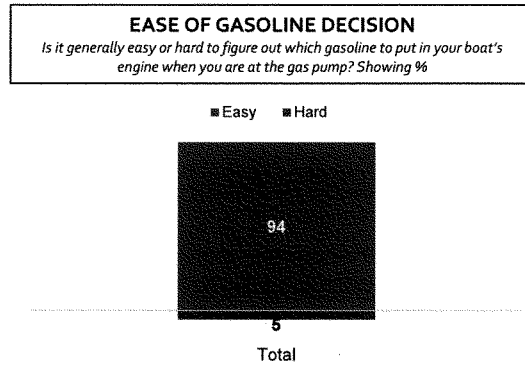
When you have been at the gas pump filling up your boat's engine, have you typically been confident that you know the right gasoline to use or have you typically been uncertain of which gasoline to use? Showing %

- I have typically been confident that I know the right gasoline to use
- I have typically been uncertain of which gasoline to use



Total

2. Also almost unanimously, they think figuring out which gasoline to use is easy.



U.S. Sen. Mike Rounds
Hart Senate Office Bldg., Suite 502
Washington, D.C. 20510

Monday, June 12, 2017

Dear Senator Rounds,

Thank you for cosponsoring S. 517, the Consumer and Fuel Retailer Choice Act. Due to your strong support and advocacy, the Senate Environment and Public Works (EPW) Committee will hold a hearing on S. 517 on June 14 and plans to mark up the legislation in July. Your leadership as a member of the EPW Committee continues to be essential to the success of this legislation.

In addition to allowing fuel retailers to give consumers a choice at the pump that saves them money, enhances vehicle performance and improves the environment, S. 517 also provides additional market access for agriculture during a time when net farm income has dropped 50 percent over four years. For South Dakota corn farmers, who currently sell over 300 million bushels of corn to produce over a billion gallons of renewable fuel production, removing a barrier that discourages many retailers from selling E15 is a no-cost means to increase grain demand that provides significant benefits to consumers as well. Ethanol is South Dakota's largest corn market.

As the EPW Committee considers S. 517 this summer, we ask that you oppose all amendments other Senators may offer to this bill and encourage your colleagues to do the same. The summer "low ozone" season commenced June 1, which means many retailers are currently being forced to pull E15 from their product offerings. Given the urgency of this issue, a clean legislative fix to the RVP barrier is imperative. S. 517 should be considered separate from other issues in order to maintain its narrow purpose and keep the focus on the technical fix under consideration.

Thank you again for your leadership on S. 517 and your commitment to move this legislation forward. Please do not hesitate to reach out to us, if we can help support your efforts in any way.

Sincerely,



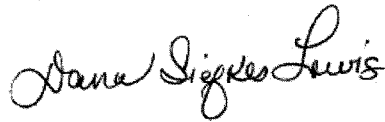
Lisa Richardson, executive director
South Dakota Corn Growers Association



Jeff Lautt, president
POET



Brian Jennings, executive vice president
American Coalition For Ethanol
Association



Dana Siefkes-Lewis, president
South Dakota Ethanol Producers



Bob Schmidt, senior vice president
Farm Credit Services of America



701 8th Street, NW, Suite 450, Washington, D.C. 20001
 PHONE: 202.545.4000 FAX: 202.545.4001

GrowthEnergy.org

June 13, 2017

Senator Joni Ernst
 111 Russell SOB
 Washington, DC 20510

Dear Senator Ernst,

On behalf of the Growth Energy Board of Directors and our retail partners across the country, I would like to thank you for supporting the Consumer and Fuel Retailer Choice Act (S. 517). You have been an incredible champion and advocate for the American ethanol industry, and our members are very appreciative of your unwavering support.

S. 517 fixes the Reid Vapor Pressure (RVP) waiver issue and gives fuel retailers across the country the freedom to provide their consumers with a consistent, year-around fueling option that is lower cost, higher performing, and better for the environment. Consumers are discovering E15 and choosing it for their vehicles. By passing S. 517, fuel retailers can choose to expand their customer offerings during the summer months, and consumers will be able to confidently choose from a consistent variety of fueling options year around.

Your support has made an impactful difference, and we need your assistance to push RVP across the finish line. The need for the RVP waiver for E15 is becoming more urgent and crucial. Currently, 876 fuel retail locations in 29 states offer E15 to their customers, and we expect this rapidly growing market to reach 1,100 locations by the end of 2017 and 2,000 locations by 2018. Your help is vital to fixing the RVP issue once and for all.

We greatly appreciate all of your help and look forward to continue working with you in the upcoming weeks. Please let me know if you need any additional information and thank you again for your support.

Sincerely,

Emily Skor, CEO
 Growth Energy

Cc:
 Senator Deb Fischer (R-NE)
 Senator Jerry Moran (R-KS)
 Senator Mike Rounds (R-SD)
 Senator Tammy Duckworth (D-IL)

June 13, 2017

U.S. Senator Joni Ernst
111 Russell Senate Office Building
Washington, DC 20510

Dear Senator Ernst,

Thank you for cosponsoring S. 517, the Consumer and Fuel Retailer Choice Act. Due to your strong support and advocacy, the Senate Environment and Public Works (EPW) Committee will hold a hearing on S. 517 on June 14 and we hope will markup the legislation in July. Your leadership as a member of the EPW Committee continues to be essential to the success of this legislation.

As you know, E15 is a safe, clean and low-cost fuel which can be used in 9 out of every 10 cars on the road today. But due to a burdensome regulation this fuel is blocked from being sold in from June 1 through September 15 each year in most of the country.

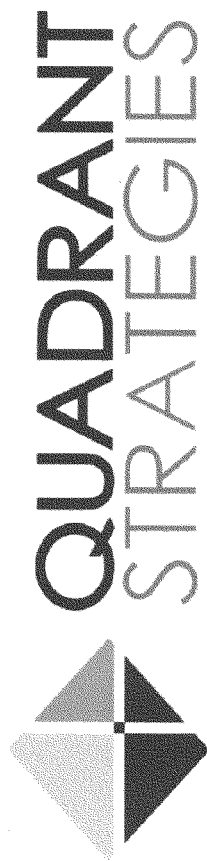
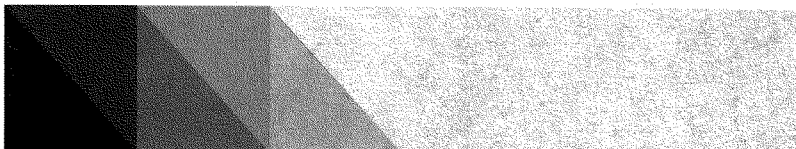
This common-sense legislation allows fuel retailers the ability to give consumers a choice at the pump that saves them money and enhances vehicle performance while improving the environment. S. 517 also provides additional market access for agriculture during a time when net farm income has dropped 50 percent over four years. For corn farmers, who currently sell one-third of their crop for renewable fuel production, removing a barrier that discourages many retailers from selling E15 is a no-cost means to increase grain demand that provides significant benefits to consumers as well.

As the EPW Committee considers S. 517 this summer, we ask that you oppose all amendments other Senators may offer to this bill and encourage your colleagues to do the same. Because S. 517 amends the Clean Air Act, we are concerned this narrow RVP correction may draw amendments on a variety of other issues. S. 517 should be considered separate from other issues in order to maintain its narrow purpose and keep the focus on the technical fix under consideration.

Thank you again for your leadership on S. 517 and your commitment to move this legislation forward. We support this legislation and your efforts to steer it through committee consideration. Please do not hesitate to reach out to us if we can help support your efforts in any way.

Sincerely,

Absolute Energy, LLC	Kemin Industries, Inc.
AgVantage FS, a division of GROWMARK, Inc.	Kum & Go
Archer Daniels Midland	Kwik Trip/Kwik Star
Aspinwall Coop	Lakeview Plymouth Energy
Bamboo Ridge Campground, Inc.	Lincolnway Energy, LLC
Becks Hybrids	Little Sioux Corn Processors, LLLP
Big River Resources, LLC	Mid-Iowa Cooperative
C&N Ethanol Marketing	Monsanto
CORN, LP	Music Station Inc.
Cresco Fast Stop	New Century Farm Service
Deere and Company	Pine Lake Corn Processors
Diamond Oil Co.	POET Biorefining – Ashton
Dick's Petroleum Company	POET Biorefining – Coon Rapids
Dyno Oil Co., Inc.	POET Biorefining – Corning
Elite Octane, LLC	POET Biorefining – Emmetsburg
Farm Credit Services of America	POET Biorefining – Gowrie
Farmers Arcadia Cooperative Elevator Co.	POET Biorefining – Hanlontown
Fuel Time	POET Biorefining – Jewell
Golden Grain Energy	POET-DSM Advanced Biofuels
Good & Quick	Quad Country Corn Processors
Green Plains Inc.	Renewable Energy Group, Inc.
Heller Implement	Siouxland Energy Cooperative
Homeland Energy Solutions	Southwest Iowa Renewable Energy
Innovative Ag Services	STAR Energy FS, a division of GROWMARK, Inc.
Iowa Bankers Association	Sundstop II LLC
Iowa Biodiesel Board	The Andersons Denison Ethanol LLC
Iowa Biotechnology Association	The Depot Express
Iowa Corn Growers Association	Two Rivers Cooperative
Iowa Farm Bureau Federation	United Farmers Cooperative
Iowa Institute of Cooperatives	W & H Cooperative Oil Company
Iowa-Nebraska Equipment Dealers Association	Waukon Feed Ranch, Inc.
Iowa Renewable Fuels Association	Western Dubuque Biodiesel
Iowa Soybean Association	Western Iowa Energy, LLC



June 2017 Growth Energy
Small Engine Poll Findings Deck



We surveyed small-engine machine owners across the United States

- ▶ We conducted a quantitative online poll from June 1 – June 3, 2017 among 500 randomly-selected small-engine machine owners to understand their experiences filling up their machines with gasoline, as well as gauge the opinion of ethanol and reaction to facts about gas that contains ethanol.
- ▶ Over 90% of small-engine machine owners interviewed use unleaded gasoline in their engines.
- ▶ The overall margin of error was +/- 4.38% and is smaller for sub-audiences.

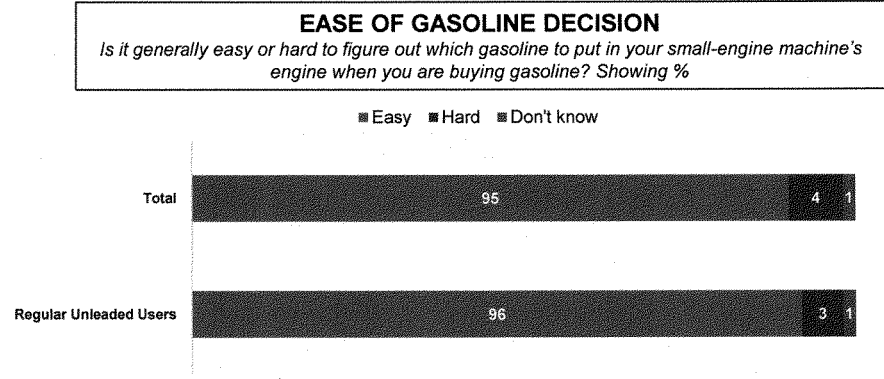
86

METHODOLOGY		
Audience	Sample Size	Margin of Error
Small-engine owners nationwide	500	+/- 4.38%
Regular unleaded users	453	--

The results are crystal clear:

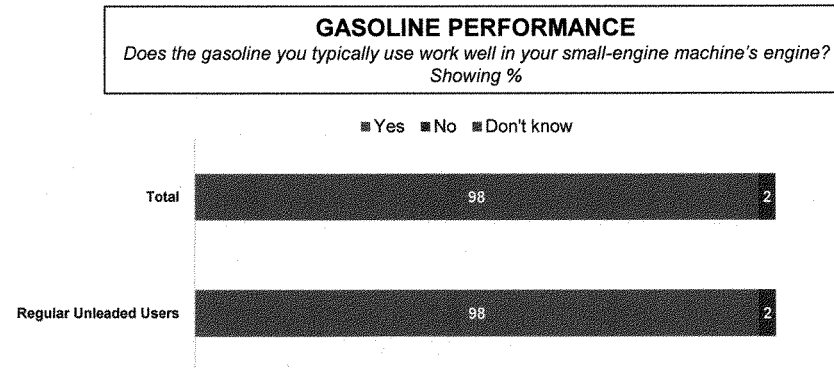
1. **Small engine machine owners aren't confused at all about which gasoline to use** – almost all say it's an easy decision.
2. **And virtually all of their machines are working well on the gasoline they use** – including Regular Unleaded containing 10% ethanol.
3. **Almost all small engine owners – nine out of 10 – want choice at the gas pump.**

Almost all small-engine owners say its easy to figure out which gasoline to use.

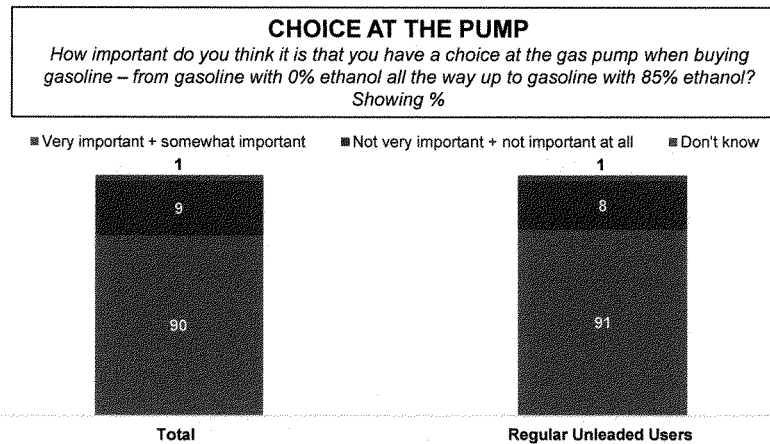


And the gasoline they choose is working well – including Regular Unleaded.

Nearly all are satisfied.



Plus 9 in 10 owners think it's important to have a choice at the pump.



Appendix: Messages

We gave them a number of facts about ethanol to consider.

FACTS WE TESTED	
Title	Full Text
Cleaner air	Ethanol makes the air we breathe cleaner and reduces carbon emissions from engines by 43% or more.
American-made	Ethanol is an American-made biofuel, and using it in our gasoline means we are less dependent on foreign oil.
Warranties	All major small-engine machine manufacturers cover the use of gasoline with 10% ethanol in their warranties.
Replaces chemicals	Ethanol replaces chemicals in gasoline like MTBE, which contaminate water supplies and bodies of water where people fish.

Accurate information about how ethanol has important environmental benefits and is American-made makes them even more positive toward using ethanol. In particular:

- 1) Ethanol makes the air we breathe cleaner and reduces emissions
- 2) Ethanol is an American-made biofuel

FACTS ABOUT ETHANOL <i>Does knowing this make you think more positively or negatively about having 10% ethanol in regular unleaded gasoline?</i> <i>Showing % (much more positively + somewhat more positively)</i>		
	Total	Regular Unleaded Users
Cleaner air	88	88
American-made	88	89
Warranties	85	85
Replaces chemicals	78	78



June 12, 2017

The Honorable Tammy Duckworth
United States Senator
524 Hart Senate Office Building
Washington, DC 20510

Dear Senator Duckworth

Thank you for cosponsoring S. 517, the Consumer and Fuel Retailer Choice Act. Due to your support, the Senate Environment and Public Works (EPW) Committee will hold a hearing on this bill on June 14 and plans to markup the legislation in July. The National Corn Growers Association (NCGA) appreciates your leadership on this issue in the EPW Committee.

With support from corn farmers and state corn associations, NCGA has made investments in fuel infrastructure and in promotion of higher ethanol blends, helping retailers offer more choices to consumers, including E15. S. 517 would remove an unnecessary barrier to selling those fuels year-round.

In addition to allowing fuel retailers to give consumers a choice at the pump that saves them money, enhances vehicle performance and improves the environment, S. 517 will help support additional market access for agriculture during a time when net farm income has dropped 50 percent over the past four years and corn prices have fallen to levels well below average. For corn farmers, who currently sell one-third of their crop for renewable fuel production, eliminating a barrier that discourages many retailers from selling E15 is a no-cost means to increase agriculture demand that provides significant benefits to consumers as well.

As the EPW Committee considers S. 517 this summer, we ask that you oppose all amendments other Senators may offer to this bill and encourage your colleagues to do the same. Because S. 517 amends the Clean Air Act, we are concerned this narrow RVP correction may draw amendments on a variety of other issues. We ask that S. 517 be considered separate from such other issues in order to maintain its narrow purpose and keep the focus on the technical fix under consideration.

Thank you again for your leadership on S. 517 and your work to move this legislation forward. NCGA supports S. 517 and your efforts.

Sincerely,

A handwritten signature in dark ink, appearing to read "Wesley Spurlock". The signature is fluid and cursive, with the first and last names being the most prominent.

Wesley Spurlock, President
National Corn Growers Association



June 14, 2017

The Honorable John Barrasso
Chairman
Committee on Environment and Public Works
U.S. Senate

The Honorable Thomas Carper
Ranking Member
Committee on Environment and Public Works
U.S. Senate

Dear Chairman Barrasso and Ranking Member Carper:

The Renewable Fuels Association (RFA) enthusiastically supports S. 517, legislation that would extend the Reid vapor pressure (RVP) waiver to ethanol blends above 10 percent. Ethanol is the lowest cost, cleanest and highest octane source of fuel on the planet. Greater consumer access to higher level blends like E15 (15% ethanol) remains our top priority and we are committed to working with leaders in Congress to make that a reality.

E15 is legally approved for use in all vehicles built since 2001, meaning E15 is an approved fuel for more than 90% of the cars, trucks and SUVs on the road today. Further, more than 80% of 2017 model-year cars and light trucks have been explicitly approved by the automakers to use E15. E15 is currently sold at approximately 700 retail gas stations in 29 states. It is estimated that more than 750 million trouble-free miles have been driven on E15 since its commercial introduction in 2012.

Major retailers like Thornton's, Kum & Go, Sheetz, Murphy USA, and RaceTrac already offer the fuel blend. And in 2016, HWRT Oil Company became the first terminal operator to offer pre-blended E15 at wholesale terminals in Illinois, Indiana, and Arkansas.

The biggest remaining obstacle to E15 growth is the inequitable application of gasoline vapor pressure regulations. The U.S. Environmental Protection Agency's (EPA) current regulations have created an un-level playing field for E15 and other higher-level blends. Many gasoline retailers have rejected E15 because EPA's current RVP regulations make it nearly impossible for them to sell E15 to EPA-approved conventional automobiles year-round. Most gas stations are not willing to dedicate storage tank space and dispensing equipment to a fuel that they can only sell for part of the year. Resolving the issue of RVP parity for E15 will remove the regulatory barrier that currently hinders stations from offering year-round access to E15 and other higher level ethanol blends.

Ensuring RVP parity for E15 is our industry's highest priority. The RFA encourages the Committee to expeditiously pass S. 517 to extend the existing RVP waiver to E15.

Sincerely,

A handwritten signature in black ink, appearing to read "Bob Dinneen".

Bob Dinneen
President & CEO

June 12, 2017

The Honorable John Barrasso
U.S. Senate Environment and
Public Works Committee
Majority Office
410 Dirksen Senate Office Building
Washington, DC 20510

The Honorable Tom Carper
U.S. Senate Environment and
Public Works Committee
Minority Office
456 Dirksen Senate Office Building
Washington, DC 20510

Dear Chairman Barrasso and Ranking Member Carper:

On behalf of the advanced and cellulosic biofuel industry and our respective companies and organizations, we are writing to ask for your support for the Consumer and Fuel Retailer Choice Act (S. 517), which is scheduled to be marked up in the Environment and Public Works Committee before the August recess.

Under current law, despite being better for the environment and more affordable, fuels containing 15 percent ethanol (E15) cannot be sold during the summer driving season in many states due to an outdated federal policy. In 1990, Congress limited the amount of evaporative emissions from vehicle fuel at 9 pounds per square inch (psi) Reid Vapor Pressure (RVP). Pure ethanol has a 3 psi RVP, but when low levels of ethanol are combined with gasoline, the RVP of the fuel exceeds the 9 psi limit. At the time, Congress specified that fuel with 10 percent ethanol (E10) would receive a 1 psi RVP waiver, in recognition of E10's overall lower emissions profile. Regrettably, this waiver only applies to E10, even though E15 has a lower RVP profile and a lower overall emissions profile. The Consumer and Fuel Retailer Choice Act will support this more environmentally-friendly fuel and extend the RVP waiver to ethanol blends above 10 percent.

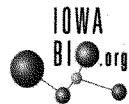
This legislation is vital to the advanced biofuels industry, which is making significant progress in expanding production of advanced and cellulosic biofuels. In just the last three years, 33 biorefineries began producing cellulosic biofuels. By definition, these fuels must achieve at least 60 percent fewer emissions than gasoline. Yet, according to DOE and EPA many of these refineries are producing fuels that reduce life-cycle transportation emissions by well over 90 percent.

Currently EIA estimates that gasoline demand to be 143 billion gallons for 2017. By allowing E15 to be sold year round, more retailers will offer E15 and we can create marked headroom for our next generation fuels. While we continue to support the RFS in its entirety, we also recognize that in order to fully unleash the potential of second generation fuels we must find a pathway for consumers to gain access at the pump.

Fixing the RVP issue will ensure that E15 can be sold year round in any state where E15 is approved, and gives our advanced and cellulosic fuels an opportunity to compete at the pump. It is important to note, that nothing about this legislation requires or mandates that E15 be sold by a retailer – it is entirely that retailer's choice. Moving to E15 not only reduces the cost of gasoline by 5 to 15 cents per gallon, but also lowers emissions harmful to the environment. Recent analysis from the Biotechnology Innovation Organization indicates that during the summer months alone E15 can reduce GHGs equivalent to taking 2.1 million vehicles off the road. In addition to the environmental benefits, the Energy and Environmental Studies Institute states that E15 can lower the public health impacts from transportation emissions, including reducing risks associated with cancer and asthma. Moreover, last year the U.S. sent \$159 billion out of the country to pay for foreign crude oil.

We ask you to stand with advanced biofuels and with clean energy to enable us to further reduce harmful emissions. Please support the Consumer and Fuel Retailer Choice Act (S. 517).

Sincerely,







GHG Benefits of the Consumer and Fuel Retailer Choice Act

- **Over the next 10 years, summer use of E15 can save between 7 million and 10.4 million metric tons of CO2 equivalent GHG emissions.**
- **The savings are equal to taking 1.4 million to 2.2 million cars off the road over the 10-year period.**
- **If this legislation encourages more U.S. fuel retailers to offer consumers higher ethanol blends, the greenhouse gas emission savings will increase.**

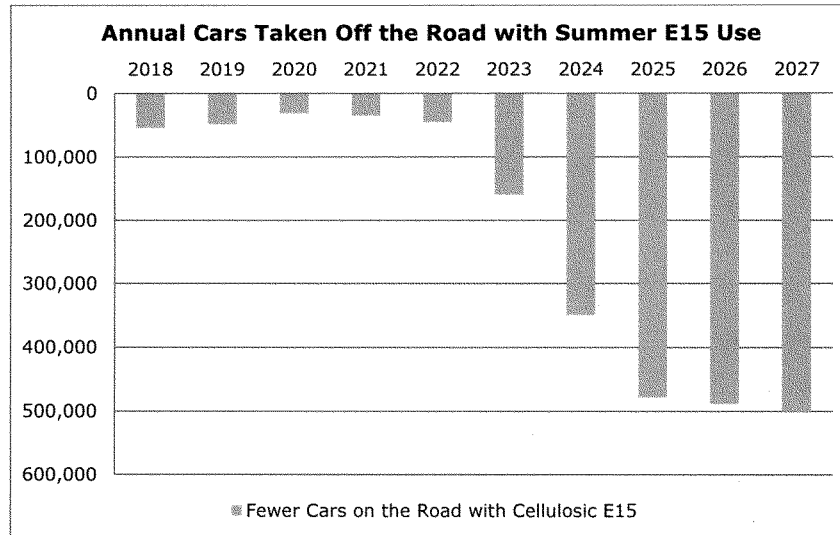
Gasoline evaporation contributes to ozone formation. Under current law, evaporative emissions from gasoline are limited during summer months, from June 1 through mid-September to prevent ozone formation. In primarily large, urban areas that are not in attainment of National Ambient Air Quality Standards (NAAQS) evaporative emissions and gasoline are even more strictly regulated.

