Attachment 2

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February 26, 2013

Vice Chairman Chris Stewart (R-UT)
House Committee on Science, Space and Technology, Subcommittee on Environment
2321 Rayburn House Office Building
Washington, DC 20515

Ranking Member Suzanne Bonamici (D-OR)
House Committee on Science, Space and Technology, Subcommittee on Environment
2321 Rayburn House Office Building
Washington, DC 20515

Dear Vice Chairman Stewart and Ranking Member Bonamici:

API greatly appreciates your holding this hearing on "Mid-Level Ethanol Blends: Consumer and Technical Research Needs". The key objective for API and the auto industry in undertaking the comprehensive mid-level ethanol blends research program being conducted by the Coordinating Research Council (CRC) is to ensure that the safety and performance of our mutual customers' vehicles are not compromised or otherwise adversely affected. You recently received a letter from the Renewable Fuels Association (RFA) which criticized the CRC studies. As shown in the attached rebuttals, we believe such criticisms are unwarranted. You can also find these rebuttals in blog postings at:

http://energytomorrow.org/blog/study-e15-could-put-some-engines-at-risk/#/type/all

http://energytomorrow.org/blog/back-to-the-facts-on-e15/#/type/all

CRC is a research organization that has been conducting research on fuels, engines and vehicles for more than 70 years. The CRC tests are developed and managed by the same company automotive engineers who design and build cars. We have great confidence in the ability of the automotive and fuels experts who sit on CRC committees to conduct well-conceived and thorough technical investigations of consumer acceptance and vehicle safety-related issues associated with the use of mid-level ethanol blends in vehicles operated by our mutual customers. The US Environmental Protection Agency (EPA), US Department of Energy (DOE), California Air Resources Board, National Renewable Energy Laboratory (NREL), Renewable Fuels Association and Growth Energy recognize and acknowledge the credibility of CRC research by virtue of the fact that **all** of these institutions have financially supported CRC projects in recent years.

In a June 2008 presentation to stakeholders, EPA outlined for industry the testing it anticipated would be needed for a waiver to be approved. EPA's requirements at the time were consistent

with the auto and oil industry's comprehensive test plans. EPA did not follow through on its own recommended broader suite of testing, but instead relied almost entirely on DOE's catalyst durability test project. EPA improperly used the DOE catalyst program to evaluate consumer acceptance and vehicle safety issues which were outside the scope of the DOE study. And DOE/EPA's decision to use the catalyst study for these parameters was not even a well thought out or statistically designed process. It was a last minute DOE/EPA decision made when the catalyst testing was almost completed. This is the complete opposite of the CRC approach where automotive engineers designed the studies with detailed and scientifically sound methodologies and plans from start to finish. The testing procedures used were based on existing protocols which are widely used in the automotive industry to evaluate engine durability and fuel systems durability to predict product life. Many of the vehicles operated on E15 using these procedures with no problems, but others did not. This in itself shows that CRC used the proper test tools.

While more detailed rebuttals to RFA's criticisms are provided in the attachments to this letter, I want to highlight a couple below:

<u>CRC Used Aggressive Ethanol</u>

CRC used aggressive ethanol in the fuel systems durability study as a worst case scenario, which is often done when research is properly conducted. Regular E15 also was tested and passes and failures were observed. The aggressive nature of one of the blends made no difference in the overall results.

<u>E15 Is the Most Tested Fuel Ever -- Equivalent to 12 Round Trips to the Moon</u>

It does not matter how many miles are accumulated if you used an inappropriate test, so the real question is "how were they tested?" You need the right test to give consumers confidence in the test results. The CRC studies employed the same established testing procedures widely used within the automotive industry to evaluate and predict new product life. So who should be trusted – automotive experts who design engines, emissions control systems and fuel systems or people who design regulations?

We look forward to your hearing today. Please contact me or Jim Williams at 202-682-8155 if you have any additional questions.

Sincerely,

Robert L. Greco III

Study: E15 Could Put Some Engines at Risk

by Bob Greco
May. 18, 2012

More on the potential risk to America's car and truck fleet posed by E15 – gasoline containing 15 percent ethanol that has EPA approval: Just-released research indicates that more than 5 million existing cars and light trucks, which EPA says are OK for E15 use, could develop engine problems as a result.

Why this discrepancy? The Coordinating Research Council (CRC), a non-profit entity supported by the automotive and oil and petroleum industries, tested the durability of engines using tests that have been conducted for more than a decade to determine how well engines would hold up with a new fuel.

On the other hand, the Department of Energy (DOE) and EPA tested the catalyst system and then used the results of those tests to say the engine would be fine. It's a bit like taking a reading test to determine whether your heart is healthy.

A key finding in the CRC study:

- Of eight different tested engine types, one had a design that was (in retrospect) inappropriate for the test cycle, two failed on E20 (20 percent ethanol) and E15, and five passed on E20 and by assumption E15 and E0 (gasoline with zero ethanol content). The two engine types that failed E15 testing successfully completed reference testing on E0.
- The majority of the failures can be linked to issues with valve seats, either related to material or wear/deformation.

There are at least 5 million known engines on the road today with the same or similar characteristics to the two engines that failed on E20 and E15. Because testing was done on only a small proportion of the light-duty engine types currently in use, the number of at-risk engines probably is higher.

API President and CEO Jack Gerard, during a conference call with reporters this week:

"EPA's decisions in 2010 and 2011 approving E15 ethanol-gasoline blends for most American vehicles were premature and irresponsible. … Worse, as API noted in its press briefing two weeks ago, it approved the fuel even though government labs had raised red flags about the compatibility of E15 with much of the dispensing and storage infrastructure at our nation's gas stations. … Not all vehicles in the CRC tests showed engine damage, but engine types that did are found in millions of cars and light duty trucks now on America's roads."

Mike Stanton, president and CEO of Global Automakers:

"We can build the cars for the fuels, but the EPA made this retroactive to 2001 and that is the problem. … Our goal is to ensure that new alternative fuels are not placed into retail until it has been proven they are safe and do not cause harm to vehicles, consumers, or the environment. The EPA should have waited until all the studies on the potential impacts of E15 on the current fleet were completed."

Mitch Bainwol, president and CEO of the Alliance of Automobile Manufacturers:

"The study… indicates the risk for consumers is profound, with clear environmental, safety, fuel efficiency and financial implications. Cars were not built for E15. It's that simple – and now we have material evidence that validates our concerns."

Not surprisingly, the CRC study doesn't sit well with some folks. A DOE blog criticized the CRC study's methodology rather than focusing on the identified risks and concerns for consumers.

First, DOE seems to think that it has more expertise than the car designers and manufacturers who conducted the CRC tests. CRC has been doing work of this kind for more than 70 years, often with DOE's funding. Even more interesting: Through the National Renewable Energy Laboratory, DOE was an active participant in the technical oversight panel for the CRC study throughout its duration and at no point raised any concerns. Other points:

- Valvetrain-type engines that were tested were selected from among popular 2001-2009 models, not cherry-picked for failure. Indeed, five of the engines that were tested passed the E20 test. If someone was trying to pick engines that would fail testing they did a pretty poor job of it.
- The engine pass/fail determination was made after engine teardown and analysis. The use of the 10 percent cylinder leakage criterion to determine whether there may be engine distress is a well-established and accepted industry standard used in engine development and was used as a signal that teardown was required. The CRC study indicated use of E15 would damage the valves in some engines, leading to cylinder leakage, loss of compression and power.
- Nobody should be all that surprised that DOE found no discernible impact of E15 based on teardown inspections of engines used in its catalyst durability study. After all, its study was just that – an evaluation of the effects of higher levels of ethanol on a catalyst (i.e., the catalytic converter). It was never designed to specifically assess the stresses of mid-level ethanol blends on an engine. For DOE and others to draw conclusions about the effect of ethanol on an engine based on a test designed for a catalyst evaluation is not only scientifically unsound, it is just plain wrong.

See a more detailed rebuttal of DOE's comments, here. (See attached).

E15 is a perfect example of why the Renewable Fuels Standard is becoming unrealistic and unworkable. EPA made a rushed and premature decision to meet a political deadline in the fall of 2010. The CRC research shows that EPA didn't do its homework and is willing to put the consumer's vehicle at risk. EPA needs to base its decision on sound science, not political goals. The auto and oil industries conducted a scientifically sound and robust study, and the results from the CRC study should be concerning.

Gerard:

“The value of these vehicles along with the value of vulnerable gasoline dispensing equipment at the nation’s 157,000 gasoline service stations could run into many billions of dollars. EPA’s waivers put these investments at risk. The result could be more vehicle repairs for consumers and upward pressure on gasoline prices. … This is breakthrough research that should’ve been done by EPA. … Our data needs to be looked at.”

Detailed Rebuttal of Critiques of the CRC Mid-Level Ethanol Blends Engine Durability Study

Background

- DOE in its critique, rather conveniently neglects to mention that, through the National Renewable Energy Laboratory (NREL), (a DOE contractor,) it was an active participant in the technical oversight panel for the CRC engine durability study throughout the duration of the program. At no point did NREL object to the tests, test cycles or the test procedures.
- DOE seems to think that it has more expertise than the car designers and manufacturers who designed and conducted the CRC tests. CRC has been doing work of this kind for over 70 years, often with DOE's funding. It is interesting that DOE now feels the need to critique this particular study.
- There is ample evidence that in the end, DOE's and EPA's testing and timing was driven more by the political time clock rather than a desire for a comprehensive test program:
    - Initially, in a June 2008 presentation, EPA outlined for industry the testing it anticipated would be needed for a waiver to be approved. EPA's requirements at the time were consistent with the auto and oil industry's comprehensive test plans. EPA did not follow through on its own recommended broader suite of testing, but instead relied almost entirely on DOE's catalyst durability test project. EPA has not offered an explanation for the change.
    - DOE initially contemplated co-funding this CRC study, but then changed their funding plans and decided to instead fund a tear down of the engines used in their catalyst program knowing full well their approach would not reveal anything because the study tested the catalyst, not the engine. This allowed EPA to do some hand waving at the end of the catalyst test and to say they also looked at engine durability and materials compatibility.
    - DOE made the political decision to inspect "critical engine parts" more than a year after the catalyst testing had already started. EPA and DOE realized that they were missing critical engine durability and materials compatibility data needed to approve a waiver, so instead of running meaningful tests to evaluate these parameters, they piggy-backed onto the catalyst study which was almost near completion. This is the complete opposite of the CRC project where automotive engineers designed the study with detailed and scientifically sound methodologies and plans from start to finish.
    - The driver in all of this was EPA's desire to make an October 2010 approval announcement. DOE's withdrawal of funding for CRC had nothing to do with test cycles and engine selection for the CRC project and everything to do about getting to the finish line before October 2010.
    - Coincidentally, mid-term elections were held November 2, 2010.
- Also, DOE looked for ways to accelerate the catalyst study since testing on one of the vehicles had been delayed. DOE changed the way the test was being run to accumulate miles more quickly so that the delayed vehicle could catch up with the rest. Auto and oil industry representatives strongly disagreed with this approach since this in effect made this one vehicle's test different from the other vehicles.

Rebuttal of specific critiques:

E0 Testing

It was unnecessary to test more than three engines on E0. The auto and oil industries do not believe in wasting resources on unnecessary tests. The fact that the test cycle was able to pass or fail the seven other engine models means we had a good test tool. The engineers who designed the engine that failed on all three fuels explained what happened during this testing – mainly that for this particular engine the test cycle did not cause the valves to rotate which resulted in abnormal wear for all three fuels. Even so, the E0 failure was less severe than E20 or E15.

E10 Testing

DOE complained that there was no E10 testing. This allegation is akin to "the pot calling the kettle black." Curiously, DOE fails to mention that, in its own evaluations of mid-level blends on marine engines, light-duty vehicle evaporative emissions testing, and teardown analyses of engines used in catalyst durability testing, E10 was not used as a control. These tests compared E0 with either E15 or E20. In its catalyst durability testing of Tier 2 vehicles DOE tested 19 vehicles on E0 and E15 but only 5 on E10. DOE chose to not tear down any of the vehicles tested on E10. In support of its initial E15 waiver decision, EPA prepared a Technical Memorandum which analyzed the DOE data and stated that "…since the waiver request is for E15, this analysis focuses on those vehicles that were aged on E15 compared to those vehicles that were aged on E0." DOE's testing in support of EPA's waiver of NLEV and Tier 1 emissions vehicles included not one E10 test. The fuels selected and tested in the CRC engine durability program are fully aligned with both the DOE and EPA work referenced above. The use of E0 and E15 in the CRC study avoids ambiguity as to the source of any effects that may be observed.

Engine Durability Test Cycles

Engine durability tests by definition stress the engine, unlike DOE's catalyst test – which stressed the catalyst and nothing else. We all know that when doctors test the durability of the human engine (i.e., our hearts), they put us on a treadmill and keep cranking it up. They and their patients are not just satisfied with a leisurely walk in the park type-test. The test cycle employed by CRC is a standard engine durability test cycle that has been in use for many years. The only modification made to it for this study was to limit the maximum engine speed to 3500 RPM. This modification was made to reduce the test severity, making it more likely that engines would complete the test without experiencing failures unrelated to the test objective, i.e., evaluating the effect of E15 on engine durability. Consumers should trust automotive engineers on this topic more than government regulators. EPA is the expert on devising regulations -- that is what they do. The automakers develop and build engines and emissions control systems -- that is what they do. We have great confidence in our scientific experts who design engines, emissions control systems and fuels.

Engine Pass/Failure Determination

The engine pass/fail determination was made after engine teardown and analysis. The 10 percent cylinder leakage criterion was used to determine whether there was engine distress and was used as a

signal that teardown was required. The use of a 10% leakdown criterion is far from arbitrary. It is an accepted and standard industry practice/criterion for determining engine distress. Engines that exceeded the 10% leak down criterion in the CRC study were further examined by teardown. The failure was determined by inspection during engine teardown, this evaluation method has been used in the automotive industry for over 100 years. In fact, 3 engines exceeded the 10% leakdown criterion, but were deemed to pass after engine inspections and detailed review of the data.

The investigators in the CRC study evaluated the performance of several different compression and leakdown gauges and ultimately used one tool which provided extremely repeatable measurements (within +/- 1%) – much smaller than the range reported in the DOE program. In addition, the fact that DOE concluded that engine leakdown is "not a reliable indicator of vehicle performance" is not surprising given that the test cycle on which they base their allegation is itself not a reliable measure of changes in engine durability. In contrast to the driving cycle evaluated in the DOE study, the test cycle used by CRC produced dramatic and easily measurable changes so it provided an excellent basis for assessing engine durability.

Test Engine Selection

The real point to be made here is that all of the engines tested by CRC are engines that were waived by EPA and are expected by the general public not to have issues with the new fuel, E15. It is true that a couple of the engines tested by CRC were subject to recalls by the National Highway Traffic Safety Administration (NHTSA). However, none of these recalls were for engine-related issues associated with operation on E0 and E10. It also is worth noting that 25 of the 27 vehicle models which DOE had used in its catalyst durability test program were subject to a NHTSA recall of some kind.

Aggressive Ethanol

Some who are not experts at fuels or vehicles have claimed that CRC used "aggressive ethanol" or "illegal fuels" in this study. That assertion is blatantly false. The ethanol used in this test program was not an "aggressive ethanol". It exceeded ASTM specifications, was made by an RFA member, and was representative of what can be found in the market place.

Usefulness of the CRC Study

The CRC study is the only real engine durability of its kind. The 240 million drivers of vehicles in the US need DOE, EPA and other government agencies to take responsible actions when it comes to regulating their fuels and vehicles.

Back to the Facts on E15

by Bob Greco
Feb. 1, 2013

The ethanol lobby doesn't like the latest research on E15 – gasoline containing 15 percent ethanol – because it raises questions about EPA's premature decision to approve E15 for use in post-2001 cars and light-duty trucks. The Coordinating Research Council (CRC) study warns that E15 could damage fuel pumps and onboard fuel measurement systems, potentially affecting millions of vehicles. This follows last year's CRC finding that E15 could damage car and truck engines.

Since ethanol producers' goal is more ethanol use, and an EPA pullback on E15 would get in the way of that goal, attacks on both studies – such as those by the Renewable Fuels Association – aren't surprising. But let's be candid: They won't be around if and when motorists end up on the side of the road with a seized-up fuel pump, damaged by E15 use. Nor will they help consumers with repair bills for engines needing an expensive valve job due to E15 damage – which automakers say won't be covered by warranties.