Ethanol burns cleanly, decreasing engine tailpipe emissions. The standard gasoline blend containing 10 percent ethanol (E10) therefore earns a small waiver of the measure of gasoline volatility (Reid vapor pressure, or RVP) that relates to evaporative emissions limits. Fifteen percent ethanol (E15) blends reduce both evaporative and tailpipe emissions compared to E10 but don't qualify for the waiver because Congress's 1990 amendments to the federal Clean Air Act specify E10.

The Consumer and Fuel Retailer Choice Act of 2017 will extend E10's RVP waiver to mid-range ethanol blends, enabling gas stations to sell E15 during summer months. In addition to reducing tailpipe emissions, E15 use will reduce greenhouse gas emissions (GHG) by displacing additional fossil fuel use.

Over the next 10 years (2018-2027), summertime use of E15 can save a minimum of 7 million to 10.4 million metric tons of CO2 equivalent GHG emissions.

The savings are equal to taking 1.4 million to 2.2 million cars off the road over the 10-year period.



In calculating this estimate, BIO developed a baseline scenario of transportation fuel use from the U.S. Energy Information Administration's (EIA) 2017 Annual Energy Outlook. EIA projects transportation fuel use to fall steadily between 2018 and 2027. EIA also projects ethanol use in transportation to decline, but at a slower rate than gasoline use. In EIA's annual projections, reported gasoline use represents E10, the average fuel blend sold in the United States. The agency also expects use of E85 blends (51 to 83 percent ethanol) in flex fuel vehicles to increase, particularly after 2020.

EIA does not publish estimates of E15 use. Nevertheless, the agency estimates increased use of ethanol in transportation fuel between 2018 and 2027 that is not accounted for in its projections of gasoline (E10) and E85 use. This additional ethanol use is assumed to represent mid-range blends such as E15 within overall gasoline use.



To model the impacts of allowing summertime use of E15 and other mid-range blends, BIO calculates EIA's projection of additional ethanol use to increase slightly and to displace gasoline blendstock. EIA's projection of ethanol use not accounted for as E10 or E85 is increased by a factor of 1.4 to represent the additional 3.5 months (June-mid-September) during which mid-range ethanol blends currently are not sold. Gasoline blendstock use is decreased by an equivalent amount.

Greenhouse gas emissions for each fuel type are calculated using well-to-wheels estimates (WTW) from Argonne National Labs' Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation Model (GREET1.2016). Ethanol from corn stover, switchgrass and miscanthus have lower WTW scores than corn ethanol. The low end of the range of greenhouse gas savings presented in this study is calculated by estimating all additional ethanol use to come from corn; the high end of the range represents use of corn stover ethanol.

If this legislation encourages more U.S. fuel retailers to offer consumers mid-range ethanol blends, the greenhouse gas emission savings will increase. The legislation could encourage fuel retailers to install blending equipment and more aggressively market mid-range ethanol and E85 blends, resulting in additional ethanol use year round.

Senator FISCHER. Mr. Lorenz, I would like to thank you for being here today. In your testimony you discussed how this bill would alleviate what I think you and I both agree is kind of nonsensical regulatory barriers that prevent consumers from choosing the fuel that they want to use in their vehicles during the summer months. Can you please explain to me the process your stores must undertake to comply with this barrier during the current summer fueling season?

Mr. LORENZ. Absolutely, Senator. So we currently have, as I mentioned, 190 stores, and that has continued to grow, with an average of five dispensers per store. So before June 1st this year we had to replace almost 2,000 stickers or labels on all those dispensers; five dispensers, 190 stores, both sides.

Senator FISCHER. And do you believe that the current treatment of E15 limits consumer choice?

Mr. LORENZ. Absolutely. Here you have a product that is perfectly fine for eight and a half months out of the year, but for an antiquated regulation you can't sell it for three and a half months out of the year. I know of no other product on the market that falls into that category.

Senator FISCHER. I thank you for your support of the bill and for consumer choice. So thank you.

I assume that you talk to other E15 retailers around the Country on a fairly regular basis. Do they share your views with this regulatory issue?

Mr. LORENZ. Oh, absolutely. All the same.

Senator FISCHER. And we hear a lot in this debate on the impact this would have on small engines, off-road engines. Can you tell me what percentage of fuel sold nationwide goes into these engines?

Mr. LORENZ. I know the combination between small engines, boats, and motorcycles is about 3 percent. Well, let's say E0 would be 3 percent.

But I think just to add, if I may, Senator, our customers consist of homeowners, motorcyclists, boat owners, and we have no incidents, having sold this product for almost 2 years, we have no problems with misfueling. To your point about the surveys, people know what to put in their boat, car, small engine, motorcycle.

Senator FISCHER. As followup, do you believe consumers can continue to correctly choose the right fuel for their engines?

Mr. LORENZ. Absolutely. You know, for eight and a half months out of the year, again, we assume they can, and now for this reason we are saying for three and a half months out of the year there is this concern that they are not going to be able to select the right choice. So it doesn't make any sense to me.

Senator FISCHER. I agree with you.

Are you concerned about any liability on misfueling?

Mr. LORENZ. We guaranty all the gas that we sell, so if there was a problem caused by the fuel that we sold you, we are going to make it right and fix it.

Senator Fischer Good. Thank you, sir.

Thank you, Mr. Chairman.

Senator BARRASSO. Thank you very much for your questions.

It seems that there were a number of Democrats who were here, and none of them are back right now, Senator Carper, so with that

I am going to head back to the Republican side for questions and turn to Senator Rounds.

Senator ROUNDS. Thank you, Mr. Chairman. Just a couple of thoughts.

Mr. Lorenz, the corn ethanol industry in South Dakota has a huge amount of support within our population.

Before I go on, I guess I would like to submit to the record a letter of support for S. 517 from the South Dakota Corn Growers.

Senator BARRASSO. Without objection.

[The referenced information follows:]

June 12, 2017

The Honorable John Barrasso
U.S. Senate Environment and
Public Works Committee
Majority Office
410 Dirksen Senate Office Building
Washington, DC 20510

The Honorable Tom Carper
U.S. Senate Environment and
Public Works Committee
Minority Office
456 Dirksen Senate Office Building
Washington, DC 20510

Dear Chairman Barrasso and Ranking Member Carper:

On behalf of the advanced and cellulosic biofuel industry and our respective companies and organizations, we are writing to ask for your support for the Consumer and Fuel Retailer Choice Act (S. 517), which is scheduled to be marked up in the Environment and Public Works Committee before the August recess.

Under current law, despite being better for the environment and more affordable, fuels containing 15 percent ethanol (E15) cannot be sold during the summer driving season in many states due to an outdated federal policy. In 1990, Congress limited the amount of evaporative emissions from vehicle fuel at 9 pounds per square inch (psi) Reid Vapor Pressure (RVP). Pure ethanol has a 3 psi RVP, but when low levels of ethanol are combined with gasoline, the RVP of the fuel exceeds the 9 psi limit. At the time, Congress specified that fuel with 10 percent ethanol (E10) would receive a 1 psi RVP waiver, in recognition of E10's overall lower emissions profile. Regrettably, this waiver only applies to E10, even though E15 has a lower RVP profile and a lower overall emissions profile. The Consumer and Fuel Retailer Choice Act will support this more environmentally-friendly fuel and extend the RVP waiver to ethanol blends above 10 percent.

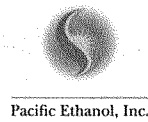
This legislation is vital to the advanced biofuels industry, which is making significant progress in expanding production of advanced and cellulosic biofuels. In just the last three years, 33 biorefineries began producing cellulosic biofuels. By definition, these fuels must achieve at least 60 percent fewer emissions than gasoline. Yet, according to DOE and EPA many of these refineries are producing fuels that reduce life-cycle transportation emissions by well over 90 percent.

Currently EIA estimates that gasoline demand to be 143 billion gallons for 2017. By allowing E15 to be sold year round, more retailers will offer E15 and we can create marked headroom for our next generation fuels. While we continue to support the RFS in its entirety, we also recognize that in order to fully unleash the potential of second generation fuels we must find a pathway for consumers to gain access at the pump.

Fixing the RVP issue will ensure that E15 can be sold year round in any state where E15 is approved, and gives our advanced and cellulosic fuels an opportunity to compete at the pump. It is important to note, that nothing about this legislation requires or mandates that E15 be sold by a retailer – it is entirely that retailer's choice. Moving to E15 not only reduces the cost of gasoline by 5 to 15 cents per gallon, but also lowers emissions harmful to the environment. Recent analysis from the Biotechnology Innovation Organization indicates that during the summer months alone E15 can reduce GHGs equivalent to taking 2.1 million vehicles off the road. In addition to the environmental benefits, the Energy and Environmental Studies Institute states that E15 can lower the public health impacts from transportation emissions, including reducing risks associated with cancer and asthma. Moreover, last year the U.S. sent \$159 billion out of the country to pay for foreign crude oil.

We ask you to stand with advanced biofuels and with clean energy to enable us to further reduce harmful emissions. Please support the Consumer and Fuel Retailer Choice Act (S. 517).

Sincerely,





June 13, 2017

The Honorable Deb Fischer
U.S. Senate
454 Russell Senate Office Building
Washington, DC 20510

Dear Senator Fischer:

We appreciate your leadership and introduction of S. 517, the Consumer and Fuel Retail Choice act. As some of the nation's leading independent retail stores and the market leaders in the sales of E15, this legislation is vital so that we can merely offer a fuel consistently year-round. Without this important legislation, retailers are forced to change labeling and marketing of fuel twice a year at thousands of pumps across the country thoroughly confusing consumers and expanding potential opportunities for misfueling. Whether you agree or disagree about renewable fuels, our stores need immediate clarity so that we can offer a fuel that our customers want to purchase today.

Enactment of this legislation will level the playing field, reduce burdensome regulations without adverse environmental impact, and simply allow our stores to sell a legally approved fuel that we want to offer to our customers.

Sincerely,



CC: The Honorable John Barasso, Chairman, Senate Committee on Environment and Public Works

The Honorable Tom Carper, Ranking Member, Senate Committee on Environment and Public Works

PRIME THE PUMP FUND

PRIME THE PUMP FUND
 15210 103rd Street
 West Burlington, Iowa 52655

June 13, 2017

The Honorable Deb Fischer
 U.S. Senate
 454 Russell Senate Office Building
 Washington, DC 20510

Dear Senator Fischer,

I am writing in response to the recent letter submitted by the Petroleum Marketers Association of America (PMAA) to clarify some of their claims regarding E15 and the Consumer Fuel and Retailer Choice Act (S. 517).

Prime the Pump understands that this legislative change would enable the free market to operate as intended, and as such, we fully support the Consumer Fuel and Retailer Choice Act. Treating E15 the same as any other fuel in the United States enables retailers to evaluate adding the new fuel as an option based on the merits of the fuel, and this legislation would not be a mandate for any retailer to offer E15. This is no different than fuel retailers who decide to offer additional non-gasoline fuels like diesel and/or flex fuels like E85.

Prime the Pump has been working closely with more than 10 of the largest retail chains in the nation along with hundreds of single store owners to help expand the availability of E15 to drivers across the country. Collectively, these fuel retailers represent more than 14 percent of the total gasoline sold in the United States. Based on our actual experience, and based on Environmental Protection Agency (EPA) regulations, the PMAA letter makes several incomplete and inaccurate statements regarding equipment compatibility with E15.

First, EPA requires that equipment storing and dispensing E15 be either UL Listed or compatible per manufacturer warranty.

PMAA only disclosed a portion of the necessary EPA requirements. Wayne and Gilbarco are the two most dominant dispenser manufacturers in the United States with market share at more than 90 percent. Based on EPA guidelines, all Wayne dispensers currently in service through the United States carry a warranty for dispensing E15. In addition, all Gilbarco dispensers installed during 2008 and newer carry a warranty for E15.

As for underground storage, the EPA guidelines for storing higher ethanol blends recognizes manufacturer warranties for compatibility. The Petroleum Institute has a public library where these warranties can be accessed. Per the database, most all existing steel storage tanks in service today are compatible with higher ethanol blends like E15. In fact, these documents also mirror our experience helping hundreds of single store owners with adding E15 as a product. Typically, when a retailer does add a tank it is a business decision by the owner to offer more fuel choices to their consumer.

During 2015 and 2016 most of the retailers adding E15 were also adding E85. Because the retailer made the business decision to invest and expand by adding multiple customer choices at the pump,

some groups have tried to use this information to distort the true cost of just adding E15 to a fuel site. In fact, recently, we've worked with retailers adding E15 to hundreds of locations without needing to change underground storage tanks, storage components, or dispensers.

We have worked on more than 800 installations of E15, frequently with single store third generation owners, and all our retail installations meet federal, state, and local regulatory requirements. In addition, we are not aware of a single incident regarding losing liability insurance. In fact, according to Federated Insurance, the largest liability insurance provider for the retail industry, assuming the retailer follows all federal requirements, their existing policy covers liability associated with E15 and the risk is no greater than other fuels they offer.

As for "exclusive" grants that cover the expense of installing E15, in 2016 the United States Department of Agriculture announced the Biofuels Infrastructure Partnership program. Under this program, the USDA made available \$100 million to any retailer interested in adding E15 and/or E85 to their retail locations. This grant program was open to all retailers nationwide, and we are not aware of any exclusive terms only offered to select retailers. All retailers, including PMAA members were eligible for this grant.

In conclusion, Prime the Pump believes that this bill simply gives retailers the choice of offering E15 to their customers year-round. This bill does not mandate the sale of E15 or force any retailer into spending money on infrastructure. Rather, it enables the free market to work as intended.

Thank you for your consideration.

Regards,

Raymond E. Defenbaugh
Chairman
Prime the Pump Fund
15210 103rd Street
West Burlington, Iowa 52655

Office Telephone: 319-753-1100
Mobile Telephone: 309-221-4681
Email: ray.defenbaugh@bigriverresources.com

CC: The Honorable John Barasso, Chairman, Senate Committee on Environment and Public Works
The Honorable Tom Carper, Ranking Member, Senate Committee on Environment and Public Works



PRIME THE PUMP FUND
15210 103rd Street, West Burlington, Iowa 52655

Senator ROUNDS. Thank you, Mr. Chairman.

The corn ethanol industry in South Dakota employs literally tens of thousands of South Dakotans, and it really is a pillar of our State's economy. We have the capability of producing nearly a billion gallons of this product per year. As the market for ethanol increases, the market for corn will grow, and that means more jobs and increased revenue for corn farmers, many of whom work on their own family owned farms.

There is a byproduct, the dry distillers grain and the wet distillers grain, which I think you find in the upper Midwest we all recognize as being a very high quality food product for livestock. We call it, in some cases, Dakota gold, and we market it not only in South Dakota, but to dairy farmers throughout the Country. California even brings it in, so it is a high quality product. And the more ethanol we produce, the more of the byproducts we also have available as well. So it isn't necessarily a matter of losing food production to the production of alcohol.

I am just curious, Mr. Lorenz, when you look at this particular legislation that is in front of us, where we go from 10 to 15, don't you think that what we are really doing is just taking out a whole lot of red tape so we can sell basically the same or very similar product throughout the year?

Mr. LORENZ. Absolutely. Like I have said before, we have the ability to sell this product for eight and a half months out of the year, and it is purely, in our view, a technicality and an antiquated regulation that doesn't allow us to sell it during the summertime.

Senator ROUNDS. Between E10 or 10 percent blend of an ethanol with gasoline versus a 15 percent blend, would there be a change in price? Would you expect a change in price?

Mr. LORENZ. We currently offer E15, so I just want to make it clear that in all the stores that we have E15, we also sell E10. So you have a choice, and this is what it is all about for us, is giving the consumer a choice. So we typically sell that from 3 to 5 cents a gallon, currently 5 cents a gallon less than 87. So it is not only more affordable; it is higher octane and cleaner burning, which appeals to the consumer.

Senator ROUNDS. And I think that is important to point out. I think it is fair to say that most people, I think, would assume that if you have a higher octane fuel, you have a better fuel. Would that be fair to say as not only a belief, but perhaps found in fact?

Mr. LORENZ. The consumer equates higher octane with better performance, which is true. And they also equate that with higher price. The thing about E15 is it is actually breaking down the consumer's paradigm on fuel on two levels, because you have a fuel that is not only cheaper, but also cleaner burning. And typically a consumer would expect to pay more for a fuel that is higher octane and more environmentally friendly, and that is not the case with E15.

Senator ROUNDS. Ms. Yanowitz, I am just curious. The last statement in your testimony you say, "Data indicates that replacing E10 with an E15 of the same vapor pressure will cause a slight decrease in emissions of ozone-forming organic compounds and carbon monoxide." Can you elaborate on that statement?

And I would just like you to answer one other question for me as well, and that is I am really curious, I always thought that alcohol was alcohol and, by definition, would have a similar formula. Can you share any thoughts? And I know that Mr. Teske had suggested the change in ethanol from a sugar cane base versus a corn base. Is there actually differences in terms of the chemical compounds between the two of them?

Ms. YANOWITZ. You are quite right, ethanol is ethanol wherever it is, but in Brazil they use some hydrous ethanol that has water in it, and there could be differences in emissions, for example,

Senator ROUNDS. OK. When we talk about the value, the ability to determine octane, and for this, Brooke, if you wouldn't mind, I like a higher octane in my vehicles, and I try to buy it. I buy E20 and E30. I have a flex fuel vehicle that is set up to do that, and I will buy E20 and E30 fuel blends, and part of what I like about it is the fact that I can get a higher octane rating, which I have always assumed was a better product, and it costs me less money as a consumer.

I am just curious. Long-term, when we get to the CAFE standards coming in in the year 2025, in that neighborhood, isn't it going to be a valuable item to be able to have a resource such as an alcohol product, regardless of where it is made, to be able to increase the actual octane ratings at a lower price than what it would be if we had a different type of a product, another chemical than we would have to put in to the existing petroleum products to bring that octane rating up? And aren't we really moving toward advanced fuels when we add something that feeds into that octane rating?

Mr. COLEMAN. We are. So modern vehicles, and I think the autos have to make their own decisions about which way they are going to go over the next not just 5 years, but 10, 20 years. But you can tune a modern engine to take advantage of the higher octane and ethanol, and create much greater efficiencies as long as that octane is there and as long as it is clean enough to comply with the Clean Air Act; and the only solution in that lane is ethanol and alcohol. So where we want to go is to give, as Mike said, consumers a choice at the pump. But imagine a scenario where the higher ethanol blends are actually cheaper, higher octane and create efficiencies from an internal combustion engine that really get to where everybody wants to go.

Senator ROUNDS. Thank you.

Thank you, Mr. Chairman.

Senator BARRASSO. Thank you, Senator Rounds.

Senator ERNST.

Senator ERNST. Thank you, Mr. Chairman. And thanks to all of the witnesses here today. This really, truly, Chairman, is one of the most exciting panels that I have seen so far. This is really great and a wonderful topic for the folks in the Midwest that actually do grow corn. I want to echo sentiments about the DDGs, the distillers grains that are used as feedstock. Those that know ethanol production know that very little is wasted from that original kernel of corn when it enters into that plant; it is all used for the benefit of our livestock and our growers.

So removing this unnecessary impediment for retailers and consumers alike is a crucial step toward expanded acceptance of biofuels nationwide and will help pave the way for advanced biofuels. I would like to enter for the record two letters from different groups expressing their support for this legislation, along with a survey conducted earlier this month of small engine machine owners.

Senator BARRASSO. Without objection.

Senator ERNST. OK. Thank you, Mr. Chair. I appreciate it.

[The referenced information follows:]



**Advanced
Biofuels
Association**

June 13, 2017

The Honorable John Barrasso
United States Senate
307 Dirksen Senate Office Building
Washington, D.C. 20510

The Honorable Thomas Carper
United States Senate
513 Hart Senate Office Building
Washington, D.C. 20510

Dear Chairman Barrasso and Ranking Member Carper:

I write today on behalf of the Advanced Biofuels Association (ABFA) to express appreciation for your commitment to the U.S. biofuels industry, but also to express deep concern that S. 517, the Consumer and Fuel Retailer Choice Act, will be detrimental to the future of advanced biofuels in the U.S. We believe the future of renewable fuels in the U.S. hinges on the advanced and cellulosic industries, both of which desperately need comprehensive reform of the Renewable Fuels Standard (RFS) to survive. Rather than focusing on this stop-gap waiver for E15, we encourage you to dedicate your time and resources to broader RFS reform.

ABFA represents over 35 companies from the United States and around the world who collectively produce and distribute over three billion gallons of biodiesel and renewable diesel per year, as well as a variety of drop-in fuels such as isobutanol, DME, cellulosic ethanol, and cellulosic heating oil. These drop-in fuels match the specifications of traditional hydrocarbon fuels made from oil and don't require a special waiver under the RFS to be used. Generally made from wood, municipal solid waste, agricultural oils and tallows, our fuels are completely separate from corn-based fuels and the first generation industry. Our feedstocks allow for the future production of materially significant amounts of advanced fuels—well beyond the gallons made possible from planted crops.

We would first like to reiterate that advanced and cellulosic fuels are the only industries that can address the fuel needs of the aviation, marine, or heavy-duty diesel engines which represent 30% of today's global GHG emissions. These fuels are already being independently produced by ABFA member companies: most notably, renewable diesel as well as upgrading renewable oils into diesel and jet fuels through pyrolysis.

The waiver authorized by S. 517 would enable corn ethanol volumes to exceed the 15 billion gallon statutory mandate established by Congress in 2007. Because corn-based ethanol is the lowest-cost ethanol molecule on the market, increasing the E15 mandate simply makes it more economically challenging for cellulosic and other advanced fuels to compete, reducing the program's ultimate sustainability and potential for GHG reductions. Rather than supporting the market, this bill would undercut its future.

While we congratulate the success of the ethanol industry, the U.S. still needs a wider variety of high GHG-reduction fuels. Today, the volume of advanced and cellulosic fuels other than biomass-based diesel is less than 300 million gallons. To incentivize the production of these truly

advanced fuels, ABFA would support granting the RVP waiver request for advanced biobutanol and ethanol rather than ethanol writ-large.

We urge you to address the RFS program holistically, rather than granting this E15 waiver for the corn ethanol industry. We must specifically address the components of the RFS that need reform: pathway approvals for technologies and feedstocks; the definitions of wood, waste, and intermediate feedstocks; and the burdensome regulatory requirements that economically disadvantage new, innovative fuels. Of course, E15 should be part of that conversation—but this carve-out bill is not a solution for the ultimate success of the industry.

This is where the future can be brighter and more diverse. We need to focus our efforts on fixing the RFS to bring the second generation to market.

Sincerely,

A handwritten signature in black ink, appearing to read "Michael McAdams", with a stylized flourish at the end.

Michael McAdams
President, Advanced Biofuels Association

cc: Members of the Environment and Public Works Committee



June 7, 2017

The Honorable John Barrasso
Chairman
Committee on Environment and Public Works
410 Dirksen Senate Office Building
Washington, D.C. 20510

The Honorable Thomas R. Carper
Ranking Member
Committee on Environment and Public Works
410 Dirksen Senate Office Building
Washington, D.C. 20510

Dear Chairman Barrasso and Ranking Member Carper:

The American Motorcyclist Association opposes S. 517, the Consumer and Fuel Retailer Choice Act. As you know, S. 517 would amend the Clean Air Act with respect to the ethanol waiver for Reid Vapor Pressure limitations to allow the sale of E15 during the summer months.

Founded in 1924, the AMA is a nonprofit organization with more than 213,000 members. Our mission is to promote the motorcycle lifestyle and protect the future of motorcycling.

RVP is a measure of gasoline's propensity to evaporate. As part of the 1990 Clean Air Act amendments, Congress enacted a provision allowing conventional gasoline to exceed the RVP limit by up to 1 psi provided it contained up to 10 percent ethanol. The 1 psi waiver is not available to ethanol blends greater than 10 percent (e.g., E15).

The AMA opposes E15 fuel because using E15 in motorcycles and all-terrain vehicles may cause engine and fuel system damage and void the manufacturer's warranty.

None of the estimated 22 million motorcycles and all-terrain vehicles in use in the United States is approved by the U.S. Environmental Protection Agency to use E15 or higher ethanol blends. Using E15 in motorcycles and ATVs violates federal law.

Yet the rush to force more E15 fuel into the marketplace by the ethanol industry greatly increases the chances of inadvertent misfueling by motorcyclists and ATV owners -- as well as owners of boats, small engines and other machines that are not warrantied for E15 use -- due to blender pumps, confusing pump labeling and the lack of any significant consumer education by the ethanol industry or the federal government.

Again, the AMA opposes S. 517. Thank you for your time and consideration of this important issue.

Sincerely,

A handwritten signature in black ink that reads "Wayne Allard". The signature is written in a cursive, flowing style.

Wayne Allard
Vice President, Government Relations

444 North Capitol Street, NW | Suite 837 | Washington, D.C. 20001
Phone (202) 220-1390 | Fax (202) 220-1399 | www.AmericanMotorcyclist.com | @AMA_Rights

ActionAid USA * Alaska Wilderness League * Clean Air Task Force * Center for Biological Diversity * Earth Action, Inc. * Earthjustice * Friends of the Earth * Mighty Earth * National Wildlife Federation * Physicians for Social Responsibility * Rachel Carson Council * Safe Climate Campaign * Sierra Club * West Harlem Environmental Action, Inc.

June 12, 2017

Dear Senators,

We write today on the behalf of our millions of supporters and members urging you to strongly oppose any attempt to expand the use of E15 (E15 is a mixture of 85% gasoline and 15% ethanol) during the ozone season. Increasing the proportion of ethanol in gasoline during the summer months can lead to more ozone pollution that will cause more smog in our communities. Ground-level ozone impairs lung functioning and contributes to increased incidences of asthma and other lung diseases, especially among children and the elderly.

While the ethanol industry sees this waiver as an opportunity to sell more of its product, it is really a debate about clean air and human health. The Environmental Protection Agency currently limits the use of ethanol during the summer precisely because of ethanol's greater emission of smog-forming compounds. These compounds make the air harder to breathe, are potentially carcinogenic, and have real impact on the people's lives. Waiving clean air standards at the behest of one favored industry would not only set a precedent for bad policy, it could cost lives.

The push for E15 has no basis in science and would do additional harm to our air, water, and land beyond increased ozone. Already, increased use of corn ethanol across the country has contributed to the conversion of more than 7 million acres of grassland and other habitats into crop productions, and has worsened water quality through additional polluted farm runoff. Moreover, according to the National Research Council, EPA data show corn ethanol "to have life-cycle GHG emissions higher than gasoline in 2012 or 2017 unless it is produced in a biorefinery that uses biomass as a heat source" (NRC 2011.) Increased production of corn ethanol—a likely outcome if E15 use is allowed year-round—would exacerbate these existing problems.

Now is not the time to increase the usage of E15 in our fuel supply, given that a shift to higher ethanol blends can exacerbate smog formation. Too many cities across the country already suffer from bad air days due to increased ground-level ozone.

We strongly urge you to reject any attempt to allow the year-round use of higher ethanol blends.

Sincerely,

ActionAid USA
 Alaska Wilderness League
 Clean Air Task Force
 Center for Biological Diversity
 Earth Action, Inc.
 Earthjustice
 Friends of the Earth
 Mighty Earth
 National Wildlife Federation
 Physicians for Social Responsibility
 Rachel Carson Council
 Safe Climate Campaign
 Sierra Club
 West Harlem Environmental Action, Inc.

Senator ERNST. And it has been an interesting discussion because a lot of what I have heard today is talking about misfueling.

Mr. Lorenz, you brought up a great point: most folks know what product to use. I am a motorcyclist. I know exactly what I can put into my motorcycle and what I can't.

Mr. Teske, you had mentioned misfueling with small engines. Does Briggs & Stratton offer a two cycle oil-gasoline small engine?

Mr. TESKE. We do not.

Senator ERNST. You do not.

Mr. TESKE. We do not.

Senator ERNST. OK. Do you know of other manufacturers that might?

Mr. TESKE. Yes.

Senator ERNST. And do you think those consumers can adequately blend that oil and fuel together to properly run their small engines?

Mr. TESKE. Yes. But manufacturers have also taken to doing it for them. So there are opportunities where, because there have been failures. I know of lots of failures where people had not properly blended, and ultimately there has been a market now for premixed fuel along the way, too, and that market wouldn't exist if everyone knew how to blend.

Senator ERNST. Do you think that there are consumers at the gas pump or pulling into a station that might fuel their vehicles with diesel when those engines aren't diesel engines?

Mr. TESKE. I don't believe so, no. Not that I am aware of.

Senator ERNST. You don't believe so. But we heard other testimony where there is lots of misfueling out there; even if there are barriers provided, other people will try and fuel their cars with the wrong products. To me, that is not trusting the consumer to know their products and what to use in their own vehicles. I think there is a level of trust.

Mr. Lorenz, you said you don't see those misfuels. Is that correct?

Mr. LORENZ. That is absolutely correct. We just, like I said, 2 years selling E15 and we have had no incidents of misfueling.

Senator ERNST. OK.

Mr. LORENZ. Or problems with vehicles.

Senator ERNST. Mr. Teske?

Mr. TESKE. Senator, if I may. It is generally not the convenience store owner that is going to hear about it; it is going to be us, and specifically through retailers. So we have talked to a number of our retailers. Fuel-related issues are becoming more prevalent.

Senator ERNST. I would say—

Mr. TESKE. Up to 40 percent of the returns at a major retailer has to do with fuel-related type issues, and it is just very frustrating because they have identified that a lot of it has to do with ethanol. They put out a promotional campaign that said ditch the ethanol, which we are not advocating to ditch the ethanol.

Senator ERNST. Certainly, I hope you don't.

Mr. TESKE. But they did, and ultimately were threatened by a number of different constituents because ultimately ethanol is a problem in small engines. So we warrant up to E10—

Senator ERNST. OK. And I understand. I use small engines. I am a motorcyclist, so I do understand, and I hope that most consumers

understand the products that they use. But there is an argument here that consumers don't understand what product is right for their small engines, or even for their vehicles, and I think that is a bad argument; that we should discontinue the use of a product simply because consumers don't know what is the recommended product for their own particular engine. So I think we need to trust our consumers.

I would like to go back to Mr. Lorenz. You have E15 products that are offered at your convenience stores. What were the barriers to entry for selling that E15?

Mr. LORENZ. Actually, one of the barriers was this very issue. This was a concern of ours. We still made the business decision to go ahead because we thought that this product was compelling enough of a value proposition to the consumer. This, though, is a severe barrier to actually offering this; worse than actually what we expected. Because we knew this was going to be a problem going in, but what we found is it has really tended to undermine the integrity of the product during the summertime, because re-labeling, the consumer really doesn't know what is going on. That doesn't happen with any other fuel, and it is extremely detrimental.

Senator ERNST. Again, I think if it is an OK product to sell any other time during the year, and limiting that opportunity during the summer, again, goes back to availability of product that is approved for sale, but also trusting the consumer and the consumer knowing what is the right product or the best product for them to choose. I think that is somewhat of the underlying issue that we are seeing today.

So I do thank you.

I am out of time, but I want to thank you, Mr. Chair. This has been a great discussion.

Senator BARRASSO. Thank you, Senator Ernst.

Senator DUCKWORTH.

Senator DUCKWORTH. Thank you, Mr. Chairman, and also the Ranking Member for convening this very important conversation.

I am a proud cosponsor of the bipartisan Consumer and Fuel Retailer Choice Act because it will solve this regulatory burden without weakening the Clean Air Act.

My bottom line is simple: the renewable fuel standard is a win-win. It creates good jobs in Illinois, across the Midwest, all around the Country, and it helps to cut our Nation's dangerous dependence on foreign oil and reducing greenhouse gas emissions.

Mr. Coleman, many of us support the RFS because it is spurring growth in advanced biofuels. Can you share with us how adopting the waiver that exists for E10 fuels and applying it to E15 will help the advanced biofuels industry grow and create good paying jobs?

Mr. COLEMAN. Yes. Thank you, Senator Duckworth. I talked a little bit about this, but I would be happy to expand on it.

Senator DUCKWORTH. Please.

Mr. COLEMAN. Again, the investment in our industry, we are at the point now where we have developed the technology at pilot scale; we have developed the technology at demo scale; and at this point we need money to build plants. And for a very long period nobody was lending money of any type over the great recession

five, 6 years ago, or longer. We are now at a point where the economy is healthier, but the conversations we are having with investors are will there be demand; is there headspace in the marketplace? And this will fundamentally change that conversation because together with the renewable fuel standard, which provides a greater incentive at this point for cellulosic ethanol, which is good news, actually, for corn ethanol production because it is feedstock diversification, that will change the conversation. We will have the ability to unlock a lot of project finance, which means new refineries, new bolt-on lower carbon; and basically you will have an ethanol industry that gets to the next level from an innovation standpoint.

Senator DUCKWORTH. How much conventional gasoline could we potentially replace once you get to that point?

Mr. COLEMAN. Well, the upside for cellulosic ethanol alone, according to NREL and some other reports, is tens of billions of gallons from agricultural waste alone, without disrupting food and feed markets. So that is obviously a study, so that is a ceiling analysis. But if this technology were to commercialize in scale in a similar way that corn ethanol did, which is very quickly, we are talking about billions of gallons of displacement of foreign oil working together with other technologies to get energy independent.

Senator DUCKWORTH. Thank you.

Dr. Yanowitz, I understand that you have worked extensively with the master renewable energy laboratory and studied the impact of ethanol on vapor pressure specifically. I am wondering if you could characterize your opinion on the environmental impacts of ethanol more broadly. Can you share your thoughts, for example, of ethanol's impact on greenhouse gas emissions?

Ms. YANOWITZ. I am really a one-trick pony.

[Laughter.]

Ms. YANOWITZ. I can't speak to greenhouse gases. I can tell you about ozone. I don't expect there will be any impact on ozone. I expect it will reduce PM emissions. I expect it will be a benefit to air quality, as opposed to greenhouse gas emissions.

Senator DUCKWORTH. Wonderful. Thank you.

Mr. Chairman, I would like to request unanimous consent to submit three letters into the record that support the passing of S. 517, a letter from the Renewable Fuel Association, a letter from 28 members of the advanced and cellulosic industry, and also a letter from the National Corn Growers Association.

Senator BARRASSO. Without objection.

Senator DUCKWORTH. Thank you.

[The referenced information follows:]

June 12, 2017

The Honorable John Barrasso, Chairman
Committee on Environment and Public Works
410 Dirksen Senate Office Building
Washington, DC 20510

The Honorable Tom Carper, Ranking Member
Committee on Environment and Public Works
456 Dirksen Senate Office Building
Washington, DC 20510

Dear Chairman Barrasso and Ranking Member Carper:

On behalf of the National Marine Manufacturers Association (NMMA), the American Sportfishing Association (ASA), BoatU.S., the Center for Sportfishing Policy (CSP), the Marine Retailers Association of the Americas (MRAA), and the Theodore Roosevelt Conservation Partnership (TRCP), we wish to submit this letter for the record regarding the June 14, 2017 hearing on S. 517, the Consumer and Fuel Retailer Choice Act.

By way of background, NMMA is the leading recreational marine industry trade association in North America, representing 1,400 boat, engine, and accessory manufacturers. NMMA members collectively produce more than 80 percent of the recreational marine products sold in the United States with a total economic impact of \$121.5 billion annually. The U.S. marine manufacturing industry is comprised of nearly 35,000 businesses that provide over 650,000 jobs.

ASA is the sportfishing industry's trade association, representing more than 800 manufacturers and retailers of sportfishing equipment across the country. ASA also gives America's 46 million anglers a voice in policy decisions that affect their ability to sustainably fish on our nation's waterways through Keep America Fishing®, a national angler advocacy campaign. America's anglers generate more than \$48 billion in retail sales with a \$115 billion impact on the nation's economy creating employment for more than 828,000 people. Since fishing is the #1 activity people engage in while boating, ASA and its membership are acutely aware of the damage E15 causes boat engines and are active in policy surrounding the issue.

BoatU.S., Boat Owners Association of The United States, is the largest organization of recreational boat owners in the country with more than 570,000 members. For more than 50 years, BoatU.S. has worked to ensure that their members, who own a wide array of types and sizes of boats, can continue to enjoy this healthy outdoor family recreation.

CSP is a coalition of angling, boating, conservation, and outdoor businesses that are dedicated to maximizing opportunities for saltwater recreational anglers.

MRAA is the trade association of small businesses in North America that sell and service new and pre-owned recreational boats, provide access to the waters through marinas, access ramps, and boat yards, and sell boat accessory products and parts.

TRCP is a partnership of 54 hunting, angling, outdoor recreation and conservation organizations, working on federal public policy that conserves fish and wildlife habitat and expands quality accesses to that habitat for America's hunters and anglers.

Our organizations stand united in opposition to S. 517, the Consumer and Fuel Retailer Choice Act. This legislation is misguided, and we urge the Committee to reject it.

While the title of S. 517 contains the word "choice", passage of this legislation would effectively deny consumers choice at the pump, while also endangering their safety on the water. There are 12 million recreational vessels registered in the United States. Ninety-five percent of these vessels are fueled at retail automotive service stations, and are dependent on a safe and legal fuel supply to operate. Ensuring all consumers have access to approved fuels is absolutely critical to recreational boaters and anglers.

S. 517 would arbitrarily amend the Clean Air Act, and effectively allow for the national year-round sale of E15. This is particularly concerning for the boating and angling industry because it would mean E15 would infiltrate the marketplace during the peak summer boating season, placing more Americans at risk. Out on the water, boaters depend on their boat to be reliable. Oftentimes weather and boating conditions change quickly and dramatically, and the ability for boaters to be able to return safely to shore is of the utmost importance. Unfortunately, S. 517 would put boaters in greater jeopardy.

Due to the very nature of marine engines—the infrequency of use, start and stop running conditions, and interaction with surrounding water—they are severely impacted by ethanol blends containing greater than 10 percent ethanol by volume (E10). Marine engines, and millions of other engine products including motorcycles, outdoor power equipment and certain car makes and models, require E10 or lower blends to be universally available at every retail service station across the country. S. 517 would push E10 and lower blends out of the marketplace, limiting consumer choice.

The chemical properties of ethanol cause it to attract and absorb water. When ethanol-enhanced gasoline sits for long periods, the ethanol separates from the gasoline, forming two separate solutions. This is known as phase separation and it can wreak havoc on marine engines. A marine engine won't run on a water-soaked ethanol solution, which sinks to the bottom of the tank and is highly corrosive. Higher ethanol blends, such as those that contain 15 percent ethanol by volume (E15), only make this problem worse.

Marine engines and fuel systems are designed, calibrated, and certified to be compatible only with E10 and lower fuel blends, and are federally prohibited from using any blends higher than E10. Additionally, NMMA members, through the U.S. Department of Energy's Renewable Energy Laboratory, have extensively studied the effects of E15 on marine engines. The results unequivocally show safety problems caused by significant engine damage, poor engine runnability, performance and difficulty starting.

Emissions and durability testing have compared E15 fuel and fuel containing zero percent ethanol (E0) and examined exhaust emissions, exhaust gas temperature, torque, power, barometric pressure, air temperature, and fuel flow. Specifically, the testing showed degraded emissions performance outside of engine certification limits as well as increased fuel consumption. In separate testing on engine durability, each tested engine showed deterioration, including two of the three outboard engines, with damages severe enough to prevent them from completing the test cycle. The E0 test engines did not exhibit any fuel related issues.

The higher oxygen levels found in E15 makes the fuel burn hotter, and the higher temperatures can reduce the strength of metallic components contained in the engine. Higher ethanol blends like E15 can cause compatibility issues with other materials in the fuel system because of the chemical reaction. Government certified testing has proven that utilizing high ethanol blends can lead to significant issues for consumers and can result in premature engine failure. EPA concurred with these findings, as evidenced by its prohibition against the use of E15 (and higher blends) in marine engines.

Aside from the scientific, mechanical, and safety reasons that drive our opposition to more E15 in the marketplace, we also have concerns regarding public awareness and consumer education. EPA has failed to properly educate and warn the public on the effects of E15 and higher blends of fuel. Consumers remain woefully unaware of the existence of higher ethanol-blended fuels, let alone the effects these fuels can have on their marine engines. Despite the industry's best efforts to educate consumers, more needs to be done by the EPA to ensure that misfueling is never a possibility.

Beginning in 2011, EPA instructed stakeholders to “develop a broad public education and outreach campaign that provides both consumers and retailers with the information they need to avoid misfueling.” The recreational boating industry has heeded this request, working with other stakeholder groups to develop and promote educational outreach efforts. Notably the “Look Before You Pump” campaign, conducted in partnership with the Outdoor Power Equipment Institute, and through distribution of “No E15” labels to manufacturers. The recreational boating community has worked to educate companies and industry partners, including safety/certification organizations, state boating associations and national groups raise consumer awareness.

According to a recent Harris Poll, conducted on behalf of Outdoor Power Equipment Institute, only 23 percent of Americans notice ethanol content when fueling; 63 percent choose the least expensive grade of gas regardless of ethanol content; and worse, 75 percent are unaware of the prohibition of using E15 in non-approved engines. It is clear that the government's approach has failed to educate consumers.

The recreational boating industry will continue to fight against efforts, like S. 517, that would expand E15 into the marketplace. However with E15 already on the market, we urge the Committee to require EPA to increase its efforts to educate consumers.

Specifically, EPA must act to strengthen its Misfueling Mitigation Plan (MMP). EPA acknowledged this concern in the November 2015 final rulemaking, and stated the agency's willingness to work with “industry, other private stakeholders, and our government partners.” However, to date, EPA has not

reached out to our respective organizations on such a project, nor has it reached out to other stakeholder group with similar concerns. Further, the current proposal fails to discuss any such concern—there is no mention of misfueling, engine damage or any mitigation plans.

The MMP is lacking and ineffective. Fuel pump labeling should not be the sole consumer outreach method. The current 3 inch by 3 inch label affixed to a gas pump is too small and not distinguishable amongst the signage, advertisements, and other labels common at a modern pump. Additionally, the text of the label could be more descriptive and straightforward; the prohibited uses are buried in smaller typeface at the bottom of the label, which is counterintuitive and ineffective. Additionally, the label is currently only required at E15 specific pumps, not blender pumps that dispense E15. This means that consumers at a blender pump do not even see a warning.

Even when conscientious consumers at the pump select the correct fuel, up to four gallons of fuel can be left in the dispenser hose from the previous customer. This means that if the prior customer at a pump dispensed E15, and the next customer wants to dispense E10, they could get up to four gallons of E15 that has been left in the hose. This is especially concerning for those with smaller boats or personal watercraft that do not have large fuel tanks.

At a minimum, fuel pump labeling should be held in conjunction with broader outreach campaigns, as was the original intent of the EPA. Our organizations would also support the implementation of physical applications that prevent misfueling, such as nozzle size differentials. Physical applications would significantly reduce the risk of misfueling, and reduce retailer liability as discussed by the Society of Independent Gasoline Marketers of America (SIGMA) and the National Association of Convenience Stores (NACS).

Nozzle size differentials and other physical applications are important because research has proven that labels alone are not an effective method to warn the public. According to the Association for Consumer Research, warning labels do not influence consumers' perceptions of hazards and risks, and the research went on to find that this lack of influence is exasperated when such warning labels are applied to commonly-used products—such as a gas pump. This is reaffirmed by recent a recent Harris Poll that showed while 92 percent of consumers notice the price at a pump, only 50 percent notice warning labels and just 24 percent notice ethanol content.

We would like to remind the Committee that an enhanced, government-led public awareness campaign is not unprecedented. In the 1970s, the EPA transitioned the country to unleaded fuels through a combination of educational initiatives that greatly went beyond a pump label. The boating and angling community believes that the introduction of E15 is akin to the introduction of unleaded gasoline and thus merits a greater government-led public awareness effort.

A prolonged lack of public awareness will continue to result in consumers accidentally misfueling with E15. This leads to unintended consequences, such as performance failures and engine damage, higher repair bills, and the voiding of warranties. Engine failures will not only harm marine businesses and disincentivize consumers and potential consumers, it will also put the boating public at risk.

In summary, we urge the Committee to reject S. 517. With federal law currently prohibiting the public from using E15 in marine engines, boaters need to have a readily available supply of E10 and lower blends. We also urge the Committee to require EPA to increase its efforts to educate consumers.

Thank you for considering our views. If the Committee has any questions or would like more information, please do not hesitate to contact Nicole Vasilaros at nvasilaros@nmma.org or 202-737-9763. Thank you.

Sincerely,



T. Nicole Vasilaros, Esq.
Vice President, Federal and Legal Affairs
National Marine Manufacturers Association



Scott Gudes
Vice President, Government Affairs
American Sportfishing Association



Chris Edmonston
Vice President, Government Affairs
BoatU.S.



Jeff Angers
President
Center for Sportfishing Policy



Matt Gruhn
President
Marine Retailers Association of the Americas



Steven Kine
Director of Government Relations
Theodore Roosevelt Conservation Partnership



October 11, 2016



Dear Member of Congress:

On behalf of the American Petroleum Institute (API) and American Fuel & Petrochemical Manufacturers (AFPM), we write to express our joint opposition to legislation that would extend the One-Pound Reid Vapor Pressure (RVP) waiver to E15 fuel. Information has been recently distributed erroneously suggesting that our organizations support the waiver. We do not.

E15 is not suitable for most engines and may harm consumers. Indeed, testing conducted by the Coordinating Research Council (CRC) demonstrated engine and fuel system durability problems associated with E15. For this reason, we do not support legislative efforts aimed at forcing more of the fuel into the marketplace, particularly given Congress's failure to address the underlying problems with the federal Renewable Fuel Standard (RFS).

Some in the ethanol lobby misrepresent comments we provided to the Environmental Protection Agency (EPA) in 2011. Those comments preceded the results of the CRC testing on E15. Because those results provided essential information on E15's impact to engine and fuel system durability, API and AFPM oppose extending the one-pound RVP waiver to this fuel. In joint comments from July 2013, API and AFPM noted that, "EPA considered this issue fully in that proposal and stated that the 1 psi waiver does 'not apply to blends above or below the range of 9-10vol%.'" More recently, in a joint letter to EPA in April 2015, we stated that, "Both the EPA regulations and the CAA [Clean Air Act] could not be clearer. As EPA has consistently recognized, E15 does not qualify for the one pound waiver and must meet the summertime RVP requirements to be legally sold."