Yet, instead of acknowledging the problem, ethanol backers go on the offensive. Click here for a detailed rebuttal of responses to the latest CRC research. But let's make a couple of quick points now.

First, CRC has been testing engines and vehicles for more than 70 years. This research often has been done with the participation and support of the ethanol industry and government agencies. Second, if CRC's work is faulty as RFA suggests, why is RFA currently sponsoring a CRC research program examining the driveability of E15 (Page 62)?

The oil and natural gas industry supports renewable fuels. Ethanol has desirable blending properties, and refiners would use it with or without a law requiring it. But scientific research shows that E15 could cause significant problems in some vehicles in use, for which consumers would bear the cost. EPA knew E15 vehicle testing was ongoing but decided not to wait for the results before approving its use – most likely to raise the permissible concentration level of ethanol in fuels so that greater volumes could be used, as required by the Renewable Fuel Standard (RFS).

Instead of attacking research it doesn't like, the ethanol industry should welcome information that could help more and more auto manufacturers adapt future vehicles to accommodate higher levels of ethanol. In the meantime, we'll say it again: EPA should pull back its E15 decision and the RFS, which forced this fuel to market before its time, should be repealed.

Detailed Rebuttal of the Ethanol Lobbyists' Critiques of the CRC Fuel Systems Durability Study

Background:

- In their attacks on the recently released CRC Fuel Systems Durability Study[1], various ethanol lobbying groups have conveniently gotten their facts wrong.
- CRC is supported by both automotive companies and API – not just API. Automotive company experts sit on CRC committees and help design these projects. We have great confidence in the automotive engineers who sit on CRC committees and who design engines, emissions control systems and fuel systems to come up with the right tests to evaluate the effects of E15 in our customers' vehicles.
- CRC has been doing this kind of research for over 70 years – often with the participation and support of the ethanol industry and government agencies. CARB, EPA, RFA, DOE, Growth Energy, ASTM, and several states have all chosen CRC to execute similar projects over the years, so clearly CRC work is highly valued.
- The fact that the ethanol industry is now criticizing CRC because the results of recent research point out all the facts is disappointing, but not surprising. The ethanol lobby has a history of attacking any study that points out problems with higher level ethanol blends.
- The fact that the CRC research shows higher level of ethanol blends with passes as well as failures shows that the work was not "junk science" or "biased" or "the books cooked" as some ethanol lobbyists have claimed.
- The ethanol industry should be applauding the research rather than criticizing it as the research is identifying what future vehicle changes are needed to accommodate higher levels of ethanol. As a result of this research, more and more auto manufactures might start building future cars that can use E15, as two companies recently did.
- The ethanol industry knows the value and credibility of CRC research. That is why they are supporting a CRC research program to look at the drivabiltiy of E15 (http://www.crcao.com/about/Annual%20Report/2012%20Annual%20Report/2012%20CRC%20Annual%20Report.pdf , see page 62), an area where CRC expertise is unique. So for them to criticize CRC because they don't like the results of some recent studies is not only unprofessional, but also defeats their own objectives of getting E15 to the marketplace.

Rebuttal of specific critiques:

CRC Used Aggressive Ethanol

It is obvious that the ethanol lobbyists are using CRC's inclusion of aggressive ethanol as a worst case fuel to detract from the fact that regular E15 also failed some of the tests. Using aggressive ethanol as a worst case scenario is often done when research is properly conducted. Regular E15 also was tested and passes and failures were observed. The aggressive nature of one of the blends made no difference in the overall results.

[1] CRC Report No. 664, "Durability of Fuel Pumps and Fuel Level Senders in Neat and Aggressive E15", January 2013

The Study Was Biased Against E15

The study shows that some fuel systems passed on E15 without any problems, but others did not. That proves that the automotive engineers who conducted the tests were not biased against E15. In fact, the study was actually conducted by a credible independent testing company and CRC simply reported the results. The testing procedures were based on existing SAE and USCAR protocols which are used in the automotive industry to predict new product life. SAE and USCAR have substantial automotive testing expertise and experience.

The DOE Study Found No Problems

The DOE Catalyst Study was just that -- a study to determine the impacts of higher levels of ethanol on the catalyst. EPA inappropriately extrapolated the results of that study to draw conclusions about parameters that the catalyst study was never intended to address (such as engine durability and fuel system materials compatibility). And DOE/EPA's decision to use the catalyst study for these parameters was not even a well thought out or statistically designed process. It was a last minute DOE/EPA decision made when the catalyst testing was almost completed.

E15 Is the Most Tested Fuel Ever -- Equivalent to 12 Round Trips to the Moon

It doesn't matter how many miles are accumulated if you used an inappropriate test, so the real question is "how were they tested?" You need the right test to give consumers confidence in the test results. The CRC study employed the same established testing procedures widely used within the automotive industry to evaluate and predict new product life. The testing procedures were based on existing SAE and USCAR protocols which are used in the automotive industry. SAE and USCAR have substantial automotive testing expertise and experience. So who do you trust – automotive experts who design engines, emissions control systems and fuel systems or ethanol lobbyists and government bureaucrats who design regulations?

The Study Ignored the Effects of Fuel Sulfur on Fuel Systems

Now that's a red herring if there ever was one. It is true that past CRC fuel sulfur research resulted in a change to the ASTM gasoline specifications, which fixed an industry-wide problem. Ironically, since the CRC Fuels System Durability study shows that E15 causes similar effects on some fuel system components, the only fix is to not use E15.

Why the Brazilian and NASCAR Experiences Are Not Relevant to E15 in the US

Ethanol advocates like to cite both the Brazilian experience with higher levels of ethanol and the use of E15 in NASCAR racing as reasons for why E15 should be okay for US consumers. Neither experience is relevant.

Brazilian Experience

Proponents of increased mandates for ethanol use in the U.S. cite Brazil as an example of why we need not be concerned about how E15interacts with automobiles and retail infrastructure. However, "we should be careful in drawing conclusions about rapid supply expansion from the Brazilian experience of the '70's. Several subsidies provided by the Brazilian government in that era – such as infrastructure investments by a state-owned oil company – could not be duplicated in the U.S. today."[2] Further, we should recognize that the Brazilians were systematic in their transition, converting vehicles, manufacturing new ones compatible with mid-level ethanol blends and building compatible fuel infrastructure over time. This can be easily contrasted with the approach that U.S. ethanol proponents and the EPA have taken, clearing the way to offer the blend for sale first and hoping that infrastructure and vehicles that can store, dispense and use the fuel safely follow in the near future.

After recognizing that the existing gasoline powered vehicles were not compatible with mid-level ethanol blends, the government disseminated the technology for converting gasoline engines to run on ethanol.[3] Eventually, the manufacturers which supplied the Brazilian automobile market made vehicles compatible with mid-level ethanol blends. See the attached chart (Table D) for a full list of changes that the auto manufacturers made to allow for the safe use of mid-level ethanol blended fuels in Brazil.[4]

E15 As the NASCAR Fuel

Except for four wheels and an engine, today's NASCAR vehicles running on E15 have very little in common with cars owned by the average person. The NASCAR engines are designed for racing, and have been modified to be compatible with the Sunoco-produced competition E15 racing fuel. The engine alone costs between $45,000 and $80,000 - significantly more than a consumer's engine costs. The fuel pumps are racing pumps that have been modified to specifically handle E15 and high performance fuel flow rates. And besides, NASCAR engines and fuel pump systems are highly stressed components that undergo intense maintenance, inspections and rebuilds after each race. As CRC research has shown, engines and fuel systems in today's consumer vehicles can be harmed by E15. Furthermore, government research shows that E15 can adversely impact sensors that help control emissions from consumer vehicles[5]. Conversely, race car emissions are uncontrolled and do not have similar sensors. So, to equate E15 miles accumulated on a NASCAR race vehicle with those driven on a typical vehicle sold to and operated by the average consumer is not a relevant comparison. In fact, it's just silly.

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[2] Ethanol: Lessons from Brazil, David Sandalow (May 2006).

[3] Brazilian Transportation Fleet, http://sugarcane.org/the-brazilian-experience/brazilian-transportation-fleet

[4] Preliminary Comments on the DOE report titled "Effects of Intermediate Ethanol Blends on Legacy Vehicles and Small Non-Road Engines, Report 1 – Updated," NREL/TP-540-43543 and ORNL/TM-2008/117, dated February 2009 Dr. Ron Sahu, Consultant to the Outdoor Power Equipment Institute (OPEI)

[5] SAE Paper, 2012-01-2305.

Table D

Adaptation of Brazilian Vehicles[21] for Use with E22 or E85+[22]

System	Part Change
Air-Fuel Feed	Electronic fuel injectors: must use stainless steel and modify the design to improve fuel "spray" and throughput. Manufacturers calibrate the system to the fuel, to ensure the proper air-to-fuel ratio and an appropriate Lambda sensor working range.
	Carburetors: must treat or otherwise protect aluminum or zinc alloy surfaces.
Fuel Handling System	Fuel pumps: must protect internal surfaces and seal connectors; a different metal may be required.
	Fuel pressure regulators: must protect internal surfaces; internal diaphragm may need to be up-graded.
	Fuel filter: must protect internal surfaces and use an appropriate adhesive for the filter element.
	Fuel tank: if metallic, must protect (coat) the internal surface. If plastic, may need to line the interior to reduce permeation.
	Fuel lines and rails: may need to coat steel parts with nickel to prevent corrosion or replace with stainless steel.
	Fuel line quick connects: must replace plain steel with stainless steel.
	Hoses and seals: "o-ring" seals and hoses require resistant materials.
Emission Controls	Vapor control canister: may need to increase the size of the canister and recalibrate it for the expected purge air flow rate.
	Catalyst: may need to adjust the kind and amount of catalyst and wash coating.
Powertrain	Ignition System: must recalibrate ignition advance control.
	Engine: should use a higher compression ratio for proper operation; new camshaft profile and phase; and new materials for the intake and exhaust valves and valve seats.
	Intake manifold: must be able to deliver air at a higher temperature; requires a new profile and must have a smoother surface to increase air flow.
	Exhaust pipe: must protect (coat) the internal surfaces and ensure design can handle a higher amount of vapor.
Other	Fuel filler door paint: must change paint formula used on plastic fuel filler door to avoid loss of paint adhesion.
	Motor oil: may require reformulation and/or a new additive package.
	All parts that might be exposed to the fuel: avoid polyamide 6.6 (nylon), aluminum, and various zinc alloys. If these materials are used, their surfaces must be treated or otherwise protected.
	Vehicle suspension: may need to modify to accommodate a higher vehicle weight
	Cold start system (for E85 or above): may require an auxiliary start system with its own temperature sensor, gasoline reservoir, extra fuel injector, and fuel pump; also, the vehicle battery must have a higher capacity.

E15 and Check Engine Light Malfunctions

by Bob Greco
Jan. 30, 2013

Earlier this week API highlighted new research by the Coordinating Research Council (CRC) on serious potential problems with vehicle fuel systems when operated on E15 fuel – gasoline containing 15 percent ethanol.

In addition to CRC's research, we want to call attention to a recent paper from Oak Ridge National Lab (ORNL) that was published by the Society for Automotive Engineers (SAE). This study examined the effects of E15 on malfunction indicator lights (MIL), also known as "check engine lights."

As might be expected given the source sponsoring the SAE paper, the study attempts to downplay the risk of a substantial number of MIL illuminations with E15 and with E20. Nevertheless, two of the main conclusions (from the last page of the paper) are very telling and support the concerns that the auto and oil industries have been conveying all along (emphasis added):

"**Results show that MIL illumination should increase with ethanol content, but the rates of illumination will vary significantly by vehicle model.** Thus, experience for a given vehicle model may differ quite significantly from a fleet-average estimate of MIL illumination rates."

And:

"Some vehicle models do not appear to be at significant risk for a substantial number of MIL illuminations with E15 fuel, and a smaller number do not appear to be at significant risk even if E20 is used. **One OEM (original equipment manufacturer) appears to be at higher risk of experiencing a significant number of MIL occurrences with E15 use than other OEMs.**"

There are a couple of important takeaways from both the CRC and the ORNL research:

- Not all vehicles are impacted. Some 2001 and newer vehicles operate on E15 without incident. But testing by CRC and ORNL has determined that some vehicles do not.
- Vehicles can have different problems with E15. One vehicle may have a fuel pump system issue. A different vehicle might have accelerated valve wear.
- A few failures can translate to millions of cars. One or two popular models that have problems can represent millions of vehicles on the road today. This means a significant number of motorists can be impacted.

The larger point is that with thorough testing – like those conducted by ORNL and CRC – we know that E15 could be responsible for significant problems in vehicles. When EPA green-lighted E15 use, it knew E15 vehicle testing was ongoing but decided not to wait for the results – most likely to raise the permissible concentration level of ethanol in fuels so that greater volumes could be used, as required by the Renewable Fuel Standard (RFS).

EPA should pull back its E15 decision, and the RFS, which drove the premature and irresponsible decision to OK E15's use, should be repealed.

Fact Checking AEC's WSJ "Fact Check"

by Bob Greco
Mar. 14, 2013

On March 11, the Wall Street Journal (WSJ) Editorial Board published a piece accurately explaining where the RFS came from, what the blendwall is, why it is problematic and how it can contribute to raising gas prices. The following day, the Advanced Ethanol Council (AEC) sent the WSJ what they claimed to be a "fact check" on the editorial board's piece titled "RIN Credits for Dummies." Ironically, almost everything in their fact check was wrong.

Here are some of the claims AEC made and explanations of why they are inaccurate:

1. A RIN is produced when a gallon of renewable fuel is produced. Oil companies can then split the RIN from the gallon when they buy the gallon of renewable fuel and sell it on the open market. So, in essence, the oil companies are buying and selling RINs to themselves and then complaining about it to the Wall Street Journal.

A RIN can't be used toward complying with the RFS unless it is actually blended into domestic gasoline. Oil companies have no reason to split the RIN from the gallon, as taken to the logical extreme, this would theoretically require them to store the ethanol indefinitely simply to obtain RINS. The increasing price of renewable fuel credits may be an indication that refiners will breach the E10 blendwall this year. The blendwall is the point at which there isn't enough E10 being sold to accommodate all of the ethanol mandated by federal law. In order to comply with the law without buying RINs from the open market, an oil company has limited unattractive options:

- blend gasoline with more than 10% ethanol, but as Kyle Isakower, API's Vice President of Policy Analysis, testified before the EPA, "there are serious compatibility issues with engines, fuels and retail infrastructure not specifically designed to handle blends above 10% (i.e. the vast majority of light-duty vehicles on the road today that are not flexible-fuel vehicles);
- produce E85, but Isakower also noted that consumers have largely rejected this fuel and refiners own less than 5% of the retail gas stations that would need to be upgraded to sell this alternative fuel; or
- reduce their obligation by increasing gasoline and/or diesel exports, decreasing imports, or reducing refinery production.

Both of these options could negatively affect consumers. Now, this challenge is compounded by refiners who may be planning to "carry over" some 2013 RINs for compliance next year, when the mandates are even larger. It's easy to see how such rigid mandates lead to unintended consequences.

2. Oil companies can either buy a gallon of renewable fuel to comply with the RFS or buy a RIN credit on the open market. Oil companies have indeed bid up the price of RINs over the last few weeks, but they are doing so voluntarily to avoid the alternative of adding more ethanol to gasoline. Ethanol is 65 cents cheaper per gallon than gasoline today.

As mentioned above, it is not possible to comply with the RFS using only RINs from physically blended gallons without using a fuel that has serious compatibility issues with the existing vehicles on the street. As a result, oil companies are complying with the federal law likely by using RINs that were generated last year when they used more ethanol than the RFS required. Now, since there are serious issues with selling a fuel that has more than 10% ethanol, and the renewable fuel mandate will exceed 10% of the total gasoline supply, additional RINs cannot be created. Consequently, the RIN market has been very tight and as with any market this has led to a sharp increase in prices. Gasoline has recently cost $3.15/gallon, while ethanol has recently cost $2.53/gallon, meaning that ethanol has been selling at a 62 cent discount to gasoline. What AEC doesn't mention is that ethanol has only 66% the energy content of gasoline. That means, using recent costs, it would have cost $3.83 in ethanol to provide the same amount of energy as a $3.15 gallon of gasoline, making gasoline the less expensive choice. They also don't mention that regardless of whether or not there was a price incentive to add more ethanol to the fuel; there simply are too many uncertainties associated with selling a fuel with more than 10% ethanol.

3. The oil industry's excuse — that it cannot blend more ethanol because of the blend wall — is smoke and mirrors. Fifteen percent ethanol blends are approved for 75 percent of today's vehicles which together account for 85 percent of miles traveled. It's pretty simple; the oil companies will bury the truth and gouge the consumer to avoid blending alternative fuels.

While the EPA provided a waiver allowing E15 to be sold to 2001 and newer light-duty vehicles, most automobile manufacturers have made it clear that using E15 will void their vehicle's warranty. AEC would benefit from reading the letters from the auto companies to Congressman Sensenbrenner as well as CRC's reports on engines and fuel systems mentioned above to better understand why automakers do not allow this fuel in the vast majority of the light-duty vehicles produced to date for the US market.

4. The oil companies helped design and openly supported the open market RIN credit program they are now using to attack the RFS. The problem for the oil industry is the RFS and RIN credits are working to reduce our dependence on oil, break Big Oil's monopoly on the gas pump, and create American jobs while also reducing gas prices.

Again, AEC misses the point. The RINs themselves are not the problem, they are a symptom of the real problem – the unrealistic mandate. The world has changed since the RFS was envisioned in 2007. While consumer demand for fuels has dropped, domestic supplies of crude oil have grown dramatically because of the revolution in shale oil and natural gas development in the U.S. This has created jobs and reduced imports.

The oil industry supports the use of all economically viable energy sources, including renewable fuels, to help meet our nation's energy demand. The industry used some 13 billion gallons plus of ethanol last year. Our members are manufacturing ethanol, researching alternative fuels like algal-based diesel and cellulosic ethanol, and working on new fuels like biobutanol. The world is demanding more energy and we believe that all fuels are needed to be able to meet the world's energy demands including renewable transportation fuels, wind, geothermal, solar, coal, oil and natural gas.

We are, however, for repeal of the federal RFS that mandates the use of a fuel that could potentially damage the consumers' vehicles.

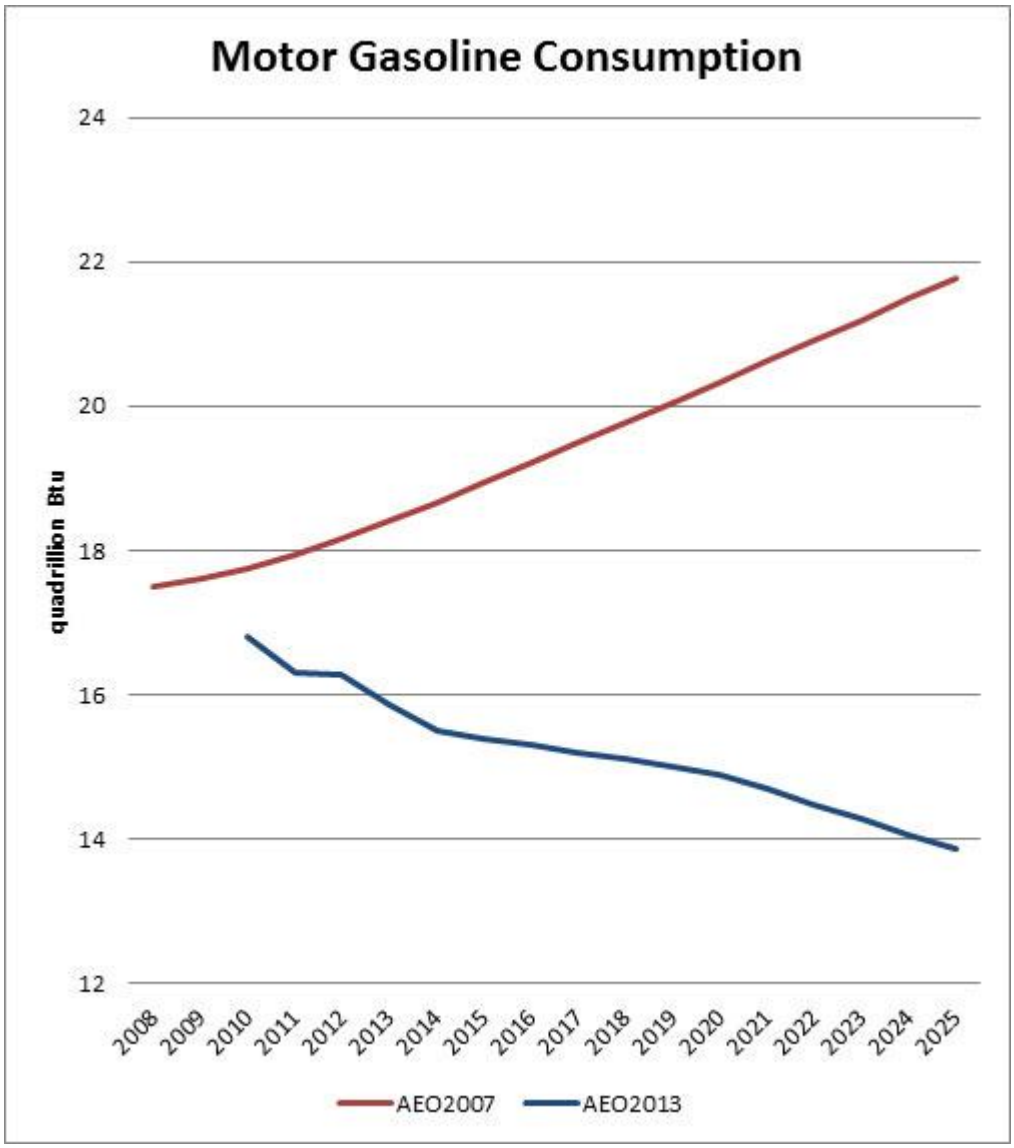
Arbitrary Mandates, Real Costs

by Bob Greco
Mar. 15, 2013

In a March 7 blog post, Renewable Fuels Association (RFA) President, Bob Dinneen claimed that the recent increase in RIN prices is not related to the E10 blendwall, and that the blendwall itself is a myth perpetrated by oil companies as an "excuse for their refusal to move to higher-level ethanol blends." He then makes a number of claims that were presumably intended to bolster his misplaced conclusion. Conveniently, the post does not propose an alternative theory for RIN prices that have gone from 3 cents apiece to over $1, before retreating to about 70 cents today, in less than one years' time.

The post also ignores that the petroleum industry is only one in a sea of voices raising concern over the negative impacts that E15 and unrealistically high ethanol blending requirements would likely have on on-road and off-road engines and fuel systems, gasoline retail infrastructure and dispensing equipment, the environment, the price of food, food security for the needy, and a laundry list of other health and safety issues. In addition to the petroleum industry, auto manufacturers, and consumer safety groups like AAA, farmers, grocery manufacturers, environmental non-profits, think tanks, world hunger groups, the California Air Resources Board (CARB) and lawmakers are all calling for a change to a no longer workable Renewable Fuel Standard (RFS). There aren't too many occasions when such a diverse group of interests stand in solidarity against a policy with only one proponent – in this case, the proponent is the party that stands to profit financially from the faulty mandate.

Before rebutting some of the specific claims, it is important to recap how we will reach the blendwall. In 2007, the Energy Independence and Security Act (EISA) expanded the amount of biofuels U.S. refiners and importers were required to blend into fuel in the coming years. At that time, the energy landscape was entirely different than what we are confronting today. Here is actual and projected motor gasoline consumption for the years 2008-2025 according to the EIA's Annual Energy Outlooks from 2006 to 2013.



Unfortunately, the projection of gasoline demand that the Energy Information Administration (EIA) made back in 2007 (and which partly formed the rationale for legislating significantly expanded RFS volumes) was wildly inaccurate. This is not to slam EIA, understandably, at that time they were unable to predict the severe economic downturn we would face over the next 5+ years, and unable to foresee the strides made by auto manufacturers in producing more fuel efficient vehicles. But it should serve as a cautionary tale for government mandating new fuels based on predictions of future markets, because while markets are fluid and dynamic, government interventions are often rigid and based on dated information. Had demand grown as anticipated, it may have been possible to meet the RFS volume requirements without blending more than 10% ethanol in every gallon of gasoline sold. Instead, a significantly reduced pool of gasoline is required to absorb a significantly increased volume of ethanol, which brought the situation to a head. Realizing this, the EPA provided a "partial waiver," allowing E15 to be sold in the market. Unfortunately, they did not perform the right testing to determine how the fuel would interact with engines, fuel systems or storage and dispensing infrastructure.

The RFA post claims that there is sufficient ethanol supply and ethanol production capacity to meet the RFS volume requirements, and that RINs were not intended to "allow oil companies to avoid blending physical gallons of renewable fuel." But this completely misses the point. Regardless of how much ethanol could be produced, compliance hinges on the ability to blend the ethanol into gasoline. According to Coordinating Research Council (CRC) studies on engines and fuel systems, blending above the 10% level could lead to engine valve and valve seat damage, seizure of the fuel pump, and inaccurate readings on your dashboard (i.e. check engine lights, fuel gauge, etc.) among other problems, forcing the refiner to choose between blending a higher volume of ethanol into the fuel, which leads to the aforementioned engine, fuel system and infrastructure problems, or risk being unable to meet their RIN obligations.

The post also claims that Congress' intent with the RFS was to transform and diversify the fuel market and that oil companies are frustrating that purpose by refusing to invest in infrastructure that would allow the sale of E15 and E85 fuel blends. However, oil companies own only 3% of all retail fuel stations, while small independent owner/operators own 58% of the 156,000 gas stations nationwide, meaning that even if E15 were appropriate for use in all vehicles (which it is not), oil companies are not in a position to invest in infrastructure to dispense it to consumers. Meanwhile, many of the independent gas station owners clearly choose not to invest in E85 infrastructure and dispensing equipment, presumably because of a lack of consumer demand. The cost to upgrade retail equipment to store and sell E15 and the issues associated with selling it are likely factors in why E15 is not being marketed by more stations.

Another claim made by RFA is that oil companies "choose" to purchase detached RINs, rather than blending ethanol to meet their obligations under the RFS. RINs are not simply created as "detached." What RFA fails to mention is that ethanol RINs can only be "detached" after the physical gallons of ethanol are purchased by a refiner and/or blended into gasoline for sale. The RINs are then submitted by the refiner at the end of the compliance period to EPA. The simple fact is that ethanol is already being blended at 10% into nearly every gallon of gasoline, the maximum level that can be used in all vehicles without experiencing problems. Later in the post, RFA acknowledges that it would be possible to meet the RFS with physical gallons of ethanol in 2013 only if a portion of the fuel supply was E15, but Congress's intent was not to subject a portion of U.S. consumers to a potentially problematic product, it was to reduce the need to import oil from unfriendly countries overseas. Fortunately, due to significantly larger crude deposits in the U.S. than were believed to exist at the time, we can provide domestic fuel without putting consumers at risk.

The post goes on to make a number of claims about how many vehicles are currently on the road, and will be on the road in the near future, that are capable of handling higher blends of ethanol, including MY2013 vehicles warranted for E15 and Flex Fuel Vehicles (FFV) capable of handling blends up to E85. The bottom line is that while E85 has been available for years, as the EIA reports, consumption of ethanol in gasoline blends with more than 51 percent ethanol by volume (E85) accounted for less than one-tenth of one percent of total ethanol produced for motor fuels in 2012. This is likely because of the significantly reduced fuel economy that a driver would experience using E85. E85 has up to approximately 26% less energy content than gasoline, meaning that a driver would have to fill up an FFV as much as 35% more often when using E85 to achieve the same distance when fueling with gasoline. According to AAA data, the day RFA posted this blog, gasoline cost $3.71/gallon, to get the same amount of miles out of E85, a consumer would have paid up to $4.32/gallon on the same day.

As API Vice President of Policy Analysis, Kyle Isakower, testified at EPA's March 8 RFS hearing, API "members' primary concern is with the ethanol blendwall. There are serious compatibility issues with vehicle and retail infrastructure with gasoline blends above 10%. Yet, EPA continues to apply aspirational criteria to set the annual standards." Rather than issuing press releases and drafting blog posts making spurious allegations against the oil industry, we would like to see RFA come to the table and join other industry, environmental, farm, food and world hunger groups to scrap the current unworkable RFS and work to formulate a real solution.

An Artificial Solution to Arbitrary Mandates

by Bob Greco
Mar. 18, 2013

The Renewable Fuels Association this morning tweeted:

This is in many ways progress in that it is a de facto admission that RIN prices are rising because we are hitting the "blend wall" on ethanol, and that a solution is needed. Unfortunately the solution in this case is crazy. From Platts:

Well-known energy economist Phil Verleger several years ago first brought up the likelihood that the refining industry might need to promote the sale of E85 as a way around the Gordian knot of a 10% ethanol blendwall combined with a rising mandate for the use of renewable fuels plus a decline in gasoline demand in the US…"The obvious solution to the RIN price problem involves no EPA intervention and no regulatory action at this point," Verleger writes. "It simply calls for boosting E85 sales."

But there is nothing simple about boosting E85 sales, which are low and projected to continue to be low. This is for several reasons; first and foremost is weak consumer demand for vehicles that use E85, over to another Platts article from February:

"US consumer demand for flex-fuel vehicles, which can run on high levels of ethanol, is not strong enough for automakers to market them in the country, representatives of several major automakers said Thursday."

Why? Well the Mother Nature Network tells us:

Flex fuel vehicles running on E85 are noticeably less fuel-efficient than the same vehicle running on traditional gasoline — about 15 percent less efficient [According to EPA and DOE, FFVs typically get 25-30% less miles per gallon than gasoline]. When you add the reduced fuel efficiency in with the

fluctuating price of E85, consumers may end up paying several hundred dollars more per year for a vehicle that only has a nominal benefit to the environment.

So demand is weak, but renewable fuel boosters have a solution, make E85 anyway and give it away:

“The situation is so convoluted that it would pay marketers to give E85 away should the RIN price rise to around $5,” [Verleger] writes.

So basically renewable fuel folks want refiners to pay them for a product and then the refiners would give it away for free. But of course it wouldn’t be free, the costs could just be spread across all other products refiners create, products that people actually want to pay for.

Verleger is correct, the situation is convoluted, convoluted beyond repair. But having refiners supply a product beyond its demand is not much of a solution, it is just wasteful. A real solution would start by ending the market distortions of the renewable fuel standard.

Paying for Ethanol's Infrastructure

by Bob Greco
Mar. 22, 2013

Ethanol supporters have a blog post up suggesting that if the oil and natural gas industry simply invested in the "modern fuel distribution infrastructure needed to dispense greater than E10 blends," industry's issues with unworkable ethanol mandates under the Renewable Fuel Standard would vanish.

Maybe in some alternate universe – one that's disconnected from economic reality, real costs and operating margins. Don't take our word for it. Take a look at this letter to the Wall Street Journal from Dan Gilligan, president of the Petroleum Marketers Association of America, the folks who own the gasoline stations, convenience stores, heating oil businesses, truck stops and other companies that invest in and market petroleum products.

Gilligan writes that most of the fueling infrastructure in this country isn't designed to handle "greater than E10 blends" – such as E15 (up to 15 percent ethanol) – and that making it so would be more impactful than ethanol backers acknowledge:

There are 700,000 gasoline dispensers in use in the U.S. and probably fewer than 5,000 have been certified for E15. There are over 3,000 miles of underground piping systems that have not been certified as safe for E15 as well. Who is going to pay to replace the dispensers and underground piping, which will cost some retailers hundreds of thousands of dollars? Over 94% of the gas stations in the U.S. are owned by independent businesses, and the major oil companies cannot order those retailers to replace dispensers and piping. The retail gasoline business is brutally competitive and the average retail outlet has an annual net profit of $40,000.

Let's bring it to a fine point: The fueling system infrastructure costs so easily dismissed by ethanol's supporters wouldn't fall on major oil companies, which own less than 3 percent of the country's service stations, but on a lot of independent businesses which, as Gilligan notes, don't enjoy huge profit margins.