We appreciate the opportunity to set the record straight on our opposition to the RVP waiver for E15 fuel. The RFS is broken, and our organizations stand ready to partner with you on significant reform of the RFS. Accordingly, we encourage you to take up and pass the bipartisan Food and Fuel Consumer Protection Act of 2016 (H.R. 5180), which would provide relief from the blend wall and protect American motorists, vehicles, and infrastructure.

Sincerely,

Jack Gerard
President and Chief Executive Officer
American Petroleum Institute

Chet Thompson
President
American Fuel & Petrochemical Manufacturers



June 12, 2017

The Honorable John Barrasso
Chairman
Committee on Environment and Public Works
US Senate
Washington, DC 20510

The Honorable Tom Carper
Ranking Member
Committee on Environment and Public Works
US Senate
Washington, DC 20510

Dear Chairman Barrasso and Ranking Member Carper:

PMAA is a federation of 46 state and regional trade associations representing approximately 8,000 independent petroleum marketers nationwide. PMAA companies own 60,000 retail fuel outlets such as gas stations, convenience stores and truck stops. Additionally, these companies supply motor fuels to 40,000 independently owned retail outlets and heating oil to over eight million homes and businesses. PMAA members are engaged in the transport, storage and sale of petroleum products including gasoline, diesel fuels, kerosene, jet fuel, aviation gasoline, propane, racing fuel, lubricating oils, and home heating oil at both the wholesale and retail level. PMAA members are the primary conduit for bringing petroleum products from the terminal rack to retail locations and represent a vital and indispensable link in the nation's petroleum distribution chain.

It is important to note up front that PMAA fully supports the growth of renewable fuels in gasoline, diesel and heating oil. PMAA member companies recognize that alternative fuels are an important component in a national strategy to reduce and eliminate our national dependence on foreign oil.

The purpose of this letter is to highlight our concerns with the "Consumer and Fuel Retailer Choice Act," (S. 517) which would extend the Reid vapor pressure (RVP) waiver to ethanol blends above 10 percent. The bill would allow retailers across the country to sell E15 year-round. PMAA has historically expressed its concern over the introduction of E15 into the fuels market; particularly as it may be mandated as a result of increasing requirements under the Renewable Fuel Standard Program. We believe that the introduction of ethanol blends higher than 10 percent (including E15) present significant economic and legal impediments to many gasoline retailers, as well as, consumer awareness issues that go beyond the price of the fuel. Extending the RVP waiver to E15 at this point further exacerbates these concerns and could force many retailers to invest considerable time and money on an accelerated schedule to switch to an alternative fuel storage and distribution system in order to remain competitive. It is important that there be an orderly transition to the new infrastructure required to handle ethanol blends higher than 10 percent. If Congress should move ahead with this legislation, it should first hold a hearing on the compatibility of existing UST system infrastructure and what would be required for the orderly transition to ethanol blends greater than 10 percent. Given these concerns, PMAA cannot support S. 517 currently under consideration.

The current fuel storage and distribution system is simply not ready to accommodate ethanol blends over the current maximum 10 percent volume for use in conventional fueled vehicles. Ethanol is an efficient solvent and will loosen rust and other deposits from the interior walls of steel tanks and piping. It corrodes metals and causes the breakdown of certain rubbers, polymers and elastomers all used in integral components of petroleum storage and delivery systems. Furthermore, the suspension of water within the ethanol blend may enhance rusting and galvanic corrosion in portions of the underground storage tank (UST) system. Not only are tanks, delivery piping and retail dispensers made with metals, rubbers, elastomers and polymers that may not be compatible with ethanol blends greater than 10 percent, but leak detection devices designed to discover and warn of a release are also susceptible to failure. Granting an E15 waiver without more testing on the effects of E10 plus blends on materials making up key components of petroleum storage and delivery systems could lead to catastrophic release of product into the environment.

The National Renewable Energy Laboratory (NREL) and Underwriters' Laboratories (UL) tested the compatibility of new and used service station equipment. NREL found 70 percent of equipment currently in use, as well as 40 percent of new equipment, failed E15 compatibility tests¹. A brand-new location built today would only be compatible if the equipment installed was specifically designed for E10 plus blends. Subsequent reports released by NREL suggest that new and many existing underground storage tanks and piping may be compatible with ethanol blends greater than E10 but notes that there is a requirement to demonstrate that this is the case. A 2016 report by the Association of State and Territorial Solid Waste Management Officials (ASTSWMO) concludes that compatibility of existing UST facilities is one of the biggest challenges and concerns with biofuel blend storage. This statement is based on the increased use of blended fuels, primarily E10, in the last decade. The report notes that "Many UST inspectors have seen the impact ethanol blended fuels can have on the corrosion of equipment with STP sumps, and an increased prevalence of leaks from equipment inside dispenser cabinets. Gaskets, adhesives, glues, and sealants (including the standard 'pipe dope' commonly used on older systems) have not always been compatible with conventional motor fuels up to E10." The report further notes that "Complicating piping compatibility questions is the fact that the UL standard (and corresponding allowable fuel permeability rates) have since become more stringent with subsequent revisions to the UL-971 standard and many owners, operators and State UST programs do not maintain detailed records for system components."

This lack of readiness is due to one important and irrefutable fact; many existing gasoline storage tanks, associated piping and retail dispensers (legacy equipment) are not certified as compatible by Underwriters Laboratories (U.L.) for use with any blend over E10. To demonstrate that a UST system is compatible with ethanol blends higher than 10 percent is difficult, if not impossible, for most retailers and is a major impediment to dispensing and storage of E15. Federal, state, and local laws and regulations, national and international fire codes, as well as all commercial insurance policies, require the use of UL certified storage and dispensing equipment or a specific demonstration that the UST and dispenser system is compatible, such as a manufacturer acknowledgement. Dispensing ethanol blends higher than 10 percent with non-certified equipment exposes retailers to legal liability for non-compliance with federal and state UST regulations and state fire codes and will subject them to significant civil penalties and possible closures. Moreover, the storage and dispensing of ethanol blends greater than E10 may void manufacturers warranties, result in denied insurance claims from private insurance and state assurance funds, and may lead to a significant increase in equipment failure leading to increases in releases from UST systems.

The bottom line is that small business petroleum marketers would assume the full risk of liability for releases from legacy equipment if the waiver application is approved. The cost of even a single release could force a tank owner without insurance or equipment warranty coverage into bankruptcy – leaving a shuttered retail station requiring a state or federal funded cleanup. If there is any doubt that petroleum marketers would be forced to assume the full risk of liability for use of non-conforming product in legacy equipment if E15 is approved for the summer months, one need only look to private insurance policies, state assurance tank fund guidelines and manufacturer specifications to find confirmation.

Meanwhile, in recent years, a select group of large retailers have been given lucrative grants to upgrade their facilities to be compatible with higher ethanol blends which will bring an unfair competitive advantage over retailers that were not able to receive grants. A retailer selling E15 across the street from a competitor not able to legally sell E15 because his/her tanks are not compatible would find it hard to compete at times. By Congress granting the waiver, this would further bring consolidation in the retail motor fuels marketplace and thus bring higher prices at the pump. Ethanol proponents also believe lucrative RIN values will lure retailers into compatible infrastructure investments. Unfortunately, the majority of retailers do not have the luxury to participate in the RINs market and, for the most part, must buy pre-blended ethanol fuel at the rack.

In some cases, motorists might not be fully informed on the use of ethanol blends greater than 10 percent in their vehicles or other small engines. There is no viable method of preventing consumer misfueling. Experience shows that no matter how many warning labels or notices are placed on the dispensers, consumers will misfuel. We have seen this in the past with the transition to unleaded gasoline. The truth is most consumers do not read pump labels and notices. If anyone doubts this, all they need to do is look around the dispenser island during their next fill-up. Any number of people will be talking on their cell phones while pumping gas despite the universal warning label on every dispenser that prohibits this practice. If a consumer mistakenly pumps E15 instead of E10 into the vehicle fuel tank or portable gasoline container and

¹Source: *A Comprehensive Analysis of Current Research on E15 Dispensing Component Compatibility* <http://www.api.org/~media/files/policy/fuels-and-renewables/e15-infrastructure-comprehensive-analysis.pdf> pg. 1

they experience problems with the vehicle or a small engine, whether real or perceived, the consumer will hold the petroleum marketer responsible. This is happening now with alarming frequency where consumers blame all sorts of performance problems on the quality of the gasoline they purchase, and sue the seller for damages. Switching to an E15 blend will compound this problem many fold. Meanwhile, some retailers in the past have used different names for E15 such as "Unleaded Plus" to disguise the E15 blend to make it more marketable than just calling it E15, which at this present time a product that many customers either do not want or should not use.

For these reasons listed above, PMAA believes that there is no imminent reason for Congress to consider allowing a waiver for E15, and therefore, cannot support S. 517.

Sincerely,



Rob Underwood
PMAA President



Chet M. Thompson
President

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June 13, 2017

The Honorable John Barrasso
Chairman
Senate Committee on the
Environment and Public Works
410 Dirksen Senate Office Building
Washington, D.C. 20510

The Honorable Tom Carper
Ranking Member
Senate Committee on the
Environment and Public Works
456 Dirksen Senate Office Building
Washington, D.C. 20515

Dear Chairman Barrasso and Ranking Member Carper,

I am writing to express the American Fuel & Petrochemical Manufacturers' (AFPM) opposition to legislation extending the One-Pound Reid Vapor Pressure (RVP) waiver to E15 fuel. Extending the RVP waiver would have significant implications for the fuels industry and consumers.

As you are aware, E15 is not suitable for most vehicles and engines, and thus may harm consumers. Indeed, testing conducted by the Coordinating Research Council demonstrated engine and fuel system durability problems associated with E15 use. Most automobile warranties do not cover damage caused by E15, leaving consumers on the hook for costly repairs. A recent AAA survey revealed that one in three U.S. drivers cannot pay for an unexpected car repair bill, which averages between \$500 and \$600 — leaving 64 million drivers at risk of going into debt should auto trouble strike. Moreover, extending the waiver would increase the likelihood of consumer misfuelling of motorcycles, lawnmowers, and other small engines. For these reasons, we do not support efforts aimed at forcing more of the fuel into the marketplace, particularly given Congress's failure to address the underlying problems with the federal Renewable Fuel Standard (RFS).

The ethanol lobby argues that this bill would reduce regulatory barriers to allow more consumer choice. But as long as the RFS is mandating higher blends of ethanol, this is simply an attempt to further distort the market. Instead, we need Congress to take a comprehensive look at fuel policies in a way that puts the consumer first and reflects the realities of the fuel market.

AFPM stands ready to be a productive partner in a broader conversation about this and other related matters, including critically needed RFS reform.

Sincerely,

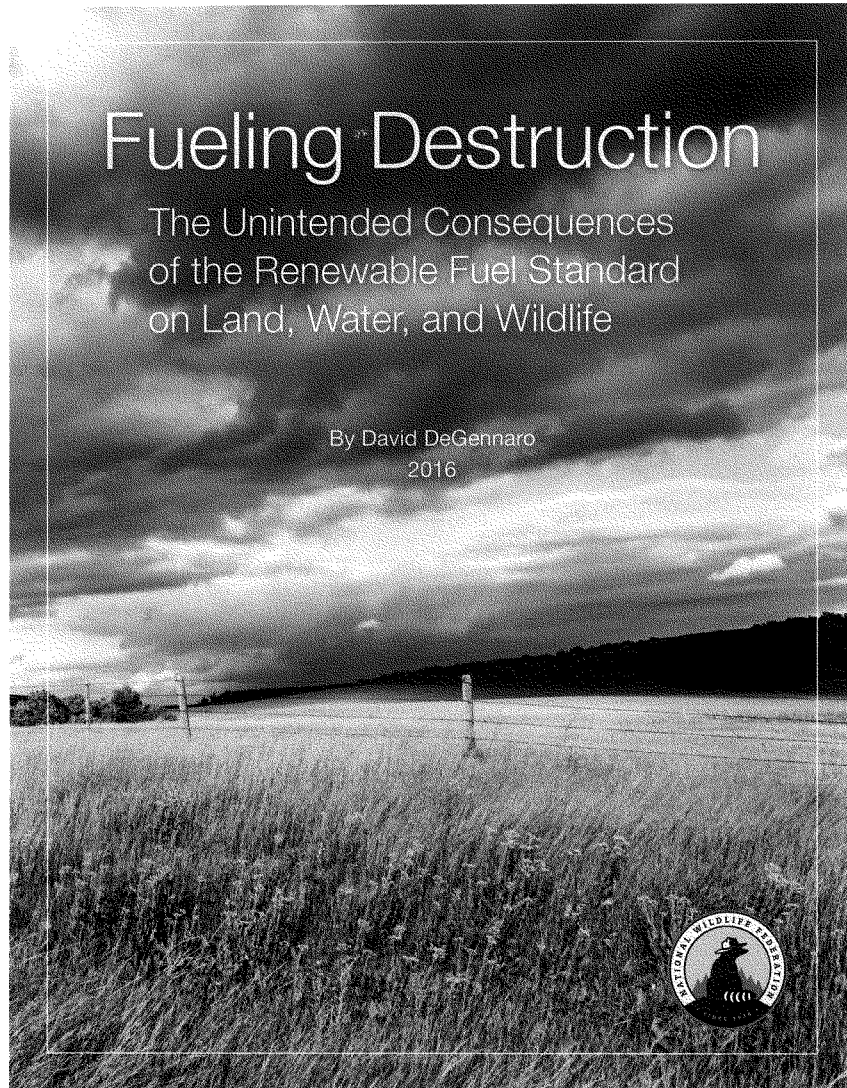

Chet Thompson

Senator DUCKWORTH. I would also like to submit an analysis of greenhouse gas benefits associated with this bill.

Senator BARRASSO. Without objection.

Senator DUCKWORTH. Thank you.

[The referenced information follows:]



Fueling Destruction

The Unintended Consequences of the Renewable Fuel Standard on Land, Water, and Wildlife

Author

David DeGennaro

Contributors: Aviva Glaser and Lekha Knuffman

Acknowledgements

My sincerest thanks to Aviva Glaser for guiding me through this process, and to her and Lekha Knuffman for their contributions to the report and their immeasurable support throughout. I also wish to thank and acknowledge Julie Sibbing, Adam Kolton, Andy Buchsbaum, Ben Larson, Bruce Stein, and the rest of the National Wildlife Federation family who have assisted or motivated this work. Thanks also to Julie Sibbing, George Cunningham, and Dave Spangler for sharing their stories; to Tyler Lark and his team for being generous with their help and expertise; and to Maja Smith for her understanding, flexibility, and skill. Finally, thank you to Collin O'Mara for his leadership and commitment to the conservation of America's wildlife and special places.

Design by: Maja Smith, MajaDesign, Inc.

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DeGennaro, D. 2016. *Fueling Destruction: The Unintended Consequences of the Renewable Fuel Standard on Land, Water, and Wildlife*. Washington, DC: National Wildlife Federation.



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Male Pheasant. Photo Credit: Nigel Winnu.

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Executive Summary



Ground nesting birds like this Baird's Sparrow are at risk thanks to conversion of grassland habitat to crop production. Photo Credit: Rick Bohn.

Sportsmen and wildlife – ducks, pheasants, song birds, bees, and monarch butterflies – should not have to lose out because of a market-distorting government mandate.
–NWF President Collin O'Mara

Since Congress passed into law in 2005 a federal mandate to blend corn-based ethanol and other renewable fuels into conventional gasoline, the increased demand for corn – which has supplied nearly all of these mandated fuels to date – has resulted in a major transformation on the landscape. Farmers, hoping to take advantage of rising prices for corn and other commodity crops, converted more than 7 million acres of native prairie, rangeland, wetlands, and forests into cropland – a devastating loss of important wildlife habitat and critical ecosystem functions like water filtering across the country. This destruction occurred despite language in the law meant to prohibit this type of land conversion, thanks in large part to the Environmental Protection Agency's refusal to enforce the provision.

With American farmers growing more corn today than at any time since the Great Depression, 40 percent of that crop now goes to produce fuel rather than feeding people or livestock. The staggering scale and swift rise of this massive biofuel industry has profound impacts to the environment as farmers cleared land, drained wetlands, and applied more fertilizers, pesticides, and irrigation water to maximize their production. These increased mechanical applications paired with the loss of buffer strips and wetlands that filter storm runoff have contributed to declining water quality in the Mississippi River watershed, Gulf of Mexico, Great Lakes, and elsewhere. And the law has provided little, if any, of the promised reduction in harmful greenhouse gas emissions that were supposed to make it a model environmental statute.

This report compiles the mounting research bringing to light the unintended consequences of requiring the use of corn-based fuels. Some of the research documented within shows that:



Pronghorn and other animals fare well on rangeland like this spot in Montana, but do not coexist with intensive row cropping.
Photo credit: Gary Kramer / NRCS.

- More than 7.3 million acres were converted into cropland between 2008 and 2012, an area larger than the state of Massachusetts;
 - Areas in Minnesota, North Dakota, and South Dakota saw conversion at rates exceeding that of tropical deforestation, while some counties outside traditional agricultural areas saw their farmland more than double over the last decade;
 - Grasslands, which include native prairie, land returned to grass under the federal Conservation Reserve Program, and pasture and rangeland – were the habitat type providing the most land for new crops, but significant amounts of wetlands and forests were also lost;
 - Corn and soybeans were the crops most commonly planted on new breakings, and corn ethanol plants are correlated both with the amount of corn grown in the surrounding area and with the conversion of new lands into farming;
 - This land conversion largely took place on sensitive land and important wildlife habitat, exacerbating pressures on numerous types of wildlife, particularly waterfowl, monarch butterflies, bees and other pollinators, grassland nesting birds such as the prairie chicken, and mammals such as the swift fox;
 - Water quality in many parts of the country has declined in large part due to agricultural runoff, killing aquatic life and promoting toxic algal blooms that threaten human health and render water supplies undrinkable; and,
 - Intensive row crop agriculture is expanding into more arid lands requiring heavy irrigation, while ethanol refineries consume very large volumes of water, adding additional stress to areas already burdened with declining aquifers and water storage.
- Finally, we call on Congress to fix the broken Renewable Fuel Standard in order to lower the demand for corn, move to more sustainable sources, and try to repair some of the damage that has been done on the landscape.

Introduction

For the last nine years, the United States has pushed full-steam ahead on a drive to infuse our transportation fuels with ever-growing volumes of alternative fuels to displace petroleum-derived gasoline. While the motivations behind this push – greater energy independence and security, reduced emissions of greenhouse gases and other harmful pollutants, and economic development in rural America – were well intentioned, the unanticipated impacts caused by the push for plant-based fuels have led to major impacts on land, water, and wildlife habitat.

Despite the good intentions of the policy, the expanded Renewable Fuel Standard (RFS), signed into law in 2007, has contributed to the destruction of threatened and biologically rich native habitats. Farmers across the country have responded to market incentives to grow ever more corn for ethanol and to meet international grain demand by increasing their production to historically high levels. They have done so not only by doubling down on land already under cultivation – changing crop rotations in favor of consecutive years of corn, double-cropping, increasing chemical fertilizer and pesticide application to maximize bushels per square foot – but also by bringing large new swaths of land under the plow, many for the very first time.

There is evidence that this new frontier of agricultural production has been spreading across the country, with a few hot spots with large amounts of habitat conversion and intensification. Unfortunately, these hot spots also serve as uniquely important areas of habitat for wildlife. Cropland conversion has swallowed many valuable wetlands, particularly in the Prairie Pothole Region of the Upper Midwest, an area that is the primary North American breeding ground for ducks and other waterfowl. And the expansion has taken a particularly heavy toll on native prairie that has never before been plowed for crops – a habitat type that is rapidly vanishing



This farm in Iowa demonstrates how stream buffers filter runoff and protect streambanks from erosion. Strips like this have been disappearing in corn country. Photo Credit: Lynn Betts / NRCS.

The expansion of row crop agriculture into sensitive habitats, driven in part by the Congressionally mandated use of corn ethanol, is having serious impacts on our land, water, and cherished wildlife populations.



Ground nesting birds like this lesser prairie chicken in Kansas depend on adequate intact grasslands for survival.
Photo Credit: Greg Kramos / USFWS.

from the North American landscape. In addition, corn production has expanded into areas of grassland habitat that were previously removed from cropping and planted with native vegetation under programs like the federal Conservation Reserve Program, as well as millions of acres of pasture or grazing land. Also falling victim to conversion are many of the marginal lands along the edges of existing farms that had previously supported pollinators like bees and monarch butterflies, buffer strips along waterways that filtered out polluted farm runoff before it clogged the lakes, streams, and rivers that we rely on for drinking water and recreation, and which are home to myriad fish and other aquatic species. Somewhat startlingly, the advance of cropland over the last several years has even captured forested lands as farmers have found it profitable to harvest native trees and grow corn or cotton in their place.

The expansion of row crop agriculture into these sensitive habitats, driven in part by the Congressionally mandated use of corn ethanol in our transportation fuel, is having

serious impacts on our land, our water, and on our cherished wildlife populations. Where will ducks, upon returning to the Plains each spring to breed, raise their young if they find corn or soybean fields in place of the wetlands and nearby grasslands they have always relied on for food and shelter? How will we recover monarch butterfly populations from their precipitous decline if we continue to replace milkweed-rich grassland habitats with vast monocultures devoid of other life? How will we ensure there is enough grass and shrub land to maintain beloved species like the swift fox and prairie chicken without some sort of firewall on expansion of crops into dwindling areas of range and pasture lands?

The impacts to wildlife come in addition to deteriorating water quality fed by farm runoff, which chokes our waterways with eroded soil, excessive nutrients, and toxic algal blooms. These water quality implications threaten aquatic life as well as human recreation and clean drinking water. Finally, all of these unintended negative impacts have accumulated for only meager

benefit, as there is debate about how much – if any – carbon reductions have come from the push for biofuels.

Although the RFS was a noble attempt to stimulate a cleaner, safer fuel supply, the time has now come to realize the policy has missed its mark, and to commit to doing a better job in achieving the law's good intentions. The law must be fixed to no longer add fuel to the destruction of our shared natural resources, so that all Americans now and in the future will be able to benefit from clean air, clean water, and abundant wildlife.

Background on the Renewable Fuel Standard (RFS)

The current federal RFS, signed into law in 2007, requires the blending of increasing amounts of ethanol and other alternative fuels into gasoline. An alcohol predominantly produced by fermenting corn starch in the United States, ethanol has been blended into gasoline in increasing volumes to meet the law's requirements; the law calls

for as much as 15 billion gallons of corn ethanol and an additional 21 billion gallons of "advanced" biofuels of other types by 2022. Ethanol produced from fermented corn starch powered Ford's first Model T engines more than 100 years ago. Since then, technology has developed to produce ethanol from the denser parts of plants – like grasses, cornstalks, and wood pulp – which is typically known as cellulosic or advanced ethanol. Other fuel types like bio-based diesel from soybean oil and even fuel mixtures produced from single-cell algae are being produced as well. While corn is the predominant source for ethanol in this country, other starchy plants are used to produce ethanol elsewhere, such as sugar cane in Brazil and sugar beets in Europe. These fuels were envisioned as a means to replace foreign-produced oil with domestically produced renewable fuel, and as a means of reducing greenhouse gas (GHG) emissions. To that end, the RFS includes GHG reduction requirements for each fuel type: in order to be comply with the mandate, conventional ethanol from new facilities would have to reduce lifecycle GHG emissions by 20 percent below the baseline emissions of producing the corresponding amount of gasoline, advanced biofuels and biomass-based diesel would require a 50 percent reduction, and cellulosic biofuels a 60 percent improvement over gasoline.