We're talking about costs ranging from thousands of dollars to potentially hundreds of thousands of dollars, per station. The country has more than 156,000 service stations. Do the math: The upper end of the price tag could be more than $15 billion. Then the question becomes whether to invest potentially tens of thousands of dollars to sell something like E15, which research has shown could damage vehicle engines and fuel systems. Real-world business decisions … the kind ethanol backers should acknowledge.

About Ethanol – Just The Facts, Please

by Bob Greco
Mar. 22, 2013

The Renewable Fuels Association (RFA) has been circulating a video titled "40 Facts about Ethanol." The first items demonstrate the growth in ethanol production over the past few decades:

- 1982 – A handful of small ethanol plants produce 350 million gallons of ethanol
- 1992 – 39 ethanol plants produce 985 million gallons
- 2002 – 66 ethanol plants in operation, producing 2.14 billion gallons
- 2012 – 211 ethanol plants produce 13.3 billion gallons

That's 3700 percent growth in 30 years, pretty impressive. As the ethanol industry's biggest customer, we have provided the demand to fuel much of that growth. Unfortunately, RFA follows these statistics with a list of "facts" that couldn't be further from factual, presumably to support the unworkable Renewable Fuel Standard (RFS) that is becoming increasingly difficult to defend. Let's take a look at a couple of the most problematic claims in RFA's video:

"Last year, ethanol displaced an amount of gasoline refined from 462 million barrels of imported crude oil. That's more oil than we imported from Saudi Arabia."

First of all, ethanol is primarily an additive TO gasoline, not a replacement FOR gasoline. Ethanol can only act as a replacement to gasoline when it is sold as E85 (fuel that contains up to 85 percent ethanol). More than 99 percent of ethanol sold is used as an additive to gasoline, typically making up 10 percent of a gallon of E10 fuel. In 2012, only 100.2 million gallons of E85 were sold. This means that ethanol sold as a fuel, rather than an additive, has "displaced" 50.7 million gallons of gasoline, after accounting for ethanol's lower energy content, which we explained in a post last week. To put this in context, the U.S. consumes approximately 352 million gallons of gasoline every day.

Additionally, every barrel of oil yields a range of products, including gasoline, that we use every day – from the tires on our cars to the heating oil that warms our homes. So there isn't any circumstance where ethanol could replace a single barrel of oil. Further, the U.S. is currently producing more than 7 million barrels of domestic oil per day, so to claim that all ethanol consumed is displacing "imported oil" is disingenuous. Finally, as an example of RFA's lack of adherence to facts, even if their claim was true, the U.S. actually imported 496 million barrels of oil from Saudi Arabia - more, not less, than the 462 million barrels for which RFA tries to take credit.

"And it means the U.S. reduced expenditures on imported oil by $44 billion last year."

The U.S. Census Bureau tracks foreign trade and reported earlier this year that the U.S. spent $18.7 billion less on crude oil imports in 2012 than in 2011. This number is far lower than the $44 billion RFA takes credit for, and these savings are the result of increased domestic oil production, reduced fuel consumption due to the recession, more fuel-efficient vehicles and some biofuel consumption, not ethanol alone.

We would like to see RFA come to the table and work with us to scrap the current unworkable RFS and formulate a real policy. But this will not be possible if RFA instead prefers to pursue a campaign of false facts and misinformation.

AUTO ALLIANCE

DRIVING INNOVATION®

Auto Alliance Response to House Energy & Commerce Committee Renewable Fuel Standard Assessment White Paper (Blend Wall/Fuel Compatibility Issues)

Questions for Stakeholder Comment

1. **To what extent was the blend wall anticipated in the debates over the Energy Policy Act of 2005 and the Energy Independence and Security Act of 2007?**

2. **What are the benefits and risks of expanded use of E-15 to automakers, other gasoline powered equipment makers, refiners, fuel retailers, and others involved in the manufacture and sale of gasoline and gasoline-using equipment?**

   While there are no identifiable benefits to expanded use of E15 to automakers, there are risks of expanded E15 usage. These risks include damage, to engines and fuel systems of many motor vehicles on the road today, including damage to the vehicles' emission control device or system. In addition, E15 would not significantly protract issues with the RFS blend wall.

   Prior to model year (MY) 2012, all motor vehicles were designed, certified, and warranted to withstand gasoline blends containing no more than 10% ethanol (E10) unless the consumer purchased a flexible fuel vehicle (FFV). Recent studies, including a study conducted by the Coordinating Research Council (CRC), have demonstrated the potential adverse effects of E15 use on certain, post-MY 2001 motor vehicles. The CRC engine durability study found signs of corrosion caused by the mid-level blend (i.e., E15-E20) affecting valves and valve seats. The CRC fuel system durability study also showed evidence of fuel level sensor errors, fuel pump failures and component swelling caused by the fuel. Recent data also underscored the risk of widespread damage from misfueling in connection with other types of engines on E15.

   During EPA's rulemaking process, automakers and other engine manufacturers consistently urged EPA to wait to make its decision on the introduction of E15 to the nation's fuel market until all of these studies on the potential impacts of E15 on the existing fleet were completed. EPA's decision to issue its partial waivers allowing use of E15 in MY 2001 and later vehicles was flawed in a number of respects. It was inconsistent with the Clean Air Act (Clean Air Act Section 211(f)(4) does not provide for partial waivers, as EPA asserted), and premature and arbitrary in failing to consider all of the pending data (in addition to the damage to the vehicles themselves, EPA ignored the fact that vehicles using E15 emit higher rates of NO_x). It was also inadequate in addressing potential misfueling avoidance (as opposed to mitigation) and the related costs of determining which vehicles are most susceptible to E15's corrosive effects, and the liability for consumers' safety claims, and claims against OEMs and fuel providers for damage from the fuel. Finally, it failed to assure adequate E10 and E0 fuels in the marketplace for the current and legacy engines that need them. For these reasons, engine manufacturers, including automakers and other stakeholders challenged the EPA final rules in court.

3. **What are the risks of the introduction and sale of E-15 to the owners of pre-2001 motor vehicles, boats, motorcycles, and other gasoline-powered equipment not approved to use**

it? Are there risks to owners of post-2001 vehicles? How do these risks compare to the benefits of the RFS?

Automakers advise consumers to continue to follow the guidance on fuel selection in their vehicle owner's manuals. Prior to MY 2012, all motor vehicles were designed, certified, and warranted to withstand gasoline blends containing no more than 10% ethanol (E10). The risks of E15 use to owners of any vehicles not designed for its use include failure of fuel pumps, fuel level sensor errors, On-Board-Diagnostic (OBD) triggered malfunction indicator light (check engine light) illumination, and engine cylinder head damage. These dangers have been extensively documented in recent CRC reports (http://www.crcao.org/news/Mid%20Level%20Ethanol%20program/index.html). The potential costs to consumers are significant which could be as high as $4,000 for single cylinder head engines and twice as much for V-type engines.

4. **What is the likely impact, if any, of the blend wall on retail gasoline prices?**

5. **What is the timing of the implementation challenges related to the blend wall? Will some entities face difficulties earlier than others?**

6. **Could the blend wall be delayed or prevented with increased use of E-85 in flexible fuel vehicles? What are the impediments to increased E-85 use? Are there policies that can overcome these impediments?**

   The increased use of E-85 could delay or prevent the "so-called" blend wall. There are more than 14 million FFVs on the road today with more being sold every day; if even half of these vehicles were being operated on E-85, it would enable a substantial increase in the sale of renewable fuels. The primary factors affecting the lack of E85 usage are pricing, availability, and consumers' willingness to use the fuel. Because ethanol is often priced above its relative energy value (it has less energy than gasoline, so its vehicle miles travelled (VMT) cost can be higher than comparable VMT cost of gasoline), E85 use is not competitive with the use of gasoline. And, because there is little demand for the mispriced product, retailers have been slow to install retail sites nationally. Roughly 2% of gas stations have an E85 pump, and most are concentrated in the Midwest, where most corn ethanol is produced. But even in states where most E85 pumps are concentrated, actual sale of E85 has been low. Policies to incentivize retailers to offer and price the product competitively and educate consumers on the value of E85 might be effective in promoting more E85 usage.

7. **Is E-15 misfueling unavoidable? Are there lessons from the labeling and dispensing of diesel, E-85 and other fuels that prevent their misfueling that can also be applied to E-15? What specific actions are companies taking to address potential misfueling concerns under MMPs?**

   Yes, E-15 misfueling is unavoidable, particularly in light of the lack of any meaningful measures in place to prevent it. The only deterrent to E-15 misfueling is a pump label for which it is inconceivable that it would be followed by all consumers; and even then, EPA so weakened the label's cautionary messaging during the rulemaking process as to render the label essentially ineffective.

   The history of the introduction of unleaded gasoline in the 1970s is instructive. Vehicles designed to use the new unleaded gasoline were not supposed to use leaded gasoline, which could damage their emission control systems. Despite having special nozzles to prevent misfueling,

significant misfueling still occurred. Indeed misfueling was common enough for EPA to conduct test programs on the subject-- "AN OVERVIEW OF SEVERAL EPA MISFUELING TEST PROGRAMS", National Technical Information Service, 1980. In 1985, EPA published a 495 page report on lead and misfueling: "Costs and Benefits of Reducing Lead in Gasoline", EPA-230-05-85-006. If misfueling occurred in the 1970s and 1980s in spite of nozzle designs intended to prevent it, it will certainly occur with much greater frequency when there are no physical barriers in place, such as nozzle design, as is the case with E-15.

Motorists' virtually exclusive focus on price, or inattention, can lead to their intentional or inadvertent misfueling of their vehicles, even when the passive warnings are provided. EPA's final pump warning language did not even refer consumers to their vehicle owner manuals for guidance, as OEMS had advocated.

8. **Can blend wall implementation challenges be avoided without changes to the RFS? Is the existing EPA waiver process sufficient to address any concerns? If the RFS must be changed to avoid the blend wall, what should these changes entail? Should any changes include liability relief or additional consumer protections for addressing misfueling concerns?**

The "so-called" blend wall could be avoided through greater utilization of E85 that will enable the consumption of the renewable fuel volumes required by the RFS2. However, the reality, based on the five years since RFS2 was enacted, is that such utilization is unlikely without further government intervention to subsidize the fuel and the installation of infrastructure.

Even though the auto industry strongly disagrees with the EPA's retroactive E15 waiver decision, unless it is overturned, it is the law of the land. This could allow for a transition of the national fuel pool from E10 to E15 while the existing car park changes over, which will take considerable time, provided manufacturers design vehicles that are compatible with E15. It is unclear, however, whether retailers (which are largely independently operated) will choose to offer E15 without additional incentives, robust misfueling provisions and liability protection. That being said, if the overall renewable fuel targets remain at 36 billion gallons and ethanol (corn-based and cellulosic) constitutes the lion's share of the mandate, then, at best, EPA's E15 waiver will only provide some delay in reaching the "so-called" blend wall.

9. **Have the 2017 and Later Model Years Light Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy standards for cars and light trucks changed the implementation outlook of the RFS?**

Yes, the combination of prospective reductions in fuel consumption produced by the MY 2017-2025 Greenhouse Gas and Corporate Average Fuel Economy standards, increased deployment of alternative fuel vehicles that do not operate on gasoline, and the on-going reduction in vehicle miles traveled (VMT) will reduce the usage of E10 fuel and thus the ethanol that is blended to make it. This requires more renewable fuel to be used such as E85, biodiesel or renewable diesel would be needed to achieve the fixed targets of the RFS2. Future transitions to alternative transportation technologies may also curtail the gasoline blend pool.

10. **What other methods, including the use of drop-in fuels, are available to industry to ease the challenge posed by the blend wall?**

11. **What are the impacts on renewable fuel producers if the RFS is changed to avoid the blend wall?**

Biotechnology Industry Organization

April 5, 2013

The Honorable Fred Upton
Chairman
Energy and Commerce Committee
U.S. House of Representatives
2125 Rayburn House Office Building
Washington, DC 20515

The Honorable Henry A. Waxman
Ranking Member
Energy and Commerce Committee
U.S. House of Representatives
2322A Rayburn House Office Building
Washington, DC 20515

via email at: rfs@mail.house.gov

Dear Chairman Upton and Ranking Member Waxman:

The Biotechnology Industry Organization (BIO) is pleased to comment on the U.S. House of Representatives Committee on Energy and Commerce's (Committee) first in a series of white papers[1] reviewing the Renewable Fuel Standard (RFS).

Introduction:

BIO is the world's largest biotechnology organization, with more than 1,100 member companies worldwide. BIO represents leading technology companies in the production of conventional and advanced biofuels and other sustainable solution to energy and climate change. BIO also represents the leaders in developing new crop technologies for food, feed, fiber, and fuel.

These companies are developing new and innovative ways to help fuel America and the world; providing more environmentally friendly energy crops, cleaner burning biofuels and renewable chemicals that help reduce greenhouse gas emissions and provide more sustainable sources of energy and materials. Achieving our nation's goals of less dependence of foreign sources of oil and cleaner fuels will require our economy to

[1] *RENEWABLE FUEL STANDARD ASSSESSMENT WHITE PAPER: Blend Wall/Fuel Compatibility Issues*, http://energycommerce.house.gov/sites/republicans.energycommerce.house.gov/files/analysis/20130320RFSWhitePaper1.pdf

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transition to sustainable energy resources and higher levels of energy efficiency. The companies BIO represents are developing innovative biobased fuels, products, and processes that will enable our economy to achieve these objective.

Toward this end, federal policy, like the RFS, has played an important role in helping to drive the commercialization of these technologies. The importance of federal policy is particularly critical in the transportation fuel sector. The U.S. transportation system is overwhelmingly reliant on petroleum fuels, and these fuels are a large component of the U.S. greenhouse gas (GHG) emissions inventory and our overdependence on foreign sources of energy. Rapid transition to alternative transportation fuels is essential to reducing GHG emission and reducing our reliance on foreign sources of energy.

The federal RFS, enacted in 2005 and updated in 2007, is an important tool in achieving the objectives of energy independence and pollution reduction. The RFS is the single most important federal policy driving investment and commercialization of conventional and advanced biofuels. Biofuel production under the RFS has already displaced nearly 10 percent of gasoline consumption and will account for more than 20 percent of U.S. transportation fuel by 2022. Biofuel production under the RFS reduced the need for imported oil by more than 462 million barrels in 2012.

Investment spurred by the RFS has led to the development of facilities like INEOS Bio's in Vero Beach, Florida, and KiOR's in Columbus, Mississippi, which represent several hundred million dollars of investment in the United States and are poised to begin production of the next generation of renewable fuel from non-food feedstocks in 2013. Dozens more advanced biofuel projects are planned or under construction, as highlighted in Appendix I, illustrating the visible success the RFS has had in driving

development of high skilled well paying jobs in rural America. Biofuel production under the RFS has led to the employment of 380,000 Americans; an additional 800,000 employment opportunities could be created by 2022[2].

Unfortunately, the RFS is increasingly under attack not because it is unworkable, but because it is succeeding in opening access to alternatives in the existing transportation fuel monopoly. The RFS provides exactly the type of long-term regulatory stability needed to send a signal to investors to develop a biofuels industry that lessens our dependence on foreign fuels and creates jobs in America.

The single most important thing Congress can do to reduce our nation's dependence on foreign oil and cut pollution is to leave the RFS in place, as-is. We are just 1/3 of the way through the timeline Congress laid out in 2007 and we must stay the course or risk losing the progress we've made.

White Paper Response:

In this first paper, the Committee has requested comments on a list of questions regarding the so called "blend wall" and fuel compatibility issues with higher blends of biofuels in the gasoline supply. In order to properly address each question, this paper has each question italicized and listed below. BIO's response will directly follow each question.

Before addressing the questions it is important to note that BIO firmly believes that the blend wall represents a series of barriers contrived by obligated parties to prevent biofuels from gaining full access to the marketplace under the RFS. Multiple avenues exist for blending additional volumes into the nation's fuel supply. These

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[2] Bio Economic research Associates, "U.S. Economic Impact of Advanced Biofuels Production: Perspectives to 2030." Washington, DC: February 2009

include E85 and E15 blends, which are approved and ready for use, and production of flex fuel vehicles. These options, combined with the potential future introduction of new "drop-in" fuel molecules, provide a suite of opportunities for RFS compliance. The true obstacle to increasing biofuel use in our transportation sector is the continued dilatory tactics of obligated parties.

Obligated parties have had more than five-years to begin establishing the infrastructure necessary to distribute RFS-mandated biofuel volumes, but have taken few steps to do so. Their assertions that the blend wall is prohibitive to distribution of greater volumes of biofuels only seek to undermine the development of homegrown biofuels that promote America's energy security, the biobased economy, and rural development.

As the Committee continues its examination of the RFS, BIO would encourage Members to look into efforts by obligated parties to stifle the development of the biofuels industry and explore ways for Congress and the government to help promote continued growth in domestic renewable fuels.

Energy and Commerce Committee, RENEWABLE FUEL STANDARD ASSESSMENT WHITE PAPER, Blend Wall/Fuel Compatibility Issues, Questions for Stakeholder Comment

1. ***To what extent was the blend wall anticipated in the debates over the Energy Policy Act of 2005 and the Energy Independence and Security Act of 2007?***

   In 2007, the targets were selected based on what Congress knew at the time. In debate on both the Energy Policy Act of 2005 (EPAct) and the 2007 Energy Independence and Security Act (EISA)[3,4] the Blend Wall did not appear to be part of the debate. In debating EISA, the House proposed a "Study of increased consumption of ethanol-blended gasoline with higher levels of ethanol," but this

[3] http://www.gpo.gov/fdsys/pkg/CREC-2007-12-13/pdf/CREC-2007-12-13-pt1-PgS15385.pdf
[4] http://www.gpo.gov/fdsys/pkg/CREC-2007-12-06/pdf/CREC-2007-12-06-pt1-PgH14270-4.pdf

was not included in the final law. However, in setting 2022 targets that represented more than 20 percent of projected fuel demand, it is clear that Congress intended the RFS to drive biofuel adoption well beyond the threshold of 10 percent of total fuel consumption. The system of Renewable Identification Numbers (RINs), credits, and compliance options articulated in the statute clearly also anticipated the role of RIN-driven market forces in achieving this broader adoption.

Following passage of EISA, EPA anticipated the blend wall when implementing the renewable fuels standard, stating "…Complete saturation of the gasoline market with E10 is referred to as the ethanol "blend wall." The height of the blend wall in any given year is directly related to gasoline demand.[5] This was also reflected in AEO 2009, where EIA projected that gasoline demand would peak around 2013 and then start to taper off due to vehicle fuel economy improvements. Based on the primary ethanol growth scenario, we're forecasting under today's RFS2 program, the nation is expected to hit the 14-15 billion gallon blend wall around 2014…although it could be sooner if gasoline demand is lower than expected. It could also be lower if projected volumes of non-ethanol renewable do not materialize and ethanol usage is higher than expected.

Estimates on fuel projections were also revised after the U.S. and world economy fell into a prolonged recession, reducing energy consumption. At the same time, automakers began implementing higher CAFE standards, further reducing U.S. domestic demand for fuel. As worldwide economic growth resumed, overseas demand for finished fuel products grew, while U.S. demand continued to decline, prompting petroleum refiners to focus on export markets. While this confluence of developments has hastened the transition across the ethanol blend threshold, the eventual transition was clearly anticipated in the law, and should have factored into fuel distribution plans of any obligated party intending to comply with the law. Indeed, some obligated parties have adequately anticipated the blend wall by incorporating greater distribution of E85 into their business models, or by investing in development of advanced drop-in biofuels. Unfortunately, other obligated parties have elected to resist compliance and instead challenge the law itself.

2. ***What are the benefits and risks of expanded use of E-15 to automakers, other gasoline powered equipment makers, refiners, fuel retailers, and others involved in the manufacture and sale of gasoline and gasoline-using equipment?***

Ethanol and other alcohol fuels (such as butanol) have higher octane ratings than gasoline. This increased octane could actually boost fuel economy in future car models, according to a 2009 report by Sandia National Labs, if automakers

[5] CFR, Vol 78, No. 58, p. 14759

concentrate on developing smaller engines with higher compression and turbocharging.[6]

Formula 1 and IndyCar race cars use ethanol to achieve high performance.[7] The IndyCar circuit today uses a fuel-injected, 2.2 liter V6 engine, which is smaller than previous engines. Between 2007 and 2011, IndyCars ran on pure denatured ethanol, but they currently use E85 because it is more widely available.

There already exists considerable variety in the blends and types of fuel available on the market. Automakers and engine manufacturers recommend the optimum grade for each car, since some run best on higher octane fuel blends, and ask owners to follow the recommendation in their manuals.

The RFS requires use of renewable fuels, but not all biofuels are ethanol or alcohols. New biofuels are being developed that are molecularly identical to gasoline and to jet fuels, and without impurities usually found in petroleum fuels. The energy content and fuel economy would be the same as petroleum fuels.

3. ***What are the risks of the introduction and sale of E-15 to the owners of pre-2001 motor vehicles, boats, motorcycles, and other gasoline-powered equipment not approved to use it? Are there risks to owners of post-2001 vehicles? How do these risks compare to the benefits of the RFS?***

Automakers, small engine manufacturers and fuel refiners established cooperative standards for fuel to allow engines to both maximize performance and meet Clean Air Act limits on emissions of air and water pollutants. Using any fuel other than that recommended by the engine manufacturer (even different grades of gasoline) can impact an engine's fuel flow, timing, operating temperature, and emission control equipment, reducing engine performance while increasing wear and potentially emissions.[8]

Small engines – because they're small – do not have the same emission control features as automobiles and are designed for maximum performance with straight gasoline – or gasoline and oil mixtures. The potential for misfueling a small engine is no greater with ethanol than any other fuel.

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[6] Next Generation Biofuels and Advanced Engines for Tomorrow's Transportation Needs. November 17 and 18, 2009, San Ramon, CA. http://digitalcommons.unl.edu/usdoepub/82/

[7] Year 2 of homologation: An engine check system. http://www.indycar.com/News/2013/01/1-9-Second-season-of-homologation

[8] Philip Reed, "To Save Money on Gas, Stop Buying Premium." Edmunds.com, 03/02/2012, http://www.edmunds.com/fuel-economy/to-save-money-on-gas-stop-buying-premium.html. Frank Markus, "Regular or Premium?" Car and Driver, November 2001, http://www.caranddriver.com/features/regular-or-premium.

The potential for increased emissions of known health hazards is why the Clean Air Act prohibits selling any new fuel that is not "substantially similar" to the industry standard. This same potential for increased emissions is why EPA is currently considering rules that limit sulfur in gasoline. EPA approved sale of E15 for light duty automobiles built since 2001, and it long ago approved sale of fuel blends up to E85 for use in flex fuel vehicles.

4. ***What is the likely impact, if any, of the blend wall on retail gasoline prices?***

The growing use of biofuels for the nation's transportation fuel use has provided significant mitigation against rising gasoline prices, resulting in substantial savings to American consumers. [9,10,11] At the same time, the average family paid $240 more for gasoline in 2012 than in 2011[12] – while cutting back on driving and using fewer gallons. The 3.3 percent rise in gasoline outpaced American's increase in income for the year.[13]

In contrast, there is no evidence that the blend wall has resulted in any offsetting increase in gasoline prices. Domestic biofuel production capacity is more than sufficient to meet the volume obligations of the RFS. Obligated parties therefore have access to more than enough RINs to meet their obligations, should they choose to meet them. If the blendwall has any impact on retail gasoline prices it will be the result of barriers imposed by obligated parties to the market entrance of these biofuels. To blame the blend wall, which is a result of obligated parties' efforts to limit biofuels' access to the market, ignores all the realities of the cost of fuels. EIA reviewed the causes of higher than normal gas prices in the early months of 2013[14] and identified reduced oil refining capacity,[15] increased oil prices, and record high crack spread[16,17] as the leading causes – not RFS compliance.

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[9] *Impact of Ethanol Production on the U.S. and Regional Gasoline Markets: An Update to 2012* http://www.card.iastate.edu/publications/synopsis.aspx?id=1166

[10] *The Impact of Ethanol Production on the U.S. Gasoline Market, http://www.ethanol.org/pdf/contentmgmt/The_Impact_of_Ethanol_Production_on_the_US_Gasoline_Market.pdf*

[11] *Global economic effects of US biofuel policy and the potential contribution from advanced biofuels, http://www.future-science.com/doi/abs/10.4155/bfs.12.60*

[12] Sure Enough, 2012 Will Go Down as Most Expensive Year Ever for Gas http://business.time.com/2012/12/05/sure-enough-2012-will-go-down-as-most-expensive-year-ever-for-gas/#ixzz2JsBkG348

[13] U.S. household expenditures for gasoline account for nearly 4% of pretax income, http://www.eia.gov/todayinenergy/detail.cfm?id=9831

[14] http://www.eia.gov/todayinenergy/detail.cfm?id=10111

[15] NYMEX October RBOB crack spread widens as USGC refineries slowly restart, http://www.platts.com/RSSFeedDetailedNews/RSSFeed/Oil/6613396

[16] http://www.bloomberg.com/quote/CRKS321C:IND

[17] http://finance.yahoo.com/q?s=ZXYJ12.NYM

Rather than assume the blend wall negatively impact fuel prices at the pump, policy makers should be exploring ways to get more biofuels into the market, where they have historically kept fuels prices lower for consumers than competing petroleum based products.

5. ***What is the timing of the implementation challenges related to the blend wall? Will some entities face difficulties earlier than others?***

BIO does not have any information on this issue at this time.

6. ***Could the blend wall be delayed or prevented with increased use of E-85 in flexible fuel vehicles? What are the impediments to increased E-85 use? Are there policies that can overcome these impediments?***

One piece of the blend wall solution could be to facilitate greater consumer use of E85 fuel (a blend of 85 percent ethanol and 15 percent gasoline) through investment in downstream petroleum infrastructure (blender pumps, etc) and Flex Fuel Vehicles that can run on that type of fuel. E85 is approved for use in flex fuel vehicles and could go a long way toward meeting the renewable fuel requirements under the RFS, with the right investments.

A flex-fuel vehicle overcomes potential differences in fuels with sensors that adjust the fuel injection and air mix as well as the timing. More than 90 percent of new cars sold today in Brazil are flex fuel vehicles, and about half of the country's entire fleet has changed over to flex fuel vehicles in less than a decade.[18] U.S. automakers previously made commitments to increase production and sales of flex-fuel vehicles, but at present are not seeing consumer demand.[19] About 5 percent (12 million out 240 million) of light-duty vehicles on the roads today are approved by manufacturers to use E15 gasoline, according to AAA.[20]

On the petroleum downstream infrastructure side, there are a number of investments that would need to be made. A major impediment to consumers having the choice of E-85 is obligated parties blocking station owners from putting in blender pumps that would allow consumers to choose higher blends of ethanol in gasoline.[21] Blender pumps would allow consumers to modify upward the blend of biofuels they desire to purchase. In addition, marketing arrangements could incentivize the consumers to utilize the higher blends. Other

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[18] UNICA, "Brazilian Transportation Fleet," Sugarcane.org, http://sugarcane.org/the-brazilian-experience/brazilian-transportation-fleet

[19] Beth Evans, "Automakers do not see big US demand for flex-fuel vehicles," Platts, 7 Feb. 2013. http://www.platts.com/RSSFeedDetailedNews/RSSFeed/Oil/6131220

[20] http://newsroom.aaa.com/2012/11/new-e15-gasoline-may-damage-vehicles-and-cause-consumer-confusion/

[21] *Trade group requests U.S. probe of oil industry's efforts to impede renewable fuels, http://eenews.net/eenewspm/2013/03/19/archive/9?terms=RFA%2C+ConocoPhillips*

forms of investment to move towards higher blends could involve even greater investment in production and proposed ethanol pipelines to move large quantities of biofuels to high-population areas.

The automotive industry, while carrying out some low carbon fuels investment due to production credits in the 2007 RFS, has an equally important role to play. As discussed above, consumers need the opportunity to fuel their cars with higher volumes of biofuels like E85, but to do so they also need cars available and accessible to run on those blends. Flex fuel vehicles (FFVs) have the capacity to run on biofuels blends ranging from 0 percent to 85 percent. Thus, depending on the blend, consumers who drive one of the more than 14 million FFVs on the road today will have the opportunity to fuel their cars at retail stations that carry the higher blends. As E85 becomes a competitive fuel, demand for FFVs will presumably grow as it did in Brazil during the 2003 to 2006 time period.

7. ***Is E-15 misfueling unavoidable? Are there lessons from the labeling and dispensing of diesel, E-85 and other fuels that prevent their misfueling that can also be applied to E-15? What specific actions are companies taking to address potential misfueling concerns under MMPs?***

We have changed our nation's fuel supply and delivery system before, such as with the transition to unleaded gasoline. The greatest challenge in that transition was that unleaded fuels cost more than leaded fuels, discouraging consumers from switching. And there will likely be challenges and confusion amongst consumer with the introduction of E15, which could lead to misfueling, given the potential for lower prices. However, one significant difference this time is the oil industry does not make the alternative fuel and is working everyday to block new renewable entrants to the marketplace to protect its monopoly.

The oil companies have slowed infrastructure upgrades by using intimidation tactics to discourage station owners from investing, fabricating misfueling concerns, and opposing incentives. The oil industry has worked to slow the approval of higher blend and new fuels through regulatory action and litigation.[22]

8. ***Can blend wall implementation challenges be avoided without changes to the RFS? Is the existing EPA waiver process sufficient to address any concerns? If the RFS must be changed to avoid the blend wall, what should these changes entail? Should any changes include liability relief or additional consumer protections for addressing misfueling concerns?***

BIO strongly disputes the assertion that the existence of the ethanol blend wall argues for changes to the RFS program. Rather, continued consistent implementation and enforcement of the RFS is essential to ensuring a rapid,

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[22] *Fill Up With Ethanol? One Obstacle is Big Oil*, http://online.wsj.com/article/SB117547886199856472.html

market-driven transition across the ethanol blend wall. Market economics associated with the value of conventional biofuel RINs are already making conventional and advanced biofuels increasingly attractive as less expensive alternatives to gasoline and diesel. Many independent fuel distributors are responding, seeking out opportunities to increase profits by expanding availability of low-cost biofuels to consumers. Thus, in fact, the blend wall is being overcome – to the benefit of consumers – without any change to – and due in large part to the market-driving force of – the RFS.

Thanks to the flexibility already provided by the RFS, any challenges encountered under the blend wall transition can be mitigated through the compliance mechanisms established in the law. Further, the RFS does not specifically require use of ethanol. Thus, if challenges do arise under the blend wall transition, other biofuels not subject to the ethanol blend wall, such as biobutanol or renewable hydrocarbons, will rapidly increase in market value. These market forces may hasten the commercial deployment of these alternatives, significantly mitigating blend wall pressure. As such, BIO believes no changes to the RFS are necessary. As for other policy dealing with liability relief or additional consumer protection, such as misfueling, these policy initiatives can be done without any changes to the RFS.

RINs

Under the RFS, obligated parties have many options to avoid the blend wall. One of these components is the Renewable Identification Number (RIN) program. By allowing refiners to purchase RINs rather than renewable fuel, they are given the option to opt out of blending biofuel, typically during times of low production or high prices, while incentivizing the further production of renewable fuel.

Higher Blends

As discussed above in Question 6, greater use of ethanol blends between fifteen and eighty-five percent is a solution to the blend wall that involve no new technological development or regulatory approval.

A recent Congressional Research Service report explains the desirability and challenges of E15 and other intermediate blends:

> For ethanol consumption to exceed the so-called blend wall and meet the RFS mandates, increased consumption at higher blending ratios is needed. For example, raising the blending limit from 10% to a higher ratio such as 15% or 20% would immediately expand the "blend wall" to somewhere in the range of 20 billion to 27 billion gallons. The U.S. ethanol industry is a strong proponent of raising the blending ratio. In response to industry concerns regarding the

impending "blend wall," the EPA, after substantial vehicle testing, issued a partial waiver for gasoline that contains up to a 15% ethanol blend (E15) for use in model year 2001 or newer light-duty motor vehicles (i.e., passenger cars, light-duty trucks, and sport utility vehicles), but announced that no waiver would be granted for E15 use in model year 2000 and older light-duty motor vehicles, as well as in any motorcycles, heavy duty vehicles, or non-road engines. According to the Renewable Fuel Association (RFA), the approval of E15 use in model year 2001 and newer passenger vehicles expand[ed] eligibility to 62% of vehicles on U.S. roads at the end of 2010. In addition to the EPA waiver announcement, fuel producers will need to register the new fuel blends and submit health effects testing to EPA. Further, numerous other changes have to occur before gas stations will begin selling E15, including many approvals by states and potentially significant infrastructure changes (pumps, storage tanks, etc.). As a result, the vehicle limitation to newer models, coupled with infrastructure issues, are likely to limit rapid expansion of blending rates. Moreover, a group of engine and equipment manufacturers has challenged the partial waiver in court, arguing that EPA failed to estimate the likelihood of misfueling (using E15 in equipment denied a waiver), and the economic and environmental consequences of that misfueling..