Federal interest in fostering the use of domestically produced fuel derived primarily from corn dates back to the Carter Administration following the Iran crisis and petroleum shortages. The corn-based ethanol industry and federal subsidies for the fuel remained small until the early 2000s when the fuel was recognized as a viable replacement for the fuel additive methyl tert-butyl ether (MTBE). A petroleum-derived chemical, MTBE had been infused in gasoline to make it perform better in vehicle engines. When MTBE was found to be leaking from storage tanks into underground drinking water supplies in the 1990s, the search for a replacement landed on ethanol.

Latching onto arguments around American energy independence and freedom from foreign sources of oil in order to help cement ethanol as the fuel oxygenate of choice, Congress passed and President George W. Bush signed into law the Energy Policy Act of 2005. The new law included the first Renewable Fuel Standard, requiring

Foreseeing Potential for Disaster

included in the 2007 RFS law was a prohibition on fuels derived from crops grown on land that had been converted from non-agricultural land after the law's passage – an important win for conservationists and wildlife enthusiasts. Through this provision, Congress sought to ensure that the large federal mandate for bio-based fuels would not drive farmers to plow up virgin habitat in order to grow crops for these fuels. However, the EPA has chosen not to implement this safeguard, and large-scale conversion is exactly what occurred. **What should have been a critical protection for native lands and prime wildlife habitat has instead been an empty promise.**

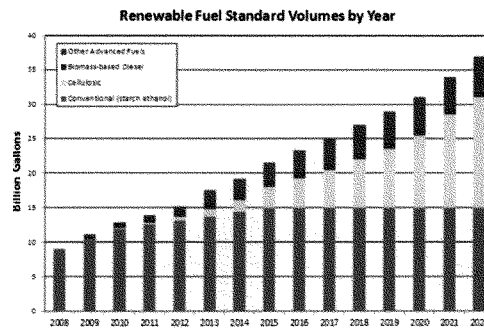


Figure 1. RFS Mandated Volumes, Credit: US Dept. of Energy.

the blending of ethanol into gasoline, with the goal of reaching a total of 7.5 billion gallons in 2012. A mere two years later, under new Democratic leadership in both the House and Senate, Congress greatly expanded the RFS, including the new requirements for second-generation fuels – termed advanced and cellulosic biofuels – to eventually surpass production of corn ethanol.

Over 97 percent of biofuels produced in the United States are derived from corn, with little potential for other major new fuel sources in the near future.^{1,2} In order to meet this level of production, around 40 percent of the U.S. corn crop is now diverted to biorefineries to meet the mandate, up from just 9 percent in 2001, though it is important to note that the use of dried distillers grain – a byproduct of ethanol production – as livestock feed reduces ethanol's overall impact closer to 25 percent.³ Corn now dominates the agricultural landscape, being grown on more than 90 million acres of cropland. Increased corn demand also has succeeded in stimulating the rural economy by driving crop prices to historic highs. While these prices have since moderated,

at their peaks in 2012, corn and soybean prices had tripled compared to 2002, with wheat, cotton and other row crops also benefiting.⁴

To date, the RFS has successfully integrated corn ethanol into the fuel supply, which today consists mostly of a mixture of about 10 percent ethanol to 90 percent gasoline. The law has not yet succeeded, however, at stimulating the large-scale commercialization of second-generation biofuels, production of which has lagged precipitously below mandated levels. This lack of cellulosic fuel supply led the Environmental Protection Agency to reduce the blending requirements far below those stated in the law every year. With corn reaching its mandated ceiling of 15 billion gallons in 2017, concerns about the so-called “blend wall,” or limit of 10 percent ethanol that can be safely added to most gasoline, will again be at the fore. Both this practical limit on ethanol and the ineffectiveness of the RFS in stimulating the growth of the advanced and cellulosic sectors have led many to call for reform or repeal of the law for reasons beyond its environmental impacts.

- Over 97 percent of domestic biofuels are derived from corn.
- 40 percent of the U.S. corn crop is sent to ethanol plants.
- Corn is grown on 90 million acres, more than any other crop.



Eliminating stream buffers and planting right up against water bodies, as on this Iowa farm, greatly increases the risk of erosion and water pollution. Photo Credit: Tim McCabe / NRCS.

High demand for corn, fueled in part by the mandated use of ethanol, may have been a boon to rural economies, but it was a bust for native ecosystems and wildlife habitat.

3

Making Way for Energy Crops: The Reality of Land Conversion and Habitat Loss

With more than 40 percent of the domestic corn crop now destined for fuel tanks rather than traditional uses such as food for people and livestock, the inevitable consequence has been a large ramp-up in production to meet the increased demand. This has included a major expansion of cropland into new areas. The first comprehensive nationwide assessment of land use change since the passage of the RFS, done by researchers at the University of Wisconsin, found overall conversion of 7.3 million acres into cropland from 2008 to 2012, the first four years of the expanded mandate.⁵ Taking into account other land use fluctuations during that time, the country saw a net expansion of 2.9 million acres of cropland. This represents an area larger than the state of Massachusetts of grassland, wetlands, and forest that had not been cropland for more than 20 years, all of which had been plowed under to make way for the greatest agricultural transformation in at least a generation. Even this very high number is likely a gross underestimate, as the study evaluated only parcels of land 15 acres or greater in size, leaving out many of the smaller changes along the periphery of existing fields. More recently, the World Wildlife Fund, using a slightly different methodology, estimated that from 2009 to 2015 the Great Plains (including a small portion of southwestern Canada) saw conversion of a jarring 53 million acres of grassland into cropland.⁶ High demand for corn and the attendant climb in crop prices, fueled in part by the mandated use of ethanol, may have been a boon to rural economies, but it was a bust for native ecosystems and wildlife habitat.

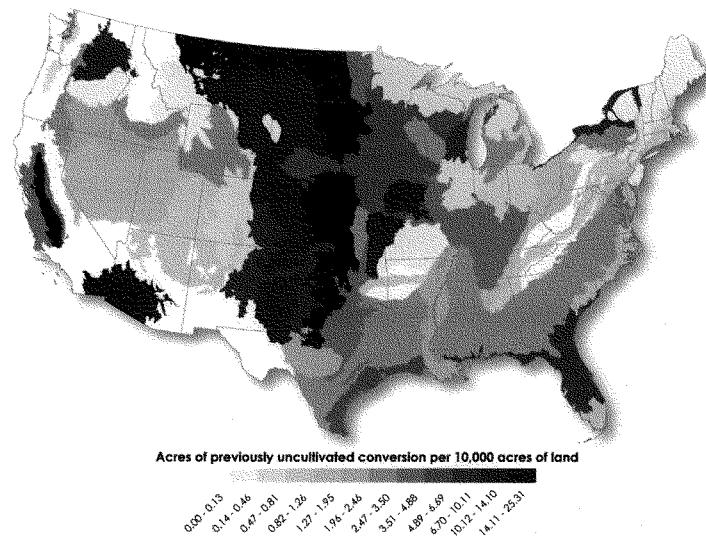


Figure 2: Map depicting trends in conversion to cropland from 2008 to 2012. Credit: Lark, et al, University of Wisconsin, 2015.

Changes in the Heartland and Beyond

The University of Wisconsin study found that some level of conversion had occurred in all regions of the country, but certain areas were identified as "hotspots" of conversion.⁵ The greatest total expansion was concentrated in predictable areas in and around the Corn Belt, such as the Dakotas, along the border of Southern Iowa and Northern Missouri, and in the Western parts of Kansas, Oklahoma, and the Texas panhandle. Others were found in "new frontiers of agriculture," including on the Western Plains from South Dakota to New Mexico, along the edge of the forests in northern Minnesota and Wisconsin, in southern Missouri and eastern Oklahoma, and in the eastern and western piedmont of

the Appalachians. Crop production expanded in these regions as new technologies made it possible to plant in these areas and the rising price of corn, along with federal crop insurance subsidies, altered the economics of planting there, and as other crops displaced by corn found new outlets elsewhere. While the researchers found the greatest total conversion in the Dakotas, a large portion of the areas of new expansion saw their cropland at least double in size over the period.

Previous studies focused on the greater Corn Belt found similarly troubling results. One zeroed in on the five western Corn Belt states of Iowa, Minnesota, Nebraska, North Dakota, and South Dakota and found conversion of more than 1.3 million acres of grassland into corn/soy crops from 2006-2011.⁷ The highest loss rate was found along the western edge of the region, where corn



Farms and wetlands often struggle to coexist in the Prairie Pothole Region. Photo Credit: Laura Hubers / USFWS.

and soy crops expanded into a more difficult climate, and in Southern Iowa where farmers planted on poor quality soils. In these hotspots, the rates of conversion were as high as 30 percent over the timeframe or as much as 5 percent annually. Focusing more closely on the Prairie Pothole Region of the Dakotas, another study found a steady increase in corn/soy acreage from 2006 through 2012, but a major ramp-up occurring at the end of that timeframe. From 2010 to 2012 alone, the region saw an increase in corn and soy acreage of 27 percent, totaling an area larger than the state of Connecticut and half the size of Belgium.⁸ The rate of increase over those years was nine times faster than that of the earlier part of the study, occurring alongside the law's implementation and drive to plant in the years following the RFS. Finally, one more recent study from 2016 documented major conversion in the Lake States of Michigan, Minnesota, and Wisconsin, finding that two million acres of non-agricultural open space was converted from 2008 to 2013, a loss of 37 percent.⁹ Meanwhile, corn acreage in the states increased by 36 percent.

Expansion Fed Largely on Grassland

As expected, the majority of losses on the landscape over the course of the RFS came from grasslands, which were already the most endangered ecosystem in the United States.¹⁰ The U.S. Department of Agriculture's Economic Research Service in 2011 published a study titled "The Ethanol Decade: An Expansion of U.S. Corn Production, 2000-2009" that attributed one-third of the

Putting Conversion in Context

"Our results show that rates of grassland conversion to corn/soy (1.0-5.4% annually) across a significant portion of the US Western Corn Belt are **comparable to deforestation rates in Brazil, Malaysia, and Indonesia**, countries in which tropical forests were the principal sources of new agricultural land, globally, during the 1980s and 1990s. Historically, comparable grassland conversion rates have not been seen in the Corn Belt since the 1920s and 1930s, the era of rapid mechanization of US agriculture." Wright et al. 2013

expansion of corn and soybeans over that timeframe to the conversion of expiring CRP lands, hay fields, or grazing lands.¹¹ Most of the additional expansion came from farmers' switching to corn from other crops such as soybeans (many farmers have changed from rotating corn and soy into a three-year corn-corn-soy rotation or foregoing soy altogether) or utilizing fallow lands. Another study from USDA focusing on the years immediately following the onset of the ethanol mandate, this time the agency's periodic National Resources Inventory (NRI), also found a net expansion of 2 million acres of new farmland and confirmed that the majority of new lands were being drawn from CRP (54 percent of the new acreage) and pasture (39 percent).¹²

The University of Wisconsin study determined that grasslands of one type or another (native prairie, planted pasture, CRP, etc.) were the largest source for converted cropland, accounting for 77 percent of new farmland. More than a fourth of these grasslands had been in grass for over 20 years, forming what the researchers

termed "long-term, unimproved grasslands" with the highest value for wildlife and carbon sequestration. Other research determined that the Dakota Prairie Pothole Region lost 6.75 percent of its long term grasslands between 2010 and 2012, which was during the corn/soy ramp-up in the region.⁸

Grasslands, however, were not the only source for new lands to feed agriculture's expansion. The UW study found, surprisingly, that forested land was the source for about 3 percent of new cropland. In all, 198,000 acres of forests were cleared between 2008 and 2012. Wetlands and their immediate surroundings were also a large contributor to conversion according to the study, particularly in ecologically important areas. Wetlands, which were the source of about 2 percent of new cropland, saw conversions concentrated in the Dakotas and Minnesota, with other concentrations in the lower Mississippi valley, and numerous other states, including California, Florida, Georgia, Nebraska, Washington, and Wisconsin. Another study demonstrated the loss of grasslands immediately surrounding wetlands; these grasslands are just as critical as wetlands in providing habitat and food sources to nesting waterfowl and other animals. South Dakota saw the greatest such loss with nearly 250,000 acres of conversion occurring within 100 meters of surrounding wetlands, and more than 80 percent of all conversion happening within 500 meters.⁷

Considering measures of the quality of newly broken lands other than original land use type, the UW study found that conversions were largely not happening on lands with soil suited for prime, productive farmland, as all the best land had been converted long ago. They were occurring on marginal and sensitive lands not well suited to farming. Wetlands, for instance, do not make ideal natural farmland because they tend to be too wet, so they generally must be drained to be viable, and even then, farmed wetlands are at risk of failure from water. The Lake State study also confirmed that much of the expanded agricultural production occurred on marginal soils not well suited to farming. Other areas, such as wetland and stream buffers, floodplains, and rocky forest soils, are not only prime wildlife habitat, but they are also less productive for agriculture and have higher crop insurance indemnity costs due to the higher potential of crop failure. It is important to note that this expansion into marginal lands was driven not only by the RFS, but also by other market forces and importantly, the



A grassland nest in the Prairie Pothole region of South Dakota. Wetlands and grasslands provide habitat for numerous species to hatch and raise their young. Photo Credit: Don Poggensee / NRCS.

availability of robust federal subsidies for crop insurance and other farm commodity programs. Without these programs, it is likely utilizing many of these lands would not be an economic choice for farmers even in the face of high crop prices.¹³⁻¹⁵

Foresight's Folly

As troubling and disruptive as this transformation has been on the landscape, it was not entirely unforeseen, having been predicted by early modeling forecasts. One of the first major assessments of the 2007 RFS law, published in *Science* magazine in 2008, sounded the alarm bells. The study, led by Princeton researcher Tim Searchinger, estimated that meeting the new targets would lead to conversion of 5.4 million acres of non-cropland into crops in the United States, with a total of 26.7 million new acres globally as producers around the world shifted their production to adjust to new commodity demands.¹⁶ That study, which was focused on GHG emissions, also predicted the inadequacy

Grasslands account for 77 percent of the millions of acres of converted cropland. Forests contributed 3 percent, and wetlands an additional 2 percent.

Not Like Home Anymore

Julie Sibbing, National Wildlife Federation

During a visit back to my hometown in the Midwest a few years ago, I visited the rural property where I grew up. I was a country kid, running in the woods with my dog and playing in the creek. I spent so many summer days wading in that creek, catching tadpoles, swimming and fishing. I remember catching my first big fish in that creek (probably a carp), only to have my brother accidentally let go of the stringer it was on. I never quite forgave him for that. I had often come back here over the years to revisit the paradise of my youth.

But this time as I rolled up my pant legs and waded into the creek I got a big surprise. Instead of stepping onto the limestone bottom, my feet disappeared into a thick layer of muck. A deep layer of mud covered the entire creek bottom; no fish or tadpoles were visible. I struggled through the boot-sucking muck and came to a place where all the trees lining the adjacent farmland had been bulldozed into the creek and replaced by corn. The unprotected banks were fast eroding away. I felt sick to my stomach. This creek – my creek – was ruined.

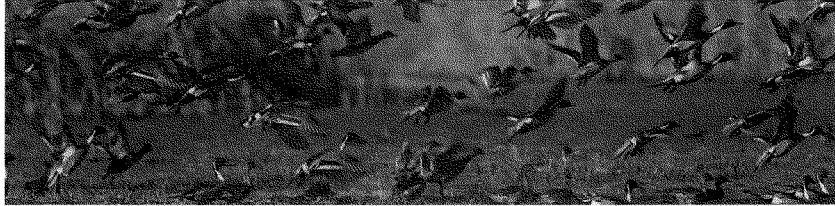
That visit to rural Illinois was just a couple of years after Congress passed the Renewable Fuels Standard in 2007. We all know what they say about good intentions: The road to hell is paved with them. Despite the law's good intentions, there have been serious environmental consequences to the increased growth of corn to meet RFS mandates, which I saw firsthand for the first time that day. To take advantage of the increased demand for corn created by the mandate, some farmers increased the intensity of their farming; some brought land back into production that had been set aside as too marginal to farm; and some plowed up field borders and buffer strips along streams to squeeze in a few more rows – some even plowed right through pioneer cemeteries. This intensive, unsustainable farming has taken a toll, from the degradation of the small creek I used to play in as a child, to toxic algal blooms in lakes and coastal waters and expanding the dead zone in the Gulf of Mexico.

My brothers and I someday stand to inherit the land and the creek where I grew up. I love to think about my great nieces and nephews having the chance to play in the creek, catching tadpoles like their grandfathers and I did. I really hope that they have that chance.

of the law's prohibition on direct land conversion to biofuel crops, stating, "Because emissions from land-use change are likely to occur indirectly, proposed environmental criteria that focus only on direct land-use change would have little effect. Barring biofuels produced directly on forest or grassland would encourage biofuel processors to rely on existing croplands, but farmers would replace crops by plowing up new lands."¹⁶

Similar predictions followed suit. The government's own Economic Research Service, a division of the U.S. Department of Agriculture (USDA), predicted in 2009 that cropland would expand by 5 million acres to meet the requirements called for in 2015.¹⁷ It noted that the new acres would come from every region in the country, but the largest expansion would occur in the Upper Midwest states of the Dakotas and Minnesota. These states include the majority of the internationally significant waterfowl breeding grounds of the Prairie Pothole Region. Another study published in 2010 estimated that meeting the 2015 mandate would require the conversion of 3.7 million acres into cropland in the United States, and 9.4 million acres globally.¹⁸

Contrary to these early estimates, the EPA in implementing the new law adopted an upbeat stance on the likelihood of large new conversion to meet the mandate. In its 2010 final rule implementing the RFS provisions of the Energy Independence and Security Act (EISA), EPA stated that the existing baseline of available cropland in 2007 would "at least in the near term, be sufficient to support EISA renewable fuel obligations and other foreseeable demands for crop products, without clearing and cultivating additional land. EPA also believes that economic factors will lead farmers to use the 'agricultural land' available for crop production under EISA rather than bring new land into crop production."¹⁹ The EPA's justification for this assumption relied heavily on expected gains in yield from existing acres. Additionally, the baseline acres included areas like the Conservation Reserve Program which had been cropped in the past but had been placed under contract and reverted back to natural grassland or forest for as much as 20 years by that time, building up significant value as wildlife habitat and storing tremendous amounts of carbon above and below ground. So while putting these lands back under the plow might not have met EPA's definition of conversion, doing so carries tremendous environmental consequences.



Habitat for ducks and other waterfowl is at high risk of conversion to agriculture in the Northern Great Plains. Photo credit: USFWS.

Furthermore, EPA has refused to implement the land conversion protection built into the law. Rather than asking ethanol producers to verify that their feedstocks originated on eligible land, the agency developed an "aggregate compliance" approach. Under this approach, the agency said it would compare the total cropland each year to the total that was available in 2007, and if a certain threshold is exceeded, then the agency would investigate to see if additional measures are necessary. Despite the clear evidence of land clearing that now exists, and despite the fact that USDA has reported an increase in planted acres of commodity crops from 242.6 million in 2007 to 249 million in 2013,²⁰ and the conversion of almost 400,000 acres of non-cropland to cropland over a single year (2011 to 2012),²¹ EPA has never pulled that trigger. Instead, the flow of corn ethanol continues unabated, even as an area twice the size of Delaware has been lost to the plow.

Corn as a Culpit

Numerous studies point to corn expansion as the primary cause of the transformation seen on landscapes around the country, and the RFS was intimately linked to this phenomena as one of the main sources of new demand for corn.²² The USDA's Economic Research Service had predicted an increase in cropland to meet the needs of the new law, and its subsequent assessment in *The Ethanol Decade* confirmed as much. That paper found that corn acreage had expanded by 10 percent, a full 7.2 million acres over those 10 years, with the majority of expansion occurring between 2006 and 2008, the years immediately following establishment of the RFS.¹¹

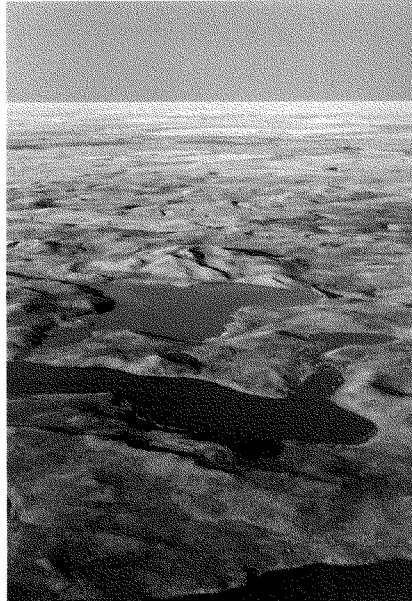
Other studies have confirmed that a dramatic surge in corn production and attendant land conversion occurred post-RFS. Johnston's study particularly shows this surge, as conversion rates after the RFS passed in 2007 were

nine times higher than the years prior.⁸ The Wisconsin study attributed more than half of the "responsibility" for the conversion to corn.⁵ The Congressional Budget Office also weighed in, attributing 20 percent of the increase in corn prices from 2007 to 2008 to demand for domestic ethanol, and that meeting the increased demand for an escalating mandate will have further upward impact on the price of corn.^{23,24}

A 2016 paper modeled the response of landowners to the location of an ethanol plant nearby, and found that the presence of a plant strongly influences increases in both corn acreage specifically and overall agricultural acreage in surrounding areas.²⁵ It also found that ethanol plants were not only driving crop expansion in existing fields, but also the conversion of new land to meet the local refining needs. Yet another upcoming paper overlays the locations of existing ethanol plants onto the data from the UW study to show that conversion of non-cropland into crops increased steadily with closer proximity to an ethanol plant, with conversion rates on land within 25 miles of a plant more than double the rate that occurred from 75-100 miles out.²⁶ The study identifies 2.7 million acres of converted lands within 50 miles of an ethanol plant, with corn and soy being planted on the lion's share. Tracking out to the 100-mile radius, the data show an additional 1.5 million acres of conversion, but with corn and soy accounting for less than half of the new production, illustrating the primacy of corn and soy production for biofuels and the displacement of other crops to areas farther away from biofuel production.

With all this information now in hand, it is clear that the mandate to blend biofuels – particularly the first generation fuels of corn-based ethanol and soy-based biodiesel – has had a domino effect, contributing to large scale destruction of natural areas and the ecosystem services they provide.

4

Threats
to Wildlife

The Prairie Pothole region provides critical habitat for more than 60 percent of the nation's ducks and other waterfowl. Photo credit: USFWS.

Wetlands and marshes in the Pothole region have been destroyed both by expansion of row crops into these sensitive habitats and by increased drainage of farm fields. This practice, known as tile drainage, helps to improve crop yields by removing excess water from the soil. Draining these wetlands and plowing up the surrounding grasslands puts this "duck factory" at great risk.

13

The dramatic changes in the landscape that have occurred over the last decade, driven in large part by the ethanol mandate, have had clear impacts on wildlife habitat, and in turn have most certainly affected the many species that depend on those habitats. Globally, land use change has been identified as one of the major drivers of biodiversity loss, and agricultural expansion has been identified as a major threat to birds around the world.^{27,28} The expansion of agriculture, particularly into areas that had previously been grasslands, wetlands, or forestland, means that less habitat is available for wildlife populations that depend on these ecosystems for food, shelter, and/or breeding. Some of the initial impacts of conversion on wildlife include loss of year-round habitat, particularly through the conversion of "marginal land" that was previously habitat, direct mortality during harvest, loss of spring nesting or fawning cover, and loss of winter food and cover. Many of the most vulnerable species, including grassland birds and upland-breeding waterfowl, are negatively affected by the loss of nesting, brooding, and winter cover that grasslands provide.

The Prairie Pothole Region (PPR) is an area that has been a hotspot of conversion of non-cropland to corn and other crops. At the same time, the region is particularly important in terms of wildlife and biodiversity. The Prairie Pothole Region contains many shallow wetlands (also called potholes), and is often referred to as the "duck factory" of the country. These wetlands are rich in biodiversity, and together with the grasslands surrounding them, serve as one of the country's most important habitats for breeding waterfowl – producing more than 60 percent of the country's total population.²⁹ In the North and South Dakota PPR, agriculture, and particularly the expansion of corn and soybeans, has been identified as the greatest source of wetland loss. Wetlands and marshes in this area have been destroyed both by expansion of row crops into these sensitive

habitats and by increased drainage of farm fields.³⁰ This practice, known as tile drainage, helps to improve crop yields by removing excess water from the soil. Draining these wetlands and plowing up the surrounding grasslands puts this "duck factory" at great risk.

Some of the species that have been most significantly affected by the expansion of monoculture corn agriculture include waterfowl, grassland birds, monarch butterflies, bees, and other native pollinators. There is a large body of research demonstrating the detrimental impact of corn expansion on wildlife biodiversity compared to native grasslands and even (to a lesser extent) perennial biofuel crops, such as grasses. Grassland bird abundance and richness has been found to be much higher in perennial biofuel plantings compared to corn or other annual biofuel plantings.³¹⁻³⁴ A 2011 study found that increased cultivation of four biofuel crops—corn, switchgrass, pine, and poplar—would result in reduced vertebrate diversity and abundance compared to the habitats that the crops replace. These effects were greatest with conversion of habitat to corn. Additionally, the researchers found that birds of conservation concern are affected more by conversion to corn than species of less conservation concern.³⁵ These results are particularly troubling in light of the fact that grassland birds are among the fastest and most consistently declining groups of birds in the country— with 48 percent of grassland-breeding bird species identified as species of conservation concern.³⁶

Land use change and loss of habitat has been cited as a major threat to the survival of the monarch butterfly— a species whose population decline has been well-documented.³⁷ Monarchs depend on milkweeds for breeding success, and the loss of milkweed-rich prairies, buffer strips, and field borders to agricultural expansion and intensification means a loss of breeding habitat for the species.³⁸

Additionally, studies have found that mixed prairie and switchgrass (a cellulosic biofuel feedstock) support much greater abundance and diversity of native bees and other important insect pollinators than corn.³⁹ With populations of both native and cultivated bees in steep decline, two recent studies have demonstrated that expansion of agricultural production, particularly corn and soybeans, into the western portion of the Dakotas poses a great threat to their continued viability. This region is home to 40 percent of the country's commercial bee colonies, which are critical

Disappearing Wildlife

George Cunningham, University of Nebraska Omaha

As a biologist in central Knox County, Nebraska, I have witnessed all around me the jarring loss of native habitats as government policies have made it easier for farmers to make a profit farming on poorer soils. Until recently, land in this area was considered marginal for water-intensive crop production and had been used mostly for cattle grazing. Wildlife in the area had always been abundant, with common sightings of Ord's kangaroo rat, ornate box turtle, greater prairie chicken, burrowing owl, and a host of other reptile, amphibian, and bird species.

Over the last 10 years, however, all of this has been changing as thousands of acres of native mixed and tallgrass prairie have disappeared as a result of land conversion to row crop corn and soybeans. Changes to the federal crop insurance program starting in 1997, along with easy access to groundwater (due primarily to Nebraska's loose water management regulations), began a process that has caught fire after the mandate for renewable fuels created a subsidized market for corn. Sadly, the number of greater prairie chicken leks has dropped dramatically, the Ord kangaroo rat that use to run by the hundreds across the county roads at night has vanished, sightings of Burrowing Owls are greatly reduced, and areas that used to be inhabited by toads, snakes, and box turtle have disappeared.

The most dramatic and heart wrenching sight I ever witnessed was the conversion of an especially sandy and hilly parcel of prairie. This area was sprayed with herbicide to chemically burn off the vegetation and followed up with disking. Right after this destruction of grassland, I observed greater prairie chickens and burrowing owls standing in in the same area, now a bare field, totally exposed and looking confused as their once dense prairie vegetation was gone.

Unfortunately, short sighted federal farm and energy policies have made it more profitable to farm corn or soy on marginal land than keeping it in grazing lands, unintentionally encouraging the destruction of many thousands of acres of native prairie. The results have been declines in plant and animal species, depleted groundwater, and a loss of Nebraska's natural prairie heritage.

to pollination of approximately \$15 billion in agricultural value. Together these studies show that in the Dakotas, biofuel crop production surrounding commercial bee colony sites increased by nearly three million acres from 2006 to 2014, despite the fact that beekeepers prefer sites far from agricultural fields, and that bees have higher survival rates when their colonies are surrounded by more open space relative to agricultural land.^{40,41}

As cultivated crops continue to move into new territory, the list of species impacted will only continue to grow. According to one analysis, expanded production of annual biofuel crops such as corn and soy onto “marginal” lands will lead to significant declines in bird species richness – between 7 and 65 percent – across 20 percent of the Upper Midwest, and could make managing threatened and endangered species even more challenging.³⁹ Continued expansion of corn will not only affect birds and pollinators, but mammals may also be at risk. Swift foxes, for instance, have proven to be highly successful in rangelands and limited agricultural landscapes such as fields with winter wheat, but irrigated agriculture is a highly incompatible use for the foxes.⁴² Expansion of agriculture has been cited as one of the major potential threats to the fox, which has been considered for listing under the Endangered Species Act.

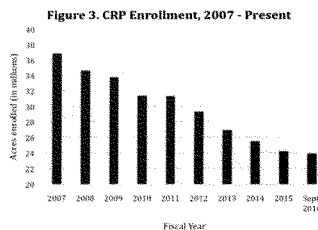
Habitat Loss and Degradation

One of the more diffuse impacts of agricultural expansion is increased habitat fragmentation and reduced habitat buffering of conservation areas. Some grassland species, particularly those of conservation interest, require large tracts of habitat for their survival. For example, the greater prairie chicken requires a large enough expanse of grasslands for the birds’ mating, nesting and brood rearing.

In addition to landscape-scale changes, the corn ethanol boom and associated high commodity prices have also led to significantly increased agricultural intensification. This agricultural intensification has led to a simplified environment within fields, as well as across the landscape. Increasingly there have also been fewer rotations between crops and more continuous corn, as well as farmers planting fencerow to fencerow without the buffers that serve as important habitat, particularly for riparian species. Many species of wildlife thrive in

landscapes with a diversity of vegetative types. For instance, crop fields buffered by trees or grasses and interspersed with prairies, CRP fields, pasture land, wetlands, and/or forests provide much greater habitat than continuous monoculture cropland. However, as more and more land is converted to cropland, these landscapes look increasingly homogeneous – intensively managed monocultures of corn, soy, wheat, and other commodity crops with little else on the landscape that does not allow for a lot of habitat for diverse species.

Another important impact of land conversion on wildlife populations stemming from land use change comes from changes in Conservation Reserve Program (CRP) enrollment. In the last 30 years since the program’s creation, CRP has proven to be an extremely effective conservation program with significant benefits for soil, water, and wildlife.⁴³ CRP offers landowners the opportunity to take their marginal lands out of production and into conservation cover in exchange for a small rental payment, and it provides much needed grassland habitat on agricultural landscapes, providing habitat for many species of wildlife that would otherwise likely be threatened or endangered. As explained earlier in this report, over the last decade, corn prices and other commodity prices increased dramatically, driven up in part by the RFS. Increased demand for corn for ethanol and high commodity prices has led to dramatically reduced enrollment in the CRP program, as landowners have been finding it more profitable to farm their land rather than enrolling or re-enrolling it in CRP.⁴⁴ Over the course of RFS2 – between 2007 and 2013, CRP enrollment dropped by around 10 million acres.⁴⁵



Source: USDA Farm Service Agency Data

5 Impacts of Corn Expansion and Biofuel Production on Water Quality

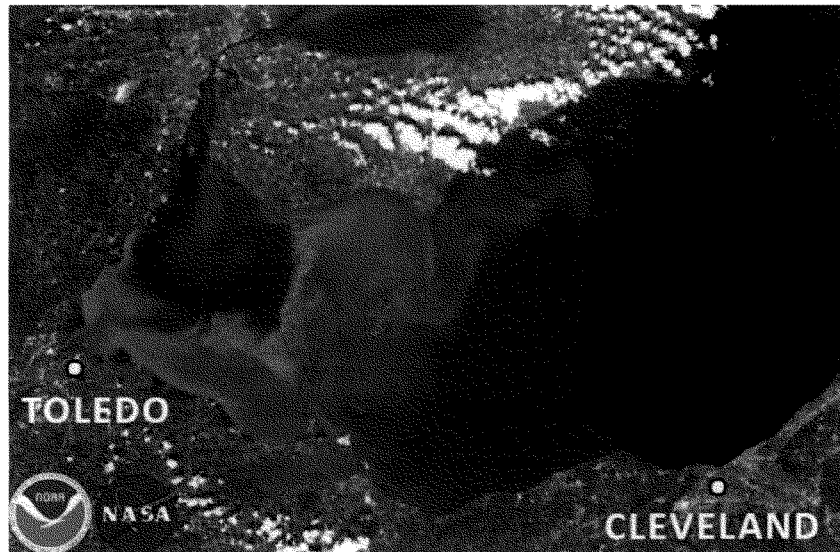
Beyond the implications for terrestrial wildlife habitat, the growing biofuels industry has had a major impact on water supplies, both in its uptake of large amounts of water during manufacture and in the increase in farm runoff laden with sediment, fertilizer, and pesticides. A few recent studies have tried to account for the impacts of biofuel production on water quality and quantity; surprisingly, the studies predominantly found that ethanol has higher water quality impacts than gasoline, and that ethanol refineries use a significant amount of water, which can have high localized impacts.⁴⁶⁻⁴⁸

Intensive row crop agriculture has long been associated with high levels of nutrient loss and soil erosion, leading to contamination of water supplies. Compared to other biofuel crops including soybean and perennial grasses, corn has the highest level of application of nutrients (fertilizer and pesticides) resulting in higher runoff from fields.^{49,50} Corn acreage used for ethanol production is mostly centered in the Mississippi River watershed and the Great Lakes Basin; thus, the Great Lakes and the Gulf of Mexico share the greatest burden for potential water quality impacts from the increased demand for corn for ethanol.^{11,23} The expansion of corn plantings has come in three forms: converting non-farmland to corn, switching from non-corn crops, and moving from a rotation such as corn-soybean to continuous corn. All of these have impacts on water quality. One recent study modeled the impacts of crop and land switching and came up with dramatic results for water outflows. A model scenario of switching other row crops to continuous corn would result in an increase of sediment yield of 42 percent, and converting pasture to corn would increase sediment yields by up to 127 percent.⁵¹



*Storm runoff erodes stream banks and fills water bodies with sediment, pesticides, and chemical fertilizers.
Photo credit: Tim McCabe / NRCS.*

Studies predominantly found that ethanol has higher water quality impacts than gasoline.



Lake Erie algal bloom, 2014. This annual phenomenon largely is fed by fertilizers running off farmland. Photo Credit: NOAA.

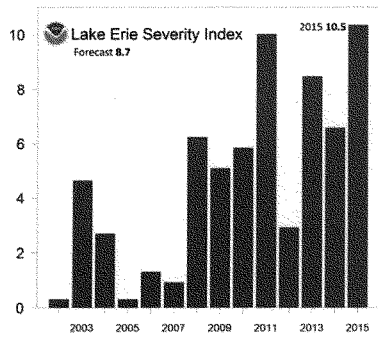


Figure 4. The severity of algal blooms on Lake Erie has risen dramatically following the RFS. Credit: NOAA.

Concurrent to corn's expansion has been an increase in the intensity and occurrence of annual algal blooms in the Great Lakes. Algal blooms are the rapid spread of sometimes toxic algae in a water body, usually as a result of excessive nutrients. In August 2014 the city of Toledo, Ohio suffered a drinking water shortage affecting half a million residents for three days thanks to the largest toxic algal bloom in Lake Erie ever recorded – even worse than the 1960s, when the algal bloom was so bad that Lake Erie was declared “dead.”^{52,53} The massive growth of toxic *microcystis* algae to levels 1,000 times higher than levels deemed safe for drinking water by the World Health Organization not only shut down Toledo's potable water, but also closed beaches, had dire impacts to the fishing, tourism, and recreation industries all along the lake, and pushed marine life out of its way. This event succeeded a similar incident from 2011 that prompted an intergovernmental review that laid the blame squarely on farm runoffs, particularly phosphorous. “The biggest

contributor of phosphorus to Western Lake Erie is agriculture, and the largest reductions must come from agriculture."⁶⁴

Even when algae is not of the toxic variety, it can cause major ecological and economic problems. The Mississippi River carries runoff from 41 percent of land in the United States and drains into the Gulf of Mexico, contributing to a well-documented annual hypoxic or 'dead' zone for the last three decades.⁶⁵ When nitrogen and phosphorous loads from fertilizers from this great expanse of farm land gather in the Gulf, they spur the growth of algae that then dies, and in decay consumes all the available oxygen in the water. Without oxygen, all other marine life perishes or swims elsewhere, thus creating epic dead zones. Researchers have determined that meeting the volume requirements mandated in the RFS by 2022 will make a goal of reduced hypoxia in the Gulf "practically impossible without large shifts in food production and agricultural management."⁶⁷

"...meeting the volume requirements mandated in the RFS by 2022 will make a goal of reduced hypoxia in the Gulf "practically impossible without large shifts in food production and agricultural management."

Finally, water quality impacts are exacerbated by conversion of sensitive land to agriculture. The loss of wetlands in areas such as the Dakotas has a number of water quality impacts, as wetlands are important filters for storm water and snow melt. The converted land is more susceptible to flooding and drainage issues, and this in turn exacerbates surface water quality impacts of nutrient-heavy runoff. Additionally, there can be leaching from agriculture to groundwater supplies with the highest levels predicted in Lakes States.⁶¹ These persistent impacts come with large ecological, public health, and economic costs.

Troubled Waters

- Dave Spangler, Dr. Bugs Charters and President, Lake Erie Waterkeeper

As a lifelong fisherman and a charter boat captain on Lake Erie for more than 30 years, I have seen firsthand just how spectacularly rewarding life on the water can be, and I have also seen just how ugly it can get. Sadly, we are seeing more and more of the bad side, as algal blooms are increasingly making the lake inhospitable to fish and other marine life, as well as to the people who make their living or pass their days on and around the lake.

It is heartbreaking to see this reversal in the lake's fortunes. Water quality coming from the surrounding area had improved after the Cuyahoga River's bursting into flames made people take notice. After decades of work to clean it up, the fish population had returned to sustainably high levels, allowing me to make a good living doing what I love.

All of that started to change over the last ten years or so. Algae has now made a comeback instead, producing massive blooms in 2011, 2014, and again last year, which NOAA has said was the worst ever. Due to the algae, the fishing season was cut dramatically in half, and I ran my last waterside trip on July 15 instead of in late October like usual. Charter businesses like mine took a 25 percent hit last year, which is impossible to make up due to the seasonal nature of the work. That hit affected the related businesses as well: the tackle stores, fish cleaning houses, and lodging as people had to go elsewhere for their summer recreation. We just hope they'll come back again next year rather than looking for a new spot to fish.

The Renewable Fuel Standard is driving up corn production here in Ohio and elsewhere, which is helping push algae back up to these historic levels. Beyond that, it has made fueling our boats much more difficult: since boat engines don't stand up to higher ethanol blends, and neither do other parts like fuel hoses and fiberglass tanks. With the corn industry pushing for E15 and the USDA funding blender pumps around the country, those of us who own and operate this country's 16 million boats are very worried we won't be able to find the ethanol-free fuel we prefer, and that will leave many of us stranded in deep water. Fishermen, boaters, and taxpayers - not to mention our fish and other marine life - deserve better.

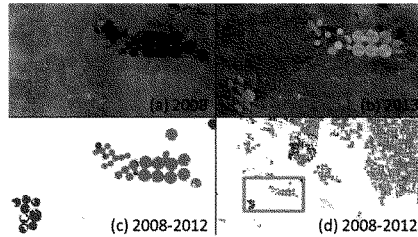


Figure 5. Expansion of center-pivot irrigated cultivation, located along the border of Texas and New Mexico. Satellite images are of the same location and extent and taken from Google Earth Pro before (a) and after (b) study period. Image (c) is our data for same location and depicts existing cropland (brown), abandonment (blue), and expansion (red). Noticeable expansion of center-pivot irrigated cropland can be seen in the lower left corner of (b) and (c). This pattern, representative of trends in the larger region (d), suggests a heavy reliance on irrigation for the increased crop production. Credit: Lark et al. 2015.

Ethanol's Contribution to Water Availability: A Race to the Bottom

Water quantity impacts of biofuels mainly come to bear when considering the expansion of corn and other biofuel crops in regions experiencing water stress. Corn is predominantly grown in adequately rain-fed regions, but higher prices improve the economics of growing it in drier climates that require costly irrigation. Irrigation continues to be the largest consumptive use of freshwater resources in the United States.⁵⁶ Nonetheless, corn grown in the High Plains, where much of the recent agricultural expansion has occurred, requires groundwater irrigation from the already severely drawn-down Ogallala aquifer.⁵⁷ Demonstrating the potential harm of producing corn-based ethanol in water-strapped regions of the country, corn ethanol produced in Colorado has a lifecycle water use of 42.5 gallons per mile driven, versus gasoline at 0.15 gallons per mile.⁵⁸ Moreover, irrigated corn for ethanol has higher average water withdrawals and consumption than oil sand and crude oil conversions to gasoline.⁴⁶ Meanwhile, irrigation for row crops continues to increase in the largest corn ethanol producing states.⁹

...ethanol produced in Colorado has a lifecycle water use of 42.5 gallons per mile driven, versus gasoline at 0.15 gallons per mile. Moreover, irrigated corn for ethanol has higher average water withdrawals and consumption than oil sand and crude oil conversions to gasoline.

In addition to these larger water quantity impacts, the location of biorefineries can have severe localized impacts on stream flows. A biorefinery producing 100 million gallons of ethanol a year consumes the equivalent water supply of a town of 5,000 people.⁵⁹ Drawing excessive amounts of water can impact minimum stream flows that further affect habitat potential. Low stream flows are associated with lower dissolved oxygen levels, placing greater stress on aquatic species.⁶⁰

Given the scale these impacts to water availability, a shift to second generation biofuels that do not rely on irrigation, along with improved agricultural practices at the watershed level, is needed in order to prevent further disruption of scarce water supplies.⁶¹

A biorefinery producing 100 million gallons of ethanol a year consumes the equivalent water supply of a town of 5,000 people.

Ethanol and Greenhouse Gases: It's Complicated

The extent of corn ethanol's contribution to GHG emission reductions remains murky. Even if the fuel has resulted in slightly lower emissions any small gains have been wrought at a very high environmental cost.

The potential for reductions in greenhouse gas (GHG) emissions was one of the most prominent justifications for passage of the RFS and reasons cited in its ongoing defense. The uncertainty surrounding the extent of these reductions, therefore, is troubling at best. The EPA calculates the lifecycle emissions of biofuels in comparison to those from gasoline since the RFS requires that biofuels have lower emissions (20 percent, 50 percent, and 60 percent for conventional, advanced, and cellulosic biofuels, respectively) relative to fossil fuels. There is considerable disagreement over the accuracy of the methodology of the life cycle assessments (LCAs) used by the EPA, with some researchers arguing that emissions from conventional biofuels can actually be higher than those of gasoline.^{62,63} The lifecycle analyses of all fuels consist of a "wells to tank to wheels" approach that includes the production of the fuel base, transportation, processing, and use – with each of these components producing emissions that need to be accounted for by the LCA. Several analyses of the LCAs of corn ethanol provide evidence that intensive nitrogen fertilizer use and land conversion, including deforestation, actually result in greater atmospheric-warming emissions when compared to traditional gasoline in the near to medium term.⁶⁴

There are many potential ways in which current EPA modeling and assumptions may underestimate the GHG emissions associated with biofuels, particularly corn ethanol. Researchers have raised questions with the EPA's assumption that burning biomass for energy (including biofuels) is inherently carbon-neutral.^{64,65} Additionally, existing models typically undervalue or ignore land conversion of various land classes, which

we know to be occurring. While the EPA accounts for land use change in its analysis of emissions, its estimates are on the very low end of the results from a number of computational models, making for an optimistic assessment of the emissions reduction potential of biofuels.⁶⁶ Others estimate that converting non-cropland into corn and soy production would release the equivalent annual emissions of 34 coal-fired power plants or 28 million additional cars on the road.⁶ Additionally, EPA's analysis excludes the emissions from rangelands on the assumption that they will not be converted to biofuel production. However, spring planted barley qualifies as an approved ethanol feedstock that is mainly grown in the Northern Plains, and evidence shows conversion in this region even though rangelands are excluded as eligible cropland under the RFS.⁶ The other studies noted earlier in this paper also clearly show that rangeland has contributed to new cropland.

Finally, and most problematic, is the law's exception for emissions requirements for corn ethanol plants that were established prior to its passing in 2007. These grandfathered plants rely on emission-heavy production (such as coal firing rather than natural gas or co-generation) and therefore do not meet the 20 percent GHG reductions required by the RFS. They account for a majority of ethanol plants and therefore the emissions reductions of most corn ethanol is minimal at best.

In summary, the extent of corn ethanol's contribution to GHG emission reductions remains murky. Even if the fuel has resulted in slightly lower emissions any small gains have been wrought at a very high environmental cost.

A Call to Action



Monarch butterflies, bees, and other pollinators rely on diverse grassland habitats rather than large-scale agriculture to forage. Photo credit: Tom Koerner / USFWS.

All those who care about a future for wildlife can no longer stand aside and watch the devastating impact of this policy on the landscape. For the sake of our wildlife, climate, and clean water, we must now say that enough is enough. Something must be done.

It is unfortunate, to say the least, that one well-intentioned policy has contributed to so much harm on the landscape. Yet the impacts of massive corn production and land conversion have been well documented, and the mandate to turn corn into fuel has contributed to a major disruption of our shared land, water, and wildlife resources. The time has come to put a stop to this destruction.

Since the law's passage and implementation, farmers and ranchers, hunters and anglers, hikers and birders all around the country have been sounding alarm bells. Organizations like the National Wildlife Federation and our state-based affiliates, as well as many others, have weighed in with the EPA, the Administration, and Congress to push for enforcement of the land conversion prohibition within the RFS and for other protections for water, land, and wildlife. Despite these cries for wildlife habitat protection, we have continued to watch as our nation's grasslands and forests are plowed to make way for more corn for ethanol.

Our objections have been made, both in public and in private, with the EPA, the White House, and Congress. We worked to get national land conversion protections in the Farm Bill, resulting in only a regionally applied "sodsaver" provision that, even where it does apply, does not prohibit conversion and farming of land but only removes a portion of the government subsidies available on converted land. All those who care about a future for wildlife can no longer stand aside and watch the devastating impact of this policy on the landscape. For the sake of our wildlife, climate, and clean water, we must now say that enough is enough. Something must be done.

The RFS as it stands is broken, and it must be fixed.