Other forms of intermediate blends, ranging from 30 percent blends to 50 percent blends, have been discussed and promoted. Most of the regulatory approval issues attendant to the 15 percent blend likewise apply to these higher intermediate blends with one distinction - there would be a need for new infrastructure investment with these higher intermediate blends. Thus the challenge to achieve these higher, intermediate blends is more daunting than perhaps other pathways.

Drop-Ins

Drop-ins are a viable solution, which we discuss in more detail in Question 10.

9. ***Have the 2017 and Later Model Years Light Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy standards for cars and light trucks changed the implementation outlook of the RFS?***

   The prospective reductions in fuel consumption produced by the 2017 GHG rule coupled with the on-going reduction in VMT (vehicle miles traveled) reduces the usage of E10 fuel and thus the ethanol that is blended to make it. This requires that more renewable fuel be used as E85, biodiesel, renewable diesel or other renewable fuels to achieve the fixed targets of the RFS2.

10. ***What other methods, including the use of drop-in fuels, are available to industry to ease the challenge posed by the blend wall?***

    Economics will dictate the best solution to the blend wall, and a combination of many different ways for biofuels to enter the marketplace may be required. One potential way to address the blend wall is to increase investment in and development of "drop-in biofuels," which have the same properties and composition as petroleum-based fuels and may be used in existing infrastructure. Because of these factors, existing downstream petroleum infrastructure and engines can run on these fuels even at blends beyond 10 percent. These biofuels, including biobutanol, may be produced from any starch or sugar-based biomass and blended using existing infrastructure at blends much higher than 10 percent. Due to biobutanol's higher energy content this is equivalent to 21 percent ethanol. Biobutanol has been endorsed by the National Marine Manufacturers Association.

    The primary challenge for drop-in biofuels is scale, but this could be addressed with greater investment in this technology (which is driven by the stability of the RFS policy). Certainly as one option to address the blend wall, drop-ins have some very attractive features: they require no change in existing infrastructure and are feedstock flexible and may be produced from both starch and sugar-based biomass sources.

    In addition, existing ethanol facilities may be cost-effectively retrofit to produce biobutanol and other drop-in biofuels.

    The expansion of aviation biofuels as drop-ins would be another potential solution to the blend-wall. Currently, sustainable aviation biofuels, derived from biomass-based plant material and waste fats, are approved for use in jet engines in an up to 50 percent blend. This fuel is a drop-in substitute for fossil-based petroleum currently used in aviation. Some commercial airlines have flown test flights on blends of sustainable aviation fuel, and aviation is well-suited for rapid deployment of drop-in biofuels. The commercial aviation industry has system-wide advantages including the ability to use current infrastructure: drop-in biofuels utilize the same pipelines and tanks as petroleum. It also has highly concentrated nodes of supply and demand, where the largest 40 U.S. airports account for more than 90 percent of jet fuel used by commercial aviation. Thus, if sustainable aviation biofuel producer can deliver to the 40 large airports, in a

cost effective manner, they will have access to a large portion of the commercial jet-fuel market.

11. What are the impacts on renewable fuel producers if the RFS is changed to avoid the blend wall?

The RFS is the nation's only long term energy policy. The current RFS goals from the 2007 EISA have only been in place for five-years, just one-third of the Standard's 15 year ramp up. Unfortunately, implementation of the standard has been delayed and slowed down not just by the economic downturn beginning in 2008, but by a number of regulatory delays, including EPA's approval of new feedstocks for the cellulosic and advanced biofuels. Any changes to the RFS would create regulatory and financial uncertainty for the industry, destabilizing an industry which has spurred billions of dollars of investment and helped to create more than 400,000 jobs in the U.S.

Conclusion:

We hope BIO's comments are beneficial to the Committee as it begins its review of the RFS and how to address the challenges surrounding the blend wall. As explained in our answers above, there a number of solutions to the blend wall, including the use of higher blends of biofuels, greater distribution of biofuels, increased production of flex fuel vehicles, and greater use of drop-in fuels. Market economics under the RFS program are already driving investment in each of these options, and the Committee can anticipate a rapid increase in availability of both higher ethanol blends and drop-in alternatives as a result – but only to the extent obligated parties provide market access to these fuels. Unfortunately, many of these solutions are currently unattainable due to barriers to the marketplace erected by obligated parties. The Committee should investigate these artificial barriers and, if necessary, take action to remove them to ensure that the market for transportation fuel alternatives established by the RFS is allowed to operate. Any remaining challenges to overcoming the blend wall can be

addressed through the broad regulatory flexibility granted to EPA under the statute. None of these solutions require changes to the RFS.

We would also encourage the Committee to examine how the RFS is providing solutions to our dependence on foreign fuels, driving investment and development in the commercialization of cellulosic and advanced biofuels and creating high skilled jobs for American citizens.

Market forces under the RFS are driving investment in solutions to the blend wall. Congress can hasten the transition across the blend wall by ensuring artificial barriers to market access for biofuels are eliminated. But the number one thing Congress can, and should, do to continue to bring renewable fuel to consumers, is to keep the RFS in place, as is.

Thank you for considering our comments.

Sincerely,

Brent Erickson
Executive Vice President
Industrial and Environmental Section
Biotechnology Industry Organization

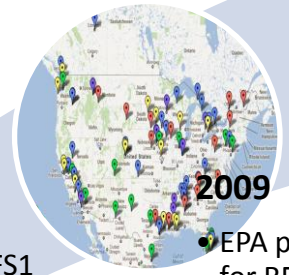
The Renewable Fuel Standard

Timeline of a Successful Policy

Biotechnology Industry Organization (BIO)

2005

- Energy Policy Act of 2005 becomes law, enacting RFS1.
- Ethanol production is 3.9 billion gallons, biodiesel 112 million gallons.



2007

- EPA final-izes RFS1 rules and begins program, offering compliance through Renewable Identification Numbers (RINs).
- The Energy Independence and Security Act of 2007 becomes law, enacting RFS2.
- **Verenium (BP Biofuels)** breaks ground on 1.4 million gallon cellulosic biofuel demonstration.

2009

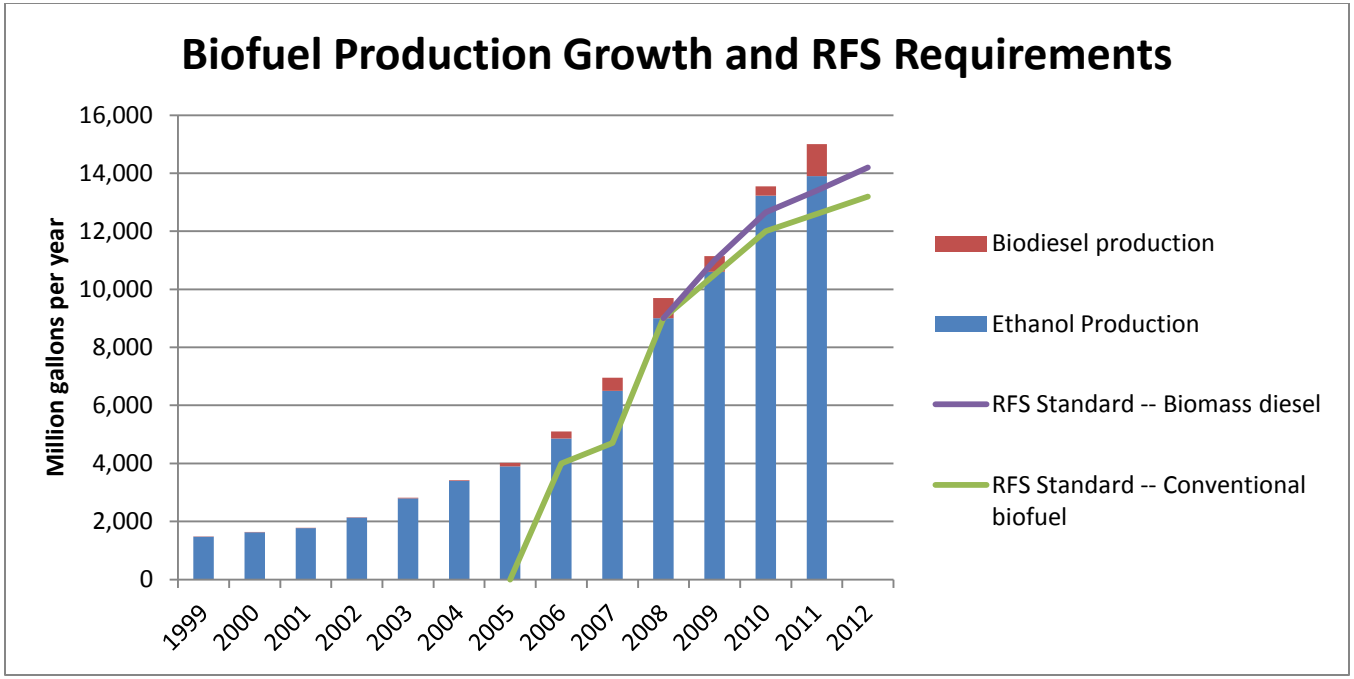
- EPA proposes rules for RFS2.
- More than **30 cellulosic and algae biofuel** pilot and demonstration biorefineries are operating or in planning stages, including Coskata and DuPont Cellulosic Biofuels.
- More than 12 companies in the United States and Canada have planned commercial biorefineries.

2010

- EPA publishes final rules for RFS2, which takes effect in July.
- Additional demonstration facilities begin operations, including Fiberight

2011 - 2012

- Companies break ground on commercial-scale cellulosic biorefineries, including **INEOS Bio**, **Abengoa**, KiOR and POET-DSM. Projected completion and start up of biorefineries ranges from Q2 of 2012 to Q4 of 2014.


Biofuel Production Growth and RFS Requirements
Million gallons per year
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Biodiesel production
Ethanol Production
RFS Standard -- Biomass diesel
RFS Standard -- Conventional biofuel

Abengoa Bioenergy, Hugoton, Kans.

26.5 million gallons per year, cellulosic ethanol.

Start Date: 4Q 2013.

Figure 1: Abengoa Bioenergy biorefinery project stack yard.

Figure 2: Abengoa Bioenergy biorefinery construction progress, Feb. 2012.

BP Biofuels, Highlands County, Fla.

36 million gallon per year cellulosic biofuel biorefinery. 20,000 acre energy cane farm.

Start Date: 4Q 2014.

Figure 3: Energy cane from Henderson Liberty Farms in Highland County, Fla., April 2012.

BP Biofuels, Jennings, La.

1.4 million gallon per year cellulosic biofuel demonstration biorefinery.

Start Date: 1Q 2007.

Figure 4: BP Biofuels demonstration facility and feedstock processing, in operation since 2007.

Fiberight, Blairstown, Iowa

6 million gallon per year cellulosic ethanol.

Start Date: 2Q 2013.

Figure 5: Fiberight biorefinery undergoing renovation to cellulosic ethanol.

Gevo, Luverne, Minn.

22 million gallon per year biobutanol.

Start Date: 4Q 2012.

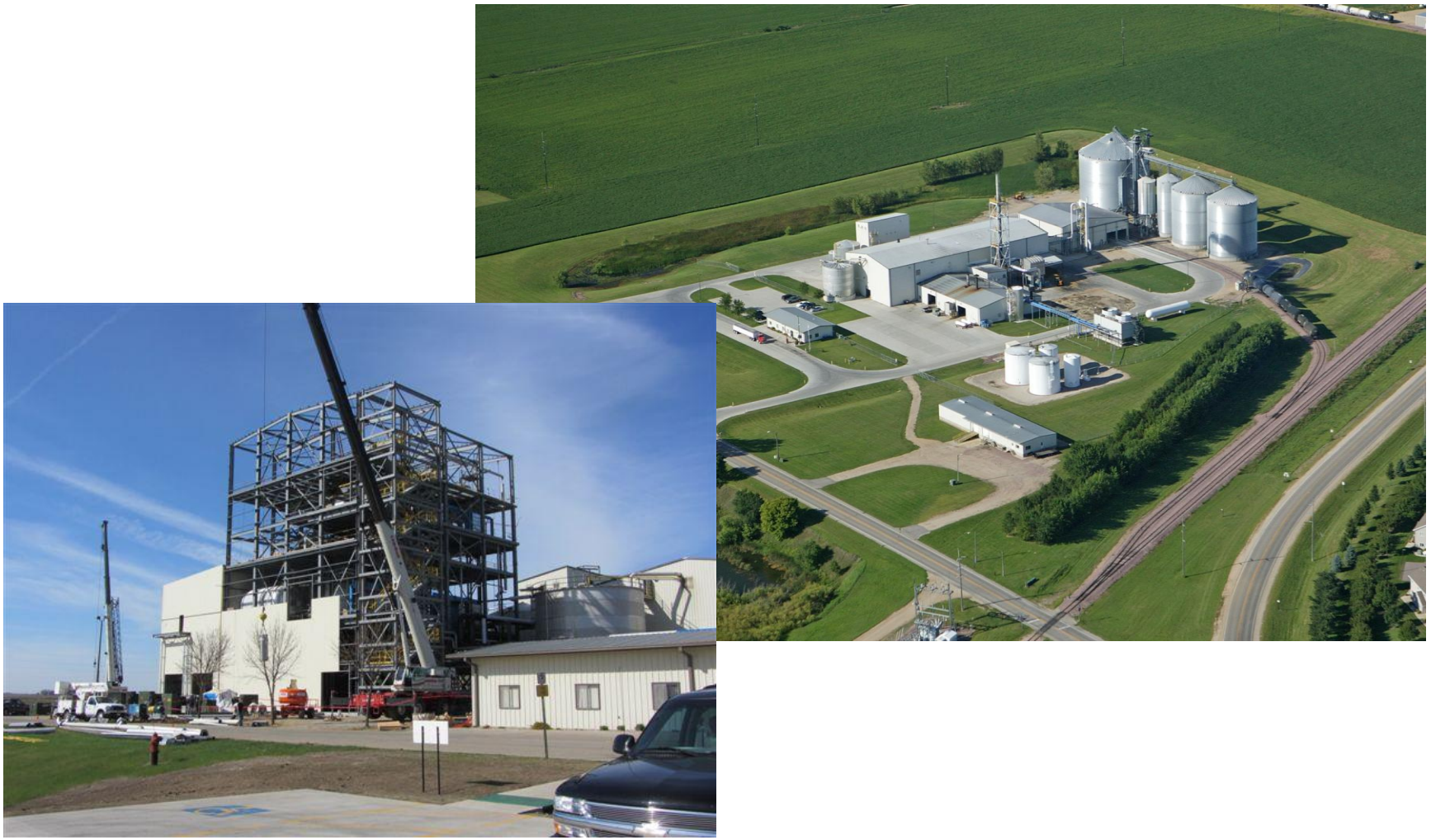


Figure 6: Gevo biorefinery undergoing renovation for biobutanol production.

INEOS New Planet Energy, Vero Beach, Fla.

8 million gallon per year cellulosic ethanol; 6 MW biomass electricity.

Start Date: 2Q 2012

Figure 7: INEOS Bio New Planet Energy groundbreaking February 2011.

Figure 8: USDA Sec. Tom Vilsack checks construction progress, August 2011.

Novozymes, Blair, Neb.

Commercial enzyme biorefinery.

Start Date: May 2012

Figure 9: Novozymes North America enzyme biorefinery at opening in May 2012.

POET-DSM Advanced Biofuels, Emmetsburg, Iowa

25 million gallons per year cellulosic ethanol.

Start Date: 3Q 2013.

Figure 11: POET-DSM corn stover stack yard November 2011.

Figure 10: POET-DSM groundbreaking March 2012.