Pheasants like this one in South Dakota rely on grassland habitat for nesting and protection from predators. They have been heavily impacted by agricultural expansion. Photo Credit: Tom Koerner / USFWS.

There is, indeed, a better way. It is time for Congress to take stock of its missed objectives and pass meaningful reform of the Renewable Fuel Standard. There are a variety of ways to improve the law so that it spurs the development and use of truly cleaner, more environmentally sound alternatives to gasoline without incentivizing the destruction of what little native habitat and sensitive land remains. In order to achieve that goal, Congress should:

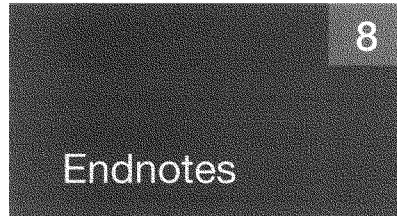
- **Reduce the Mandate** – We have already seen the disaster 15 billion gallons of corn ethanol have wrought on the landscape, yet the current RFS envisions another 17 billion gallons of advanced and cellulosic ethanol to be produced on top of that existing amount. While there are technical hurdles to actually infusing that much biofuel into the fuel supply, we fear that growing millions of new acres of dedicated energy crops could unleash a second wave of land conversion potentially worse than what has happened thus far. Instead, a reduction in the mandate, coupled with additional changes to agriculture policies and incentives and increased conservation funding could halt the increase in corn plantings – particularly in the most sensitive and ecologically important areas, many of which are poor quality farmland.

- **Enforce the Prohibition on Land Clearing** – Congress must be even clearer in its direction to EPA not to allow fuels from crops grown on newly converted land. A credible, enforceable mechanism for verifying this must be written into the law.

- **Promote Truly Sustainable Biofuels** – New types of biofuels, produced from sources other than corn and soy, have the potential to be much better for wildlife, water, and greenhouse gas reductions. Some can even be produced without additional land. The RFS was originally designed to promote advanced and cellulosic biofuels. However, current policy has failed to stimulate the investments necessary to mature the advanced and cellulosic biofuels industries. Policy should prioritize these cleaner fuels, allow them to replace less sustainable biofuels over time, and include sufficient safeguards to ensure that they are truly sustainable.

- **Mitigate Habitat Losses** – As documented in the previous pages, the nation has lost some of its most vital remaining wildlife habitat, complex native ecosystems, and natural water filtration systems over the course of the RFS. The cost to wildlife, water quality, and our way of life has been tremendous, and Congress must right that wrong. In addition to fully funding existing conservation programs, lawmakers should establish a new fund that will directly conserve and restore habitat in areas threatened by crop expansion, helping to mitigate the impacts of what has already been lost.

These reforms cannot wait. Our wildlife populations are already in decline, our waters are impaired and supplies are dwindling in some regions. For the sake of our country's wildlife, water, and climate, the National Wildlife Federation calls on our leaders in Congress to be bold and to forge a new path forward that will uphold the ideals and traditions all Americans share. The RFS must be reformed.



- ¹ Food and Agricultural Policy Research Institute. US Baseline Briefing Book: Projections for Agricultural and Biofuel Markets. (University of Missouri Columbia, MO, USA, 2015).
- ² U.S. Department of Agriculture. Agricultural Projections to 2025. (2016).
- ³ U.S. Department of Agriculture & Economic Research Service. Corn Use Table <<http://www.ers.usda.gov/topics/crops/corn/background.aspx>> (03/23/2016).
- ⁴ U.S. Department of Agriculture & Economic Research Service. Corn Data Table <<http://www.ers.usda.gov/topics/crops/corn/background.aspx>> (03/23/2016).
- ⁵ Lark, T. J., Salmon, J. M. & Gibbs, H. K. Cropland expansion outpaces agricultural and biofuel policies in the United States. *Environmental Research Letters* **10**, 044003 (2015).
- ⁶ World Wildlife Fund. *Plowprint* <<https://www.worldwildlife.org/projects/plowprint-report>> (11/28/2016).
- ⁷ Wright, C. K. & Wimberly, M. C. Recent land use change in the Western Corn Belt threatens grasslands and wetlands. *Proceedings of the National Academy of Sciences* **110**, 4134-4139 (2013).
- ⁸ Johnston, C. A. Agricultural expansion: land use shell game in the US Northern Plains. *Landscape ecology* **29**, 81-95 (2014).
- ⁹ Mladenoff, D. J., Sahajpal, R., Johnson, C. P. & Rotheisen, D. E. Recent Land Use Change to Agriculture in the US Lake States: Impacts on Cellular Biomass Potential and Natural Lands. *PLoS one* **11**, e0148566 (2016).
- ¹⁰ Samson, F. B., Knopf, P. L. & Oetle, W. R. Great Plains ecosystems: past, present, and future. *Wildlife Society Bulletin* **32**, 6-15 (2004).
- ¹¹ Walander, S., Claassen, R. & Nickerson, C. The ethanol decade: an expansion of US corn production, 2000-09. *USDA-ERS Economic Information Bulletin* (2011).
- ¹² U.S. Department of Agriculture. Summary Report: 2010 National Resources Inventory (2013).
- ¹³ Miao, R., Hennessy, D. A. & Feng, H. The Effects of Crop Insurance Subsidies and Sodasaver on Land Use Change. (2012).
- ¹⁴ Claassen, R., Carriazo, F., Cooper, J. C., Hellerstein, D. & Ueda, K. Grassland to cropland conversion in the Northern Plains. *US Department of Agriculture, Economic Research Report* (2011).
- ¹⁵ Claassen, R., Cooper, J. C. & Carriazo, F. Crop insurance, disaster payments, and land use change: the effect of sodasaver on incentives for grassland conversion. *Journal of Agricultural and Applied Economics* **43**, 195-211 (2011).
- ¹⁶ Searchinger, T. et al. Use of US croplands for biofuels increases greenhouse gases through emissions from land-use change. *Science* **319**, 1238-1240 (2008).
- ¹⁷ Malcolm, S., Allery, M. & Weinberg, M. Ethanol and a Changing Landscape. *US Department of Agriculture, Economic Research Service*, (2009).
- ¹⁸ Hertel, T. W. et al. Effects of US maize ethanol on global land use and greenhouse gas emissions: estimating market-mediated responses. *BioScience* **60**, 223-231 (2010).
- ¹⁹ 40 CFR 80. Regulation of Fuels and Fuel Additives: Changes to Renewable Fuel Standard Program. (2010).
- ²⁰ U.S. Department of Agriculture & Farm Service Agency. Crop Acreage Data <<https://www.fsa.usda.gov/news-room/efolia/electronic-reading-room/frequently-requested-information/crop-acreage-data/index>> (03/23/2016).
- ²¹ U.S. Department of Agriculture & Farm Service Agency. Cropland Conversion <<http://www.fsa.usda.gov/FSA/webapp?area=newsroom&subject=land&topic=foi-er-tr-dtc>> (03/23/2016).
- ²² Faust, S. W. The causes and unintended consequences of a paradigm shift in corn production practices. *Environmental Science & Policy* **52**, 41-50 (2015).
- ²³ U.S. Congressional Budget Office. The Renewable Fuel Standard: Issues for 2014 and Beyond. Report No. 45477. (Congressional Budget Office, Washington, DC, 2014).
- ²⁴ U.S. Congressional Budget Office. The Impact of Ethanol Use on Food Prices and Greenhouse-Gas Emissions. (2009).
- ²⁵ Motamed, M., McPhail, L. & Williams, R. Corn Area Response to Local Ethanol Markets in the United States: A Grid Cell Level Analysis. *American Journal of Agricultural Economics*, aav095 (2016).
- ²⁶ Wright, C. K., Larson, B. B., Lark, T. J. & Gibbs, H. K. Recent grassland losses are concentrated around U.S. ethanol refineries. *In revision following review* (2016).
- ²⁷ Newbold, T. et al. Global effects of land use on local terrestrial biodiversity. *Nature* **520**, 45-50 (2015).
- ²⁸ BirdLife International. *Agricultural expansion is a major threat to birds, and appears to be increasing in importance. Presented as part of the BirdLife State of the world's birds.* <<http://www.birdlife.org/datazone/sowb/casestudy/130>> (12/17/2016).
- ²⁹ Doherty, K. E., Ryba, A. J., Stemler, C. L., Niemuth, N. D. & Meeks, W. A. Conservation planning in an era of change: state of the US Prairie Pothole Region. *Wildlife Society Bulletin* **37**, 546-563 (2013).
- ³⁰ Johnston, C. A. Wetland losses due to row crop expansion in the Dakota Prairie Pothole Region. *Wetlands* **33**, 175-182 (2013).
- ³¹ Uden, D. R., Allen, C. R., Mitchell, R. B., McCoy, T. D. & Guan, Q. Predicted avian responses to bioenergy development scenarios in an intensive agricultural landscape. *GCB Bioenergy* **7**, 717-726 (2015).
- ³² Meehan, T. D., Hurlbert, A. H. & Gratton, C. Bird communities in future bioenergy landscapes of the Upper Midwest. *Proceedings of the National Academy of Sciences* **107**, 18533-18538 (2010).
- ³³ Robertson, B. A., Doran, P. J., Loomis, L. R., Robertson, J. & Schemske, D. W. Perennial biomass feedstocks enhance avian diversity. *GCB Bioenergy* **3**, 235-246 (2011).

- ³⁴ Blank, P. J., Williams, C. L., Sample, D. W., Meehan, T. D. & Turner, M. G. Alternative scenarios of bioenergy crop production in an agricultural landscape and implications for bird communities. *Ecological Applications* **26**, 42-54 (2016).
- ³⁵ Fletcher Jr, R. J. et al. Biodiversity conservation in the era of biofuels: risks and opportunities. (2011).
- ³⁶ The State of the Birds. *The State of Grassland Birds*. <<http://www.stateofthebirds.org/stateofthebirds/habitats/grasslands>> (03/23/2016).
- ³⁷ Flockhart, D., Pichancourt, J. B., Norris, D. R. & Martin, T. G. Unravelling the annual cycle in a migratory animal: breeding-season habitat loss drives population declines of monarch butterflies. *Journal of Animal Ecology* **84**, 155-165 (2015).
- ³⁸ Borden, B. et al. Pollinator Plants of the Central United States: Native Milkweeds. (2013).
- ³⁹ Gardiner, M. A. et al. Implications of three biofuel crops for beneficial arthropods in agricultural landscapes. *BioEnergy Research* **3**, 6-19 (2010).
- ⁴⁰ Otto, C. R., Roth, C. L., Carlson, B. L. & Smart, M. D. Land-use change reduces habitat suitability for supporting managed honey bee colonies in the Northern Great Plains. *Proceedings of the National Academy of Sciences* **113**, 10430-10435 (2016).
- ⁴¹ Smart, M. D., Pettis, J. S., Euliss, N. & Spivak, M. S. Land use in the Northern Great Plains region of the US influences the survival and productivity of honey bee colonies. *Agriculture, Ecosystems & Environment* **230**, 139-149 (2016).
- ⁴² Stephens, R. & Anderson, S. Swift Fox (*Vulpes velox*): A Technical Conservation Assessment. (Wyoming Cooperative Fish and Wildlife Research Unit, University of Wyoming, Laramie, Wyoming, 2005).
- ⁴³ Stubbs, M. Conservation Reserve Program (CRP): status and issues. *Congressional Research Service Report* **42783**, 24p (2014).
- ⁴⁴ Wiens, J., Fargione, J. & Hill, J. Biofuels and biodiversity. *Ecological Applications* **21**, 1085-1095 (2011).
- ⁴⁵ Widmar, D. A. *The 10 Million Acre Land Rush*. <<http://ageconomists.com/2014/11/03/the-10-million-acre-land-rush/#more-24813>> (03/22/2016).
- ⁴⁶ Scown, C. D., Horvath, A. & McKone, T. E. Water footprint of US transportation fuels. *Environmental science & technology* **45**, 2541-2553 (2011).
- ⁴⁷ Donner, S. D. & Kucharik, C. J. Corn-based ethanol production compromises goal of reducing nitrogen export by the Mississippi River. *Proceedings of the National Academy of Sciences* **105**, 4513-4518 (2008).
- ⁴⁸ U.S. Government Accountability Office. Energy-Water Nexus: Many Uncertainties Remain about National and Regional Effects of Increased Biofuel Production on Water Resources. (2009).
- ⁴⁹ National Research Council & Committee on Economic and Environmental Impacts of Increasing Biofuels Production. *Renewable fuel standard: potential economic and environmental effects of US biofuel policy*. (National Academies Press, 2011).
- ⁵⁰ Housh, M., M. Khanna & Cai, X. Mix of First and Second Generation Biofuels to meet Multiple Environmental Objectives: Implications for Policy at a Watershed Scale. *Water Economics and Policy* **1**, 26 (2015).
- ⁵¹ Shao, Y., Lunetta, R. S., Macpherson, A. J., Luo, J. & Chen, G. Assessing sediment yield for selected watersheds in the Laurentian great lakes basin under future agricultural scenarios. *Environmental management* **51**, 59-69 (2013).
- ⁵² Jeanneret, D. *Lake Erie Water Quality: Past, present and future*. (Ohio Sea Grant College Program, 1989).
- ⁵³ Scavia, D. et al. Informing Lake Erie Agriculture Nutrient Management via Scenario Evaluation. (University of Michigan Water Center, 2016).
- ⁵⁴ International Joint Commission. A Balanced Diet for Lake Erie: Reducing Phosphorus Loadings and Harmful Algal Blooms. (2014).
- ⁵⁵ Rabotyagov, S., Kling, C., Gassman, P., Rabalais, N. & Turner, R. The economics of dead zones: Causes, impacts, policy challenges, and a model of the Gulf of Mexico hypoxic zone. *Review of Environmental Economics and Policy* **8**, 58-79 (2014).
- ⁵⁶ Stone, K., Hunt, P., Cantrell, K. & Ro, K. The potential impacts of biomass feedstock production on water resource availability. *Bioresour Technol* **101**, 2014-2025 (2010).
- ⁵⁷ U.S. Environmental Protection Agency. Biofuels and the Environment: The First Triennial Report to Congress. Report No. EPA/600/R-10/183F, (Washington, DC, 2011).
- ⁵⁸ Yang, Y., Bao, J., Kim, J. & Suh, S. Replacing gasoline with corn ethanol results in significant environmental problem-shifting. *Environmental science & technology* **46**, 3671-3678 (2012).
- ⁵⁹ Romanow, S. Biofuels production in US impacts water resources. *Hydrocarb Process* **86**, 23-725 (2007).
- ⁶⁰ McBride, A. C. et al. Indicators to support environmental sustainability of bioenergy systems. *Ecological Indicators* **11**, 1277-1289 (2011).
- ⁶¹ Costello, C., Griffin, W. M., Landis, A. E. & Matthews, H. S. Impact of biofuel crop production on the formation of hypoxia in the Gulf of Mexico. *Environmental science & technology* **43**, 7985-7991 (2009).
- ⁶² Searchinger, T., Edwards, R., Mulligan, D., Heimlich, R. & Plevin, R. Do biofuel policies seek to cut emissions by cutting food? *Science* **347**, 1420-1422 (2015).
- ⁶³ DeCicco, J. M. The liquid carbon challenge: evolving views on transportation fuels and climate. *Wiley Interdisciplinary Reviews: Energy and Environment* **4**, 98-114 (2015).
- ⁶⁴ U.S. Environmental Protection Agency. in EPA-420-R-10-006 (ed U.S. EPA) (Washington DC, 2010).
- ⁶⁵ Wang, M., Tyner, W., Williams, D. & Dunn, J. Comments on and Discussion of The Liquid Carbon Challenge: Evolving Views on Transportation Fuels and Climate. (Argonne National Laboratory, 2015).
- ⁶⁶ Plevin, R. J., Jones, A. D., Torn, M. S. & Gibbs, H. K. Greenhouse gas emissions from biofuels' indirect land use change are uncertain but may be much greater than previously estimated. *Environmental science & technology* **44**, 8015-8021 (2010).



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COMMENTS BY AMERICAN LUNG ASSOCIATION, CLEAN AIR TASK FORCE, CLEAN AIR WATCH, CENTER FOR AUTO SAFETY, EARTHJUSTICE, FRIENDS OF THE EARTH, NATURAL RESOURCES DEFENSE COUNCIL, AND SIERRA CLUB IN RESPONSE TO REQUEST FOR COMMENT AND NOTICE OF RECEIPT OF A CLEAN AIR ACT WAIVER APPLICATION TO INCREASE THE ALLOWABLE ETHANOL CONTENT OF GASOLINE TO 15 PERCENT

Docket ID No. EPA-HQ-OAR-2009-0211

July 20, 2009

The organizations listed above oppose the Growth Energy request for a waiver request under Section 211(f) (4) to authorize the general sale of E-15. We assert that there exists little valid testing of E-15 to demonstrate that E-15 meets the requirements for a waiver.

Background

Section 211(f)(4) requires that Growth Energy establish that E-15 will not cause or contribute to a failure to achieve emission standards of ANY(emphasis added) emission control device or system over the useful life of motor vehicles, motor vehicle engines, nonroad engines or nonroad engines. We accept in principal EPA's requirements that the applicant provide vehicle/engine testing for tailpipe emissions, evaporative emissions, material compatibility and materials compatibility. Further, testing must include tailpipe and evaporative emissions testing over the full useful life of vehicle and equipment. Since the statutory language does not require Growth Energy to test every vehicle and engine, we accept EPA's requirement that tests be done with sufficient statistical rigor so as to capture "small effects" in order to properly assess whether a fuel or fuel additive could cause or contribute to the failure of "any" emissions control device or system.¹ These comments are limited to an assessment of emissions testing and not other factors which EPA considers as part of an application for a waiver. We assert Growth Energy did not submit sufficient scientifically based data to demonstrate the requirements of Section 211(f) (4) have been met with respect tailpipe emissions, evaporative emissions or durability of both on-road and non-road vehicles and engines.

Data regarding E-10 should not be used in support of an E-15 waiver request. The higher amount of ethanol in E-15 changes the fuel properties of the gasoline containing it including T-40 and T-50² as well as the level of oxygen. Increases in levels of oxygen provided by E-15 compared with E-10 have been shown to increase

¹ See Karl Simon, "Mid level Ethanol Blend Experimental Framework – EPA Staff Recommendations, June, 2008, p. 13.

² John R. Braeutigan, *Ethanol Blend Wall*, CEC Joint IEPR and Transportation Workshop on Transportation Fuel Infrastructure issues, April, 14, 2009, pp. 4-5.

exhaust temperatures in both vehicles and small non-road engines.³ Temperature increases of engines using E-15 were significantly higher than those using E-10. The long term impact of these temperature increases has not been studied.

GROWTH ENERGY PROVIDED NO DATA REGARDING VEHICLE OR ENGINE 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 any level ethanol in gasoline on vehicle engines and emissions systems over their useful life.**

One study, done in Australia, raises a red flag on this issue. It appears that when pre-Tier II vehicles—model year 2004 and earlier—are operated in wide open throttle mode (WOT), 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 engine and catalyst after artificial “aging” of 50,000 miles. One vehicle had 200 percent increase in HC emissions and 500 percent increase in NO_x emissions and showed evidence of materials degradation. The other experienced a 20 percent increase in HC emissions and 150 percent increase in NO_x emissions.⁴ 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**.

The two vehicles that experienced damage in the Australian test failed to apply long-term trim correction during WOT, the same problem described in the DOE study

³ 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, figure 3.5, p.3-8, Table 3.13, p. 3-28

⁴ 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>.

that occurred with seven of the vehicles tested.⁵ However, in the DOE study this effect also occurred in two 2007 model year vehicles and may not be limited to pre-Tier II vehicles. Before we risk the engines of 116 million pre-2004 vehicles on the road today, and also possible damage to a subset of Tier II vehicles durability testing is clearly needed.

GROWTH ENERGY MUST SHOW E-15 WILL NOT CAUSE STANDARDS EXCEEDENCES OVER THE USEFUL LIFE OF BOTH VEHICLES AND NON-ROAD ENGINES

Growth Energy asserts it may substitute a “reasonable theory” on emissions effects and testing to support such theory.⁶ In light of the data discussed above, we believe the questions raised can only be answered through representative testing of both vehicles and non-road engines through engine aging comparable to that required for engine certification. EPA cannot claim to be unaware of deteriorative effects of oxygenates as it did in Sun Refining’s waiver decision as argued in Growth Energy’s petition.⁷

The need to address engine durability is reinforced by revisions to Section 211(f) (4) adopted by Congress in EISA 2007. Among the changes adopted was the explicit addition of language that requires the Administrator find an applicant has demonstrated that a new fuel will not cause or contribute to a failure of emissions device or system of non-road engines and non-road vehicles over their useful life. Clearly, the statutory language and Congress’s intent is to make an applicant’s demonstration more comprehensive and cover a broader array of engines than that which could be derived from previous court decisions and EPA guidance, including that widely cited in the Growth energy petition.

Growth Energy has provided no data of testing specifically designed to demonstrate engine performance and emission control system over its useful life comparable to that required for vehicle certification.

ONLY TWO TESTS SUBMITTED BY GROWTH ENERGY MEET REASONABLE REQUIREMENTS FOR RIGOR AND DESIGN

⁵ DOE study, *Op. Cit.*, p. 3-7

⁶ *Application for a Waiver Pursuant to Section 211(f) (4) of the Clean Air Act for E-15*, Submitted by Growth Energy on Behalf of 52 U.S. Ethanol Manufacturers, March 6, 2009, p. 9.

⁷ *Id.*, p. 20.

We believe that testing to be scientifically based and credible it must:

- 1) Be specifically designed to test for emissions
- 2) measure cold start and multi speed emissions
- 3) include multiple tests for each vehicle
- 4) control for fuel parameters including boiling temperature(a measure of fuel vaporization)
- 5) include a representative variety of vehicle and engine types and emissions control technologies
- 6) undergo peer review

Growth Energy's petition identified only two studies that fully meet these criteria: the DOE Study and study of evaporative emissions conducted by the Coordinating Research Council.⁸

We comment on the elements above that are not met by the following studies cited in the Growth Energy petition and thus significantly call into question the reliability of the results with respect to emissions.

Minnesota Center for Automotive Research, **Optimal Ethanol Blend-Level Investigation**, October 2007. This study tested only three non-FFV 2007 model vehicles, thus it lacked a representative variety of vehicles. This study was primarily designed to measure fuel economy, not emissions, and was not peer reviewed. Fuel parameters were not controlled and emissions results have not been made available for public review.

Minnesota Center for Automotive Research Study, **Use of Mid-Range Ethanol/Gasoline in Unmodified Passenger cars and Light Duty Trucks**, July 1990. This study was designed primarily to test drivability over the course of one year's use. It tested 15 older model cars and trucks. The study was not peer reviewed and lacked controls on fuel parameters. The study did not measure cold start and multi-speed emissions as required for certification.

Rochester Institute of Technology, **Report to the U.S. Senate on E20 Ethanol Research**, October, 2008. This study of 10 older cars and trucks is designed to test both operability and emissions and is incomplete. The report is a summary of data that is not peer reviewed and not available to the public.

One well-conducted, peer reviewed study of emissions has recently been completed by the Department of Energy (DOE). Much of Growth Energy's petition relies on this

⁸ Coordinating Research Council, Inc., CRC Report No. E-65-3, Fuel Permeation from Automotive systems E0, E6, E10, E20, and E85. December, 2006.

study. However, the DOE study raises a number of troubling concerns about the conclusions it reaches. 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.⁹

The Executive Summary fails to report that 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 was off set by decreases in other vehicles, DOE deemed these findings statistically insignificant.¹⁰ While Section 211(f)(4) does not require a “no increase” in emissions, emissions increases must be evaluated to determine if they can worsen or are near the limits of certification standards.

DOE TEST RESULTS ON SMALL NON-ROAD ENGINES (SNREs) RAISES SIGNIFICANT QUESTIONS

While DOE did conduct a “scoping” of a very limited number of Small Non-Road Engines (SNREs), even this part of the study raises many questions. 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 when compared to emissions when operated on E-0 when they were new.¹¹ The SNRE testing also found a significant exhaust temperature increase in many small engines.¹² Temperatures of engines operating on E-15 increased as much as 50° C. These findings are consistent with a potential durability degradation problem as discussed above with vehicle engines.

NON-ROAD ENGINE TESTING ON E-15 MUST BE CONDUCTED BEFORE GROWTH ENERGY’S PETITION CAN BE GRANTED

⁹ U.S. DOE Study, *Op. Cit.*, p. 2-6.

¹⁰ *Id.*, Table 3.1, p. 3-4.

¹¹ *Id.*, Tables 3.8-3.12, pp. 3-24 – 3-28.

¹² *Id.*, Table 3.13, p. 3-28.

There has been almost no testing on the use of mid-level ethanol 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). EPA must identify a representative sample of the more than 900 non-road engines and testing must be conducted to determine if E-15 has an adverse impact on the ability of these engines to meet emissions standards. The Growth Energy petition does not address non-road engine or vehicle emissions at all. The absence of any data provided by Growth Energy combined with the limited and questionable results of data provided in the DOE study (as discussed below) provide a sufficient basis alone to deny the Growth Energy petition.

GROWTH ENERGY FAILS TO SHOW E-15 WILL NOT RESULT IN VIOLATION OF EVAPORATIVE EMISSIONS STANDARDS

Section 211(f)(4) makes it clear that a new fuel can receive a waiver only if it will not cause or contribute to exceedences of standards to which vehicles and engines were certified. With regard to meeting evaporative emissions all vehicles must certify to evaporative standards using E-0. Tier II vehicles must certify the durability of evaporative controls using E-10. Growth Energy attempts to argue that it need only show that E-15 would not increase evaporative emissions more than E-10, a “commercially available fuel.”¹³ The clear statutory basis of comparison should be between E-15 and E-0, the fuel used to certify such vehicles. The CRC permeation study submitted as part of Growth Energy’s petition raises serious questions. The study found that the use of E-20 in a 2001 model vehicle caused evaporative emission to reach 1765 mg, just below the 2000 mg standard.¹⁴ The evaporative emissions effects of E-15 were not studied. Given that the testing did not include an “aging” phase to assess the impact of ethanol in gasoline on evaporative emissions over time, this data supports the proposition that E-15 may “contribute to” exceedences of the certification standard for evaporative emission in older model vehicles. Clearly more testing is necessary to assess this finding.

Growth Energy also cites a Stockholm Study in support of its contention that E-15 causes no more evaporative emissions than E-10. We note that this study itself acknowledged the dearth of test data with the following,

“There is a need to generate data and experience by running tests and analyzing the environmental effects of blending ethanol with gasoline. The

¹³ Growth Energy application, *Op.Cit.*, p. 25.

¹⁴ CRC E-65-3, *Op. Cit.*, Figure 17, p. 18.

lack of data is more marked for blends with high ethanol content (~20%). Such blends should be avoided before a thorough analysis has been carried out and more data are available.”¹⁵

We could not agree more with this view.

RESPONSE TO REQUEST FOR COMMENT

(a) Whether an appropriate level of scientific and technical information exists for a waiver of E-15 regarding motor vehicles or motor vehicle engines.

As discussed above we assert there is not a sufficient level of scientific and technical information for the Administrator to determine whether the use of E-15 will or will not cause or contribute to a failure of emission control devices over the useful life of any motor vehicle or motor vehicle engine or any subset of motor vehicles or motor vehicle engines.

b) Whether an appropriate level of scientific and technical information exists for a waiver of E-15 regarding non-road vehicles or engines.

As discussed above, we assert there is not a sufficient level of scientific and technical information for the Administrator to determine whether the use of E-15 will or will not cause or contribute to a failure of emissions control devices over the useful life of any non-road vehicle or non-road engine.

(c) Whether an appropriate level of scientific and technical information exists for a waiver of an ethanol-gasoline blend greater than 10 percent and less than 15 percent.

We assert that a determination by the Administrator of a waiver under 211(f)(4) of other levels of ethanol-gasoline blends greater than 10 percent ethanol must be made pursuant to a specific waiver request accompanied by appropriate scientific and technical information in support of such request. The Administrator can not legally promulgate a waiver different from that published in the Growth Energy petition in absence of a separate waiver process. Because other ethanol-gasoline

¹⁵ Stockholm University et al, *Blending of Ethanol in Gasoline for Spark Ignition Engines: Problems Inventory and Evaporative Measurements*, 2004-2005, p. 1

blends have different fuel properties, and could well have different impacts on on-road and non-road engines, as well as fuel distribution systems, the comments provided by the public on the Growth Energy petition would not necessarily be relevant to such fuel. Therefore, the approval of such a fuel is not a logical outgrowth of the Growth Energy petition.

We further assert that there is not an appropriate level of scientific and technical information in order for the Administrator to determine whether the use of an ethanol-gasoline blend greater than 10 percent and less than 15 percent will or will not cause or contribute to a failure of any emissions control device or system over the useful life of any motor vehicle or motor vehicle engine or any nonroad vehicle or nonroad engine.

(d) Legal and technical aspect of granting a conditional or partial waiver restricted to a subset of gasoline vehicles.

As EPA has acknowledged, no “downstream” condition has ever been imposed on fuel manufacturers as part of a Section 211(f) (4) waiver.¹⁶ The requirements necessary to prevent misfueling and other distributional problems vary depending on the nature of the conditions that may be imposed. We can not provide sufficient comment here in the absence of specific proposed conditions for a waiver. For this reason, as discussed above, we assert that a conditional or partial waiver of E-15 designed to limit the use of such fuel to a subset of vehicles is not a logical outgrowth of the Growth Energy petition and must be the subject of a separate proposal subject to public notice and comment. We note that it is by no means clear that any conditional or partial waiver under Section 211(f)(4) designed to limits the use of E-15 and other ethanol-gasoline blend to a subset of vehicles or vehicle engines could meet the statutory requirements of Section 211(f)(4).

(e) Educational efforts needed for a partial waiver

As discussed in (d) above we assert this information should be the subject of a separate proposal.

(f) The extent to which the use of an E-15 blend would in practice help address the blend wall.

¹⁶ See discussion in RFS@ Preamble, p. 260.

Some experts claim that the blend wall, when the use of E-10 has been used in all feasible gallons of gasoline, may be reached as soon as 2009.¹⁷ EPA estimates that the blend wall may be reached at the end of 2012 and that an optimistic estimate of E-15 use could defer the blend wall until 2017.¹⁸ However, EPA identifies many regulatory and infrastructure hurdles which must be overcome before E-15 sales could achieve significant volumes.¹⁹

We believe that the combination of hurdles, not all of which have been identified, virtually assures that E-15 could not be marketed in substantial volumes for multiple years. Certainly, an E-15 waiver does not constitute a timely solution to the blend wall if the Growth Energy estimates prove correct. Among the most time consuming changes include: modifying federal reformulated gasoline regulations and the Complex Model to accommodate E-15, modifying section 211(h) of the Clean Air Act and accompanying regulations that limit the 1 pound RVP waiver exclusively to ethanol blends containing 9-10% ethanol, modifying state SIPs containing fuel requirements that limit the 1 pound waiver exclusively to ethanol blends containing 9-10% ethanol, and modifying state fire, safety, and leak protection codes to authorize the use of E-15 in existing gasoline storage and dispensing equipment. We note that the identification of these hurdles should not be interpreted as approval or support of any of the changes by any of the signatories to these comments. If existing infrastructure for gasoline storage and dispensing is required to be substantially modified to accommodate E-15, we believe a wiser, safer, more effective, and just as timely investment would be to implement a program to expand the availability and use of E-85.

We specially note that a partial waiver is especially unlikely to allow sufficient E-15 to address the blend wall. Assuming EPA identifies sufficient data to issue a partial waiver for the use of E-15 limited to Tier II vehicles, the limited volume of such cars in currently use limits the volume of additional ethanol sold via E-15 to levels that would do little to address the blend wall. According to DOE, Tier II vehicles constituted 15% of the motor vehicles registered for use in the U.S. in 2007²⁰ In the short term, assuming regulations that bar the use of E-15 in California cleaner Burning Gasoline and federal Reformulated Gasoline (41% of national pool) are not modified, a Tier II partial waiver would increase ethanol sales a mere 600,000 gallons per year if E-15 were used in every gallon available in the national

¹⁷ Braeutigan, *Op. Cit.*, p. 7.

¹⁸ RFS2 Preamble, Federal Register, May 26, 2009, Vol. 74, Number 99, pp. 24903-25143, Regulation of Fuels and Fuel Additives, Change to Renewable Fuel Standard Program; Proposed Rule, Figure V.D. 3-1, p256.

¹⁹ *Id.*, pp. 256-258.

²⁰ U.S. DOE study, *Op. Cit.*, Table 2.3, p. 2-3.

conventional gasoline pool that remained (approximately 80 B gallons). In our view, the modest benefit in ethanol sales associated with a partial waiver for E-15 is far outweighed by the risk of misfueling and substantial damage to the estimated 97 million non-Tier II vehicles that would operate in the areas where E-15 would be sold under this scenario.

Senator DUCKWORTH. Mr. Lorenz, you indicated in your testimony that Sheetz sells E15 because there is a consumer demand for the fuel, not because of any required mandate. If true, this means that consumers are losing money because E15 is often less expensive than alternative fuels, and gas stations are spending more to comply with labeling burdens that deliver little value to consumers during those summer months.

Is this assessment correct, and can you share how this labeling conundrum is challenging the market?

Mr. LORENZ. Well, I mean, I think it is preventing current retailers from entering into the market and offering E15. It is also affecting retailers that are offering E15 today and the fact that it is difficult to actually grow sales, because we have seen where sales have been growing, then the summer comes along and we have to relabel all of our dispensers, and the sales don't return or the customers don't return after the summer. And I think it has to do with they are just confused as to what the product is because, like I said, there is no other product or no other gasoline fuel that we have to relabel. So they don't know anything about our VP or waivers or anything like that. We actually created a brochure to explain that, but they don't really care. I mean, the consumer just wants to buy their gas and go; they don't want a lesson on gasoline 101 or renewable fuel standards, or anything else.

Senator DUCKWORTH. So this is a burden, especially on those gas station owners who are small businessmen who are trying to just retain their market share and provide a service.

Mr. LORENZ. Oh, absolutely. I mean, I think that we look at it from the standpoint that this is an advantage, that we are offering a new product, giving that consumer choice of a product that is cleaner burning, cheaper; and that is what they want. If you look at the consumer, as a retailer, we speak for the consumer. And what they want, the gasoline product is highly price-sensitive. They want something that is cheaper and higher performance, and that is what E15 gives you.

Senator DUCKWORTH. Thank you.

I yield back, Mr. Chairman.

Senator BARRASSO. Thank you, Senator Duckworth.

Senator BOOZMAN.

Senator BOOZMAN. Thank you, Mr. Chairman.

Mr. Teske, I think you gave the statistic that 40 percent of the warranty was fuel-related.

Mr. TESKE. Up to 40 percent of the returns to one of the major retailers that we deal a lot with has to do with fuel-related issues.

Senator BOOZMAN. I have heard that also from the retailers. Also, when you visit with the mechanics, the mom-and-pop shops that services equipment, the reality is I think they would say the same thing; maybe even more so. So we do have a problem in that regard when you look at the return rate, when you look at the people that are actually dealing with the products, so it is something that we have to deal with. You mentioned in your testimony, I believe, you referenced the transition from leaded to unleaded gasoline in the 1970's and 1980's, and during this period new fuel tanks were designed to ensure consumers were not at risk of misfueling. Can you explain why this is preferable to labeling?

Mr. TESKE. Having a physical barrier will prevent someone from misfueling. So the whole idea was, back then, is that if there is a physical barrier, you really can't do it. Now, people were trying to circumvent that, but you had to be mindful of what you were doing.

So we don't have that same luxury here. This has to do with a label on a pump, a pump that can be really confusing. And Senator Ernst said we should trust consumers. Consumers are also economic animals, and they believe, and we have studies, as well, that show they basically trust the convenience store not to sell them something that won't work in their product.

So think about a convenience store today. You will have separate pumps for diesel. You will have separate pumps for E85. In my neighborhood, we now have 88, they are calling it unleaded 88, which is E15. It is within the same pump configuration as what has always been there and, in fact, it is cheaper. So what they will oftentimes do is they will migrate to that cheapest product that is out there because they want to save money. I don't blame them for wanting to save money, but they will have more cost in the long-term because ultimately that engine is going to fail.

So, ultimately, we don't think a label is going to make a difference. We think that it is useful, but it is not going to prevent misfueling from occurring.

Senator BOOZMAN. So in the case of diesel, you simply can't stick it in your—I think probably most of us, certainly I have tried to do that, when I am daydreaming or whatever. That is just something that most of the audience, I think, has experienced also.

Mr. Coleman, you mentioned cellulosic ethanol. Corn ethanol was supposed to be the bridge as we got into cellulosic ethanol, which makes a lot of sense. Tell me about its progress. This is something we have heard about for a decade now, over a decade, that it was going to be and do, and we are all looking forward to that, but tell me what the sticking points are, why are not there yet, and really foresee into the future, be a futurist for me and tell me what the difference is that is going to be a few years from now or 10 years from now as we make that transition.

Mr. COLEMAN. Sure. Thank you, Senator, for the question. So essentially cellulosic ethanol became part of national energy policy in 2007 with RFS-2. The rules were completed by EPA in 2010 and, as you know, by then we were mired in a global recession where we couldn't get any lent money, essentially, to build. So there was a delay. President Obama—

Senator BOOZMAN. But it really went back even before that, in the sense of the—

Mr. COLEMAN. Well, as I had mentioned earlier in my testimony, doing the stuff in the lab and actually convincing the oil industry to buy it are two different things, and the RFS-2 was really the first time that we had a law that would require the oil industry to buy it in a non-competitive marketplace. The good news is it is no longer a future issue. As Senator Ernst knows and Senator Fischer knows, we now have enzyme facilities up and running, cellulosic ethanol commercial facilities up and running, three of them in Iowa. So what you will see over the next couple years is what we—

Senator BOOZMAN. So it is cost-effective now?

Mr. COLEMAN. It is cost-effective. You have to remember that ethanol replaces some of the most expensive components of gasoline. It is an octane enhancer. And I am sure Mike or others could expand on this. But we are not replacing conventional gasoline; we are replacing benzene, alkylates. And some of these things are \$5.00 a gallon, which is why you are seeing savings. So we will see commercial learning curve achievements over the next four or 5 years if we can get demand, and that is why this bill is so important.

Senator BOOZMAN. OK.

Thank you, Mr. Chairman.

Senator BARRASSO. Thank you, Senator Boozman.

Senator MARKEY.

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

Mr. Coleman, in Massachusetts and in many other States across the Country we use reformulated gasoline that is designed to burn more cleanly and reduce smog forming and toxic pollutants. Could you comment on the impact of this bill on reformulated gasoline areas like Massachusetts?

Mr. COLEMAN. Appreciate the question, Senator Markey. This does not affect RFG zones at all. Ethanol waivers are not allowed in RFG zones. Essentially, the oil industry produces sub-vapor pressure-based gasoline, so this is really a conventional gasoline law.

Senator MARKEY. In order to create a higher octane fuel that allows engines to run more efficiently, petroleum refiners add benzene-based aromatic hydrocarbons known as BTEX. But there is a major problem with BTEX, and its combustion byproducts are carcinogenic and neurotoxic and a major source of toxins in urban areas. Maybe instead of BTEX it should have been BTOX they are called.

The good news is that ethanol is an even better octane booster than BTEX, and it is cheaper, as well.

Could increasing usage of E15 reduce America's exposure to BTEX?

Mr. COLEMAN. Yes. In order to comply with the Clean Air Act, you can't have too much octane or too much of these components, so when you add more ethanol, by definition you have to take some stuff out of the blend to make sure that it complies with fuel specs. So what comes out is the most toxic and often expensive octane enhancers, as you describe, and replacing them with something that is renewable and American made.

Senator MARKEY. Dr. Yanowitz, could you discuss some of the dangers to human health associated with BTEX, benzene, toluene, xylene?

Ms. YANOWITZ. I am certainly not an expert on, again, this topic, but benzene is a well known carcinogen, and removing any petroleum from the mix will reduce the amount of this carcinogen in the air.

Senator MARKEY. And in your expert opinion, would it be possible for refiners to replace the BTEX in gasoline with ethanol and deliver consumers a high octane premium gasoline that costs the same as regular?

Ms. YANOWITZ. They can certainly remove some of the benzene by replacing it with ethanol.

Senator MARKEY. Mr. Lewis, have you looked at the impact of air toxics from BTEX in gasoline, and is the Clean Air Task Force concerned about these pollutants?

Mr. LEWIS. We are concerned about those pollutants.

Senator MARKEY. You are concerned?

Mr. LEWIS. Certainly.

Senator MARKEY. What is the concern?

Mr. LEWIS. With respect to BTEX?

Senator MARKEY. Yes.

Mr. LEWIS. We are concerned about the carcinogen effects of BTEX. We are also concerned about the toxic impacts of aldehydes. And there is mixed impacts from ethanol on both fronts.

Senator MARKEY. Mr. Coleman, in your testimony you note that all types of ethanol have lower lifecycle carbon emissions than gasoline, even after accounting for changes in land use. Is this because more and more of the oil we are extracting today is coming from hard-to-reach sources like deep ocean drilling, shale, and tar sands?

Mr. COLEMAN. That is part of it. You know, essentially we know more now than we did 10 years ago, and the more recent analysis reflects efficiencies on the biorefining side for all fuels. It also reflects more knowledge on land use. But you make a good point. These fuels should not be analyzed in a vacuum. So if you take ethanol out or add it back in, you are either replacing it or displacing something, and that something is not average petroleum. There is no big tank in the middle of the Country where it is all mixed together. What is actually being replaced is marginal petroleum. The era of light sweet crude is over and, as you can see, the oil companies are looking in deepwater, fracked oil, heavy oil from Venezuela, and we are displacing the marginal gallon of oil, which is significantly more carbon intensive, and that is particularly the case with regard to tar sands.

Senator MARKEY. And I know that some of the other Senators have already asked questions on the share of this growing advanced biofuel industry and the impact on climate change. Since that has already been covered, I won't go over that same territory.

I was the chairman of the Select Committee on Energy Independence and Global Warming back in 2007, when we created that new law with regard to cellulosic, and in the law it said that by 2022 our national goal was 16 billion gallons of cellulosic biofuels. And, of course, that was December 2007 when that law was signed into law by George Bush. 2008, the biggest recession since the Great Depression. 2009 it continued. The capital markets were very skittish about the investment that would have to be made, so it was an unfortunate worst case scenario for the cellulosic industry in terms of getting off the ground to meet these goals. And the goals have been lowered, but it still offers tremendous promise for the future and it is starting to really pick up some momentum right now. So that is our great hope.

Thank you, Mr. Chairman.

Senator BARRASSO. Thank you very much.

Senator CARPER.

Senator CARPER. Thanks very much.

When I got out of the Navy near the end of the Vietnam War, I moved from California to Delaware to get an MBA, and I remember one of the courses I took was marketing. And the professor brought into our class 1 day not a glass, but he brought in a container from margarine, and he said what do I have here? And we said, well, that is a container for margarine. And he said, people buy this for different reasons. He said some people buy this margarine because of the price. Some other people buy margarine because of the taste. Some of them buy the margarine because of its, I don't know, its health benefits for them, or lack thereof. He said some people buy the margarine because this container is recyclable. Some people buy it because they like the way it looks and they want to use it for storing things. But he said people buy it for a lot of different reasons.

And sitting here I was reminded today of a little bit of that. People buy ethanol for fuel for their vehicles for different reasons. Some people think it is good for the environment. There is reason to believe maybe that is true. Others think that is not the case. Some folks buy it because they think there is better value, lower cost, and we actually have higher performance because of the octane. Some people buy it because they like the idea that we want to reduce our reliance on foreign oil.

I have a concern. I will go to Todd and the concern that he has raised about the impact on their business and their customers and so forth. I think we have to follow the Golden Rule, put ourselves in their shoes; how would we wanted to be treated here. I think that is important for us to keep in mind.

For me, a real consideration of this legislation deals with the RIN market and trying to decrease volatility in the RIN market. There is a saying, you have heard it: All politics is local. One of Ed Markey's great mentors, Tip O'Neill, used to say that, so a half dozen or so refineries, mostly on the east coast, for which this spiking up and down, volatility in the RIN market, is threatening to put them out of business. And we are anxious to see if there is some way to address, either in this legislation or other legislation, the way to reduce the volatility in the RIN market.

Could you just explain, Mr. Coleman, for us or describe how many more RINs, just roughly how many more RINs we are talking about that might become available if a bill like this were to become law and what more could we do to make the RIN market more transparent?

Mr. COLEMAN. Well, my view on this, although there are different kinds of RINs and, as you know, we have gotten to the point where the conventional biofuel RIN, which is predominantly corn ethanol, which is the one of concern for refineries, we are no longer increasing the requirement for that RIN. So pressure is going to come off of that RIN. Now, it takes a little while for that fuel to flow out, but the more that fuel does flow out, the less pressure there will be on credit markets. Where this will really generate results is the production of D3 cellulosic RINs because suddenly you are changing the discussion.

So I guess I would summarize a relatively complicated issue by saying the degree to which we facilitate a shift to using more re-

newable fuel and ethanol, it pushes the market away from putting pressure on RIN markets, which is what creates that volatility more toward usability of the fuel, which takes pressure off those RIN markets. And it also moves it toward D3 RINs and away from the RINs that have been an issue for your refineries.

Senator CARPER. All right, thanks.

Mr. Chairman, I said at the beginning this is a good panel, and it is one if I wanted to find some consensus on this issue, this is probably a good place to start. I think I have some reservations about the legislation that is before us. I know others do as well. But for me, in deciding where to go, one of the issues we have to address as part of it is the one I have raised here today.

Thank you all for coming. Thank you for your thoughtful testimonies. We are just very grateful to you. Thank you.

Senator BARRASSO. Thank you, Senator Carper.

Mr. Lewis, anything you would like to add? You have been sitting here mostly quietly for a little while.

Mr. LEWIS. Thank you. I would like to respond to the point that Mr. Coleman made that we cherry-pick data. I just want to point out that the National Research Council took the same exact approach that we did in determining whether or not EPA's greenhouse gas emissions analysis for corn ethanol was accurate.

And I would just like to leave off by saying there are important unanswered questions about the extent to which expanded use of E15 will impact corn ethanol production levels and ozone formation, and we think that those questions should be studied and answered before any further consideration of this bill occurs.

Thank you.

Senator BARRASSO. Well, thank you.

I want to thank all of you. I thought it was a very productive discussion. We obviously had a lot of people here attending the hearing and a very busy day here on Capitol Hill. Members are going to be able to submit questions for the record. The hearing record is going to stay open for 2 weeks, so please, if you get written questions, respond quickly.

I want to thank all of the witnesses for your testimony today.

Thank you, Senator Carper.

The hearing is adjourned.

[Whereupon, at 11:50 a.m. the committee was adjourned.]