Sapphire Energy, Columbus, N.M.

1 million gallon per year integrated algal biorefinery.

Start Date: 1Q 2014

Figure 12: Sapphire IABR construction progress November 2011.

Figure 13: Sapphire IABR ground preparation October 2011.

ZeaChem, Boardman, Ore.

250,000 gallon per year cellulosic ethanol and acetyl acid.

Start Date: 4Q 2011

Figure 14: ZeaChem demonstration biorefinery, aerial view.

Figure 15: ZeaChem demonstration facility under construction, September 2011.

Date	Event
July 29, 2005	Congress passes the Energy Policy Act of 2005, with the first Renewable Fuel Standard (RFS1). President George W. Bush signs it into law (PL 109-58) on **August 8, 2005**. RFS1 sets annual standards for production and use renewable fuels, growing to 7.5 billion gallons by 2012, with 250,000 gallons to come from cellulosic sources beginning in 2012. Ethanol production reaches 3.9 billion gallons by year's end 2005. Biodiesel production is 112 million gallons.
Sept. 7, 2006	EPA proposes rules for RFS1 and asks Oak Ridge National Laboratories to estimate the energy security benefits of reducing foreign oil imports. Ethanol production reaches 4.9 billion gallons by year's end 2006. Biodiesel production reaches 250 million gallons.
Feb. 16, 2007	Verenium – a merger of Celunol Corp. and Diversa Corp. – breaks ground on a demonstration cellulosic ethanol biorefinery, with a capacity of 1.4 million gallons per year. The facility is commissioned in May 2009 and is later purchased by BP Biofuels.
May 1, 2007	EPA finalizes regulations for RFS1 for 2007 and beyond. EPA estimates the RFS1 will reduce emissions of benzene by as much as 4 percent and carbon dioxide equivalent greenhouse gas emissions between 8.0 and 13.1 million metric tons.
Sept. 1, 2007	RFS1 program begins. Obligated parties must demonstrate compliance on an annual basis through retirement of Renewable Identification Numbers (RINs) associated with each gallon of renewable fuel.
Dec. 18, 2007	Congress passes the Energy Independence and Security Act of 2007, containing an updated Renewable Fuel Standard (RFS2). President George W. Bush signs it into law (PL 110-140) on **Dec. 19, 2007**. RFS2 sets annual standards for production and use of both conventional and advanced renewable fuels, with conventional biofuel to reach 15 billion gallons by 2015 and advanced biofuel to reach 21 billion gallons by 2022, for a combined 36 billion gallons. Conventional biofuel production reaches 6.5 billion gallons by year's end 2007. Biodiesel production reaches 450 million gallons.
May 26, 2009	EPA proposes rules for RFS2 for 2010 and beyond, including four separate standards for biomass-based diesel,

	cellulosic biofuel, advanced biofuel and conventional biofuel. EPA formulates a new lifecycle assessment (LCA) model and publishes preliminary estimates of greenhouse gas emissions from various feedstocks, production processes, discount rates and projection timelines. EPA commissions peer reviews of model.
Oct. 15, 2009	Coskata commissions its Lighthouse demonstration cellulosic ethanol biorefinery in Madison, Pa., with a capacity of 40,000 gallons per year. The demonstration runs for two years. Conventional biofuel production reaches 10.6 billion gallons by year's end 2009. Biodiesel production declines from 700 million gallons in 2008 to 545 million gallons in 2009, as industry awaits final rules for RFS and reauthorization of tax policies.
Jan. 29, 2010	DuPont Danisco Cellulosic Ethanol officially opens its demonstration cellulosic ethanol biorefinery in Vonore, Tenn., with a capacity of 250,000 gallons per year. The facility employs 40 people. Genera Energy – wholly owned by the University of Tennessee – supplies corn stover and switchgrass feedstocks to the facility, contracting with area farmers.
March 26, 2010	EPA publishes final regulations for the RFS2 for 2010 and beyond, setting the cellulosic standard at 6.5 million gallons for 2010 and combining the 2009 and 2010 standards for biomass-based diesel, keeping the two other s standards at statutory levels. EPA determines that biofuels made from a short list of approved cellulosic feedstocks comply with RFS greenhouse gas targets. The list includes: 1. Crop residues such as corn stover, wheat straw, rice straw, citrus residue; 2. Forest material including eligible forest thinnings and solid residue remaining from forest product production; 3. Secondary annual crops planted on existing crop land such as winter cover crops; 4. Separated food and yard waste including biogenic waste from food processing; 5. Perennial grasses including switchgrass and miscanthus.
May 6, 2010	Fiberight LLC commences production of cellulosic ethanol from municipal solid waste at a converted corn ethanol biorefinery in Blairstown, Iowa. When the second phase of construction is complete, the facility will produce 6 million gallons of cellulosic biofuel annually.
July 1, 2010	RFS2 regulations take effect. Obligated parties must now demonstrate compliance with all standards on an annual basis, with RFS1 RINs remaining valid.
Dec. 9, 2010	EPA finalizes the RFS2 standards for 2011, setting the cellulosic biofuel standard at 6.6 million gallons and

	keeping all other standards at statutory levels.
Dec. 21, 2010	EPA finalizes rules for Moderated Transaction System (EMTS) to track trading and retirement of RINs. Conventional biofuel production reaches 13.2 billion gallons by year's end 2010. Biodiesel production declines again to 315 million gallons.
Feb. 9, 2011	INEOS Bio New Planet Energy breaks ground in Vero Beach, Fla., on the Indian River BioEnergy Center, a commercial biorefinery that will produce eight million gallons of cellulosic ethanol and six megawatts of power when fully operational. The project creates 175 construction jobs and the operational biorefinery will employ 50 permanent workers. INEOS Bio has operated a pilot facility in Fayetteville, Ark., since 2003.
May 12, 2011	KiOR breaks ground on a commercial biorefinery in Columbus, Miss., to produce 11 million gallons of renewable crude from wood chips. KiOR began production at a demonstration facility in Pasadena, Texas, the first quarter of 2010.
Sept. 16, 2011	BP Biofuels begins planting 300 acres of energy cane seeds in Highlands County, Fla., in preparation for an eventual 20,000 acre farming operation and a 36 million gallon per year commercial cellulosic biofuel biorefinery.
Sept. 21, 2011	Abengoa Bioenergy finalizes permits and begins construction of a commercial cellulosic biorefinery in Hugoton, Kansas, which will produce 23 million gallons of cellulosic biofuel plus renewable electricity for the facility. The biorefinery will employ 65 people and create 250 construction jobs over two years. Abengoa contracts with local biomass producers and farmers to secure up to 315,000 lbs. of crop residue each year.
Jan. 5, 2012	EPA issues direct final rule determining that additional feedstocks and production methods meet the requirements for advanced and cellulosic biofuels: • Biodiesel, renewable diesel, naphtha and liquified petroleum gas from camelina qualify as advanced biofuel; • Ethanol, renewable diesel, and naphtha from energy cane, giant reed and napier grass qualify as cellulosic biofuel; • Renewable gasoline and blendstock from crop residue and cellulosic components of municipal solid waste in a facility that uses natural gas or biomass for heat and power qualify as cellulosic biofuel; • Esterified biodiesel qualifies as biomass based diesel and advanced biofuel. ZeaChem completes construction and begins operation of a demonstration cellulosic biorefinery in

	Boardman, Ore., producing intermediate chemicals acetic acid and ethyl acetate. By April, the company begins construction of a second phase to produce up to 250,000 gallons of cellulosic ethanol from acetic acid, expected to be completed in 2012. The demonstration biorefinery will employ 100 full-time workers and create 338 construction jobs. ZeaChem also contracts with Greenwood Resources and area farmers to supply coppiced willow trees from 7,000 acres surrounding the biorefinery.
Jan. 9, 2012	EPA finalizes 2012 RFS2 standards, setting the cellulosic standard at 8.65 million gallons.
March 5, 2012	EPA withdraws direct final rule issues on Jan. 9, due to adverse comments, and moves forward with proposed rule and additional comment period.
March 13, 2012	POET-DSM Advanced Biofuels breaks ground on a commercial biorefinery in Emmetsburg, Iowa, to produce 25 million gallons per year of cellulosic ethanol. The biorefinery will employ 40 full time workers and create 200 construction jobs. POET had previously completed the feedstock stackyard and worked with farmers for two years to begin harvesting and delivering corn stover to the facility. POET had also operated a pilot scale biorefinery in Scotland, S.D., since 2009.

Response to White Paper Series on the Renewable Fuel Standard

Bret Strogen, PhD (Postdoctoral Scholar, UC Berkeley)

1. To what extent was the blend wall anticipated in the debate over the Energy Policy Act of 2005 and the Energy Independence and Security Act of 2007?
    - The blend wall has been known as a mounting concern since I started my PhD in Jan 2008, so I assume it was well anticipated among industry & policy experts.
2. What are the benefits and risks of expanded use of E-15 to automakers, other gasoline powered equipment makers, refiners, fuel retailers, and others involved in the manufacture and sale of gasoline and gasoline-using equipment?
    - Benefits: essentially none. Lower energy density, higher perceived risk, and unlikely to be any cost benefit TO CONSUMERS– especially if the E15 blends go ~unlabeled in the way E10 has gone (which essentially allowed blenders to sneak in as much low-energy ethanol into the gasoline as they could get away with, depending on spot prices (Walls et al. 2011)).
    - Risks: Voided warranties and lawsuits, perhaps. It is impossible to retroactively get UL approval for blender & retailer equipment, as far as I understand.
3. What are the risks of the introduction and sale of E-15 to the owners of pre-2001 motor vehicles, boats, motorcycles, and other gasoline-powered equipment not approved to use it? Are there risks to owners of post-2001 vehicles? How do these risks compare to the benefits of the RFS?
    - Risks: Accelerated aging of equipment & vehicles. This could be managed if the EPA is able to offer some kind of insurance to fuel blenders, to cover claims from pre-2001 (or maybe even post-2001) vehicle owners that may end up having problems.
    - I'd also suggest that neat gasoline still be available for owners of classic cars, etc., and to ensure that consumers can exert pressure on pricing-per-energy.
    - This risk should be weighed against the cost of not opening E15 to the mass market. For example,
        1. needing to transport ethanol farther distances & even exporting it – see (Strogen et al. 2012).
        2. needing to invest a lot of effort into retail station signage (MMP) to prevent refueling incidents.
4. What is the likely impact, if any, of the blend wall on retail gasoline prices?
    - Theories differ, and most arguments I hear seem meaningless &/or misleading.
    - As long as ethanol is more expensive per MJ than gasoline to produce, consumers are being disadvantaged on a per-mile basis (either through taxes or prices at the pump).
    - RBOB prices may go down if ethanol demand is reducing aggregate demand for pure gasoline, but few people are able to even buy pure gasoline.
5. What is the timing of the implementation challenges related to the blend wall? Will some entities face difficulties earlier than others?

- This depends on ethanol production & gasoline consumption trends, but I'd assume this is relatively urgent, as gasoline consumption could (hopefully) decrease again. So, we'll want a functional plan to increase low-level blends, mid/high level blends in FFVs, and also facilitate exports.

6. Could the blend wall be delayed or prevented with increased use of E-85 in flexible fuel vehicles? What are the impediments to increased E-85 use? Are there policies that can overcome these impediments?
    - E85 use would certainly relieve some pressure to ramp up sales of low-level (e.g., E15) blends. However, I haven't seen any authority (e.g., EIA) predict that E85 will make up more than 1% of gasoline demand! I attribute this to inefficient infrastructure and vehicle policies, and the high cost-per-MJ of ethanol (which is clear to E85-purchasers, but ~hidden from E10-purchasers that do not have shopping power).
    - I (and Wally Tyner and others) have argued in our research papers that the nation could save a lot of money if mid/high level blends are sold in more concentrated pockets – instead of subsidizing stations and FFVs around the country that may not be highly utilized.
    - Even though the manufacturing premium for FFVs is small ($100-$200), lots of effort and money has gone down the drain in how the CAFE incentive for FFV sales has been implemented. Excerpt from my paper, (Strogen and Horvath 2012).

        > Only 2,475 E85 stations could be found throughout the country in 2010 (E85 Vehicles 2011), for a US average of approximately 3,500 FFVs per E85 station. This ratio varies from less than 400 in South Dakota and Minnesota (where state subsidies are strong) to more than 76,000 in Massachusetts (Protec Fuel 2010). If the $100-$200 manufacturing premium on flex-fuel vehicles (Anderson and Sallee 2009) is allocated to each E85 dispenser in a state, the investment[1] attributed to manufacturing FFVs in Midwestern states is comparable to the investment in constructing each E85 fuel tank and dispenser (i.e., $100,000), whereas up to $15 million has been invested in FFVs for each E85 dispenser in Massachusetts. In contrast, the average ratio of vehicles to conventional retail stations is closer to 1,600 for the 256 million registered highway vehicles in 2008 (US DOT BTS 2010) with access to 160,000 conventional retail stations in 2010 (Reid 2010).

7. Is E-15 misfueling unavoidable? Are there lessons from the labeling and dispensing of diesel, E-85 and other fuels that prevent their misfueling that can also be applied to E-15? What specific actions are companies taking to address potential misfueling concerns under MMPs?
    - *Not qualified to comment.*
8. Can blend wall implementation challenges be avoided without changes to the RFS? Is the existing EPA waiver process sufficient to address any concerns? If the RFS must be changed to avoid the blend wall, what should these changes entail? Should any changes include liability relief or additional consumer protections for addressing misfueling concerns?
    - I don't think the blend wall is a deal breaker. Focus first on more harmonized & smart infrastructure projects to boost local consumption and therefore boost local highly

[1] Note: this "investment" is partially subsidized by the corporate average fleet economy (CAFE) credit that auto-makers earn for each FFV (Anderson and Sallee 2009).

utilized infrastructure in the Midwest. The RIN system should also lead to this result through ~natural market forces, but I was surprised that it doesn't seem to have worked as well as I expected over the last decade – when I assumed coastal blenders would ~happily subsidize ethanol consumption in the Midwest (Strogen et al. 2012).

- Also, make it easier to export ethanol, and the problem is solved, as plenty of other nations are not yet "saturated" at their blend wall.

9. Have the 2017 and Later Model Years Light Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy standards for cars and light trucks changed the implementation outlook of the RFS?
    - *Not qualified to comment.*
10. What other methods, including the use of drop-in fuels, are available to industry to ease the challenge posed by the blend wall?
    - I have little more to add, but don't think any "drop-in" fuels will be commercial as soon as would be needed.
11. What are the impacts on renewable fuel producers if the RFS is changed to avoid the blend wall?
    - I assume this would suggest decreased demand for renewable fuels, and therefore fuel prices (and RIN prices) would drop.

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Butamax™ Advanced Biofuels LLC

A joint venture between BP and DuPont

April 5, 2013

The Honorable Fred Upton
Chairman
House Energy and Commerce Committee

The Honorable Henry Waxman
Ranking Member
House Energy and Commerce Committee

Dear Chairman Upton and Ranking Member Waxman:

Butamax is respectfully responding in response to your request for information regarding the Renewable Fuel Standard (RFS) and the so-called blend wall.

President George W Bush and now President Obama have given us a bipartisan roadmap for achieving greater U.S. energy security. The Bush/Obama plan -- embodied in the RFS2 -- calls for a transition to more clean renewable sources of U.S. energy. Current law requires that an increasing amount of renewable fuel is blended into our national gasoline supply and this approach is working. The RFS is creating thousands of new jobs and whole new industries in the U.S. that will employ engineers, factory workers, construction workers, farm workers, secretaries and administrative workers.

In 2003, DuPont and BP identified biobutanol as an ideal product to develop as a domestic advanced biofuel and, through their own investment, created Butamax in order to bring this product to the commercial market, both in the U.S. and abroad. Research began in 2004 with the first patents being filed in 2005. With the passage into law of the RFS and RFS2, Butamax recognized that biobutanol, as a "drop in fuel" technology applicable to both existing and new biofuel production facilities, can be a key factor in the U.S. achieving the goals of domestic U.S. energy security.

Butamax is now preparing to use its biobutanol production technology and bring this fuel into the commercial market place in partnership with the established US biofuels industry. Butamax inventions and patents include recombinant microorganisms that convert various feedstocks to biobutanol, process engineering for recovering biobutanol produced during fermentation, engineering design for optimized energy integrations, and various renewable fuel and chemical compositions. The compatibility of this fuel with existing vehicles and infrastructure has been demonstrated through over 1.5 million miles of vehicle testing. In fact, a portion of the official vehicle fleet of the 2012 Summer Olympic Games in London was fuelled with a 24% biobutanol blend prepared from biobutanol produced at Butamax's demonstration plant.

Attached, please find our response to the thoughtful questions you posed regarding the RFS. If there is any other information we can supply to the Committee, or additional questions we can answer, we would be pleased to assist the Committee in any way possible.

Sincerely,

P. Beckwith

Paul Beckwith
Chief Executive Officer

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Questions for Stakeholder Comment

1. To what extent was the blend wall anticipated in the debates over the Energy Policy Act of 2005 and the Energy Independence and Security Act of 2007?

Butamax firmly believes that the blend wall was foreseen by the Congress at the time of passage of the Energy Independence and Security Act of 2007. The Congress had full appreciation for the need for infrastructure and to encourage the private investment that would be required for the RFS to be successfully implemented. Further, the Congress anticipated correctly that markets can often react more slowly than envisioned and therefore it granted the EPA the authority to use its judgment to enforce the goals of the aspirational targets set in statute and waive them as appropriate as part of the Act(s). All of these topics were discussed extensively in both 2005 and 2007 during over a year of hearings, debate, and amendment to the underlying legislation, which eventually passed with bipartisan support and was signed into law by President George W. Bush.

The blend wall was not a consideration for EPAct 2005 as the 7.5bgal requirement could be readily achieved through replacement of existing MTBE-blended gasoline with E10 and limited expansion of E10 to other regions. At this volume level, there was no need for any markets to accept ethanol blends above 10%.

However, even with the gasoline demand forecasts being made at the time when EISA 2007 was being crafted, it was clear that 36 bgal was far in excess of what could be accomplished with E10 and the Congress understood that dynamic. President Bush, in his 2007 State of the Union speech to the Congress strongly stated his support for biofuels and declared the U.S. is "addicted to oil". The President then again reiterated his call for a dramatic increase in domestic alternative fuel. The RFS2, which later passed, sought to do exactly what President Bush called for. The President was correct then and his vision is still correct today. President Obama has continued to pursue the goals of the RFS to reduce U.S. dependence on oil.

The EISA 2007 also contained far reaching provisions for improvements in vehicle fuel economy, with the specific intent to substantially reduce gasoline demand. Approval and market acceptance of higher ethanol blend levels, as well as contribution of non-ethanol bio-gasoline components, were therefore the only feasible ways in which the legislated RFS volumes could be achieved. E85 distribution was growing and flex fuel vehicle (FFV) availability was steadily increasing. Analysis at that time focused on what to assume about future rates of FFV penetration, absent any mandate, and what needed to be assumed about availability of E85 to assure sufficient voluntary consumer uptake. Many major refiners were divesting their retail holdings and so the need to create incentives for non-obligated retailers to voluntarily install E85 fuelling systems was also well known. Thus, both the need for infrastructure investments and the type of infrastructure investments required for RFS compliance were well understood at the time of enactment. Indeed, in Butamax's view, E85 and FFVs were widely understood to be the default mechanism for increasing renewables in fuel, although the legislation was designed to be technology neutral and accommodate alternative technologies as they became available.

The fact that RFS requirements would exceed what could be achieved with E10 was, therefore, clearly apparent to all stakeholders in 2007; at the time, this was generally expected to occur in 2014 or 2015. It was therefore apparent that a potential "blend wall" could be expected to occur and we believe the intent of Congress was for private industry to anticipate this issue and adapt to address it prior to its eventuality. The Congress also understood that the market might not be able to adapt as quickly as intended and therefore gave the EPA limited authority to waive certain parameters and requirements of the RFS. The faster than anticipated decline in gasoline demand, which has occurred since 2007, has gradually moved that date forward to 2013, but this is offset by the fact that favorable ethanol prices since 2007 have enabled many obligated parties to proactively build a large bank of unused RINs which will enable them to manage this transition in a more gradual manner.

2. What are the benefits and risks of expanded use of E-15 to automakers, other gasoline powered equipment makers, refiners, fuel retailers, and others involved in the manufacture and sale of gasoline and gasoline-using equipment?

Butamax does not have any new compatibility data to inform the E15 debate. However, as explained later, we would point out that developments in the RIN market have created an environment where E85 can be sold to FFV owners at an attractive price, while also providing favorable economics to blenders and retailers. Because of this, there are other more sustainable (and less contentious) options to increase the ethanol share in the fuels market. In addition, drop-in fuels, such as biobutanol, which are compatible with both existing cars and infrastructure, can further increase renewable energy in the fuel mix beyond the ethanol compatibility limitations of the vehicle fleet.

3. What are the risks of the introduction and sale of E-15 to the owners of pre-2001 motor vehicles, boats, motorcycles, and other gasoline-powered equipment not approved to use it? Are there risks to owners of post-2001 vehicles? How do these risks compare to the benefits of the RFS?

Butamax does not have any new compatibility data to inform the E15 debate. However, as explained later, we would point out that developments in the RIN market have created an environment where E85 can be sold to FFV owners at an attractive price, while also providing favorable economics to blenders and retailers. Because of this, there are other more sustainable (and less contentious) options to increase the ethanol share in the fuels market. In addition, drop-in fuels, such as biobutanol, which are compatible with both existing cars and infrastructure, can further increase renewable energy in the fuel mix beyond the ethanol compatibility limitations of the vehicle fleet.

4. What is the likely impact, if any, of the blend wall on retail gasoline prices?

Biofuel blending has contributed to lower retail fuel costs for consumers. This is clearly

evidenced by the fact that levels of biofuel blending have, to date, continually exceeded mandates, being driven instead by clear economic incentives for blenders. Simply stated, ethanol prices have generally been low relative to gasoline prices, and this encourages biofuel blending, thereby reducing fuel component costs for blenders. As the market has approached the blend wall, the ethanol market has become oversupplied relative to demand. This has resulted in a sustained reduction of the ethanol price relative to gasoline. While this reduction in price has created significant hardship for many ethanol producers, it has strongly supported ethanol blending economics.

Looking forward, in an environment where the blend wall is overcome by increasing sales of E85, Butamax expects this to directionally support lower average retail fuel prices. This average fuel price will be comprised of a slowly reducing volume of E10, which is likely to increase slightly in price over time, combined with a rapidly growing volume of E85, which will be sold at significantly lower prices than E85 is today. Overall we expect the volume weighted price to reduce slightly, reflecting the increasing volume of lower cost ethanol in the mix.

Against this "default", Butamax expects increasing biobutanol availability to support further reduction in retail gas prices. Indeed, biobutanol will only achieve significant penetration into the market if it results in improved economics for fuel producers and consumers. These economic advantages arise from the highly favorable blending properties of biobutanol. Biobutanol enables refiners to materially improve the economics for fuel manufacture, because when biobutanol is blended, significantly more of the crude oil processed at the refinery can be converted into high value fuel products. Further, biobutanol offers significant economic advantages over the E85 approach, since it can be blended with gasoline at higher levels than ethanol while remaining compatible with all existing vehicles and retail infrastructure.

5. What is the timing of the implementation challenges related to the blend wall? Will some entities face difficulties earlier than others?

Unfortunately, implementation challenges are becoming evident now as retail channels for higher biofuel blends and availability of drop-in biofuels lag the increasing RFS requirements.

Individual obligated parties will experience blend wall issues at different times depending upon their specific mix of refinery production verses marketing sales and their position with respect to banked RINs. A refiner's obligation is proportional to their gasoline and diesel supply, while their ability to blend ethanol and biodiesel is proportional to their blended sales volume. Refiners with blending volumes smaller than their production need to acquire RINs from the market, while a refiner with large blending volumes can sell RINs exceeding their obligation. Refiners who have taken advantage of low ethanol prices since 2007 to exceed their RFS obligations have been able to accumulate a RIN surplus which will enable them to delay the impacts of the blend wall. Thus, while these effects balance out for the market as a whole (fuel marketed = fuel supplied), they can differ in timing for different refiners.

It is important to note that "drop-in" fuels are beginning to be commercialized and brought to market. As a result, there will be more options for fuel companies to achieve compliance with the provisions of the RFS and avoid the blend wall. This opportunity can be accelerated with improvements in the timeline required to secure necessary EPA registration and pathway approvals. The innovation which these drop in fuels represent – all developed by the private sector – is exactly what a forward looking Congress envisioned when it wrote the RFS. However, implementation of drop-in fuel solutions can be slowed by other federal regulations which restrict fuel companies in deploying new renewable fuels. Under Section 211 of the Clean Air Act, fuels and fuel additives --- including new renewable fuels --- must be registered with EPA prior to being offered for sale. Under the registration program, fuel and fuel additive manufacturers are required to analyze emissions generated by their products, survey existing scientific information for each product and, where adequate information is not available, conduct tests to screen for potential adverse health effects of these emissions. These requirements are entirely appropriate and are well-understood in the fuels industry and renewable fuel companies have submitted the required information for some drop-in fuel solutions. However, EPA's resources for timely evaluation and approval of such applications to register new drop-in renewable fuels are limited, resulting in a very lengthy process. This not only slows deployment of these drop-in solutions, but also creates uncertainty for investment in the required production capacity.

6. Could the blend wall be delayed or prevented with increased use of E-85 in flexible fuel vehicles? What are the impediments to increased E-85 use? Are there policies that can overcome these impediments?

Yes. E85 is a readily available option to increase the market share of ethanol by use of an established fuel in vehicles which were designed to use it, namely flex fuel vehicles. There are approximately 11 million FFV's on the road in the US today and E85 dispensers are installed at somewhere between 2,000 and 3,000 existing retail sites. Continued commitment to RFS targets, combined with the existing RIN pricing mechanism will incentivize increased availability and use of E85.

There are three key factors here that merit further discussion --

*1. **Price** – E85, to date, has typically been sold at a retail price of approximately 10% less than E10 but delivers approximately 25% poorer fuel economy. Thus, many FFV owners consider E10 to be in their best economic interest. Now that RIN prices have become material, however, a blender can profitably sell E85 to a retailer at considerably lower prices than E10 because of the market value of the RINs they collect. As a result, with suitable encouragement we believe FFV owners should migrate to E85.*

(Example: with wholesale gasoline price of $3.00/gal, ethanol at $2.50/gal and RINs at $0.70/gal the blender's cost of goods for E10 is 90%$3.00 + 10%*($2.50 – 0.70) = $2.88/gal and their corresponding cost of goods for E85 is 15%*$3.00 + 85%*($2.50 – 0.70) = $1.98/gal or 31% less than E10). Thus, as RIN prices increase, E85 effectively becomes cheaper to produce and increasingly cost-effective for owners of FFVs.*

Falling retail prices for E85, enabled by high RIN prices, can be expected to increase demand for E85. This, in turn, will cause additional RINs to be generated and create downward pressure on RIN prices. Over time, the market can be expected to reach equilibrium where RIN prices will largely be a function of the retail price difference between gasoline and E85 that is necessary to stimulate sufficient E85 demand.

2. ***Retail Availability*** *– E85 retail availability remains limited and is disproportionately located in the Midwest. As E85's cost advantage relative to E10 improves with current RIN values there is opportunity for the E85 market to grow more quickly. Blenders and refiners seeking to increase demand for E85 have incentive to encourage or support investment at independent retail sites. Government policies that reduce the cost of installing E85 infrastructure at retail sites would also encourage stations to offer E85. One result of high RIN prices is that they create a market incentive to offer E85 to consumers at attractive prices. As more E85 infrastructure is built, market demand for E85 will be able to more rapidly respond to increasing RIN prices, serving to reduce volatility. Increased availability, combined with FFV fleet growth and public education, will result in lower prices and will directly benefit consumers looking to lower their fuel costs.*

3. ***FFV Penetration of Light Duty Fleet*** *– The U.S. FFV fleet is currently estimated at about 11 million vehicles. This fleet represents a large percentage of new vehicle sales from GM, Ford and Chrysler with additional models available from several other auto makers (Toyota, Nissan, VW, Audi and Mercedes). Historically, auto makers have produced FFVs in order to capture CAFÉ credits, rather than in response to consumer demand. However, it should be noted that auto makers are not obligated parties under RFS, and neither are they directly linked through their supply chains to obligated parties. Accordingly, we believe policy should increasingly encourage growth of the FFV population. We believe that with minimal changes to existing laws, rules and regulations, auto manufacturers can be further encouraged to develop and market FFVs to the public at negligible additional cost. This is important to create an environment where the market can efficiently determine the most cost effective route to increasing renewable fuels supply.*

7. Is E-15 misfueling unavoidable? Are there lessons from the labeling and dispensing of diesel, E-85 and other fuels that prevent their misfueling that can also be applied to E-15? What specific actions are companies taking to address potential misfueling concerns under MMPs?

Misfueling can occur in two distinct scenarios. Consumers may accidently misfuel or may in fact intentionally misfuel.

Unintentional misfueling should be mitigated by the use of distinctive labeling and/or physical segregation of E15 dispensers/nozzles from E10 dispensers/nozzles. However, it should be noted that many consumers will overlook labeling, and physical mechanisms are likely to be the only effective means of materially mitigating unintentional misfueling.

Intentional misfueling could occur where consumers deliberately choose E15 for an inappropriate use, either because it is lower priced than E10 or because they prefer a higher ethanol blend, or for other reasons. Intentional misfueling, like unintentional misfueling, should be mitigated by education of the consumer via warning signs, general consumer education or by other public service communications. However, some intentional misfueling is inevitable.

8. Can blend wall implementation challenges be avoided without changes to the RFS?

Yes. We believe that there is perfectly workable route to navigate through the blendwall, if all parties remain steadfast in their commitment to the RFS and a renewable energy future, while making the necessary investments in E85 distribution, continued FFV production and drop-in biofuels. There is no need to change the RFS in any substantial way.

Is the existing EPA waiver process sufficient to address any concerns?

When crafting the RFS, the Congress wisely and proscriptively wrote parts of the law that could not be altered by rule or regulation. However, the Congress also believed it appropriate to give the EPA the authority to adjust certain aspirational goals of the Act based on a variety of factors laid out by the Congress. The EPA was given discretion to revise annually volume requirements after due diligence and considering a variety of factors. The EPA under the law is allowed to waive volumes to address certain situations. Further, under the Act, aggrieved parties with standing are allowed to petition the EPA to waive provisions of the Act. The EPA has a long history of making responsible decisions on waiver requests to mitigate severe supply disruptions attributable to their regulatory requirements.

Current statute also grants EPA authority to reduce annual volume requirements beginning with calendar year 2016:

‘‘(F) MODIFICATION OF APPLICABLE VOLUMES.—For any of the tables in paragraph (2)(B), if the Administrator waives—

‘‘(i) at least 20 percent of the applicable volume requirement set forth in any such table for 2 consecutive years; or

‘‘(ii) at least 50 percent of such volume requirement for a single year,

the Administrator shall promulgate a rule (within 1 year after issuing such waiver) that modifies the applicable volumes set forth in the table concerned for all years following the final year to which the waiver applies, except that no such modification in applicable volumes shall be made for any year before 2016. In promulgating such a rule, the Administrator shall comply with the processes, criteria, and standards set forth in paragraph (2)(B)(ii).’’. (*42 USC 7545(o)(7)(F)*)

This provision provides EPA with authority beyond their annual rule-making process to modify the volumes of all pools (Total, Advanced, Biomass-based Diesel and Cellulosic) for the

remaining years of the RFS program. Thus, if the blend wall proves to make compliance infeasible, as will be evidenced by obligated parties exhausting their existing RIN banks and utilizing the permissible one-year shortfall provisions, EPA will have time and opportunity to make appropriate revisions to the program in a manner which will provide both obligated parties and biofuel producers with the stability and predictability required for them to reasonably plan their businesses.

If the RFS must be changed to avoid the blend wall, what should these changes entail?

According to the EPA's website, the RFS2 "lays the foundation for achieving significant reductions of greenhouse gas emissions from the use of renewable fuels, for reducing imported petroleum, and encouraging the development and expansion of our nation's renewable fuels sector". We agree with that mission and remain steadfast in our commitment to achieve it. To assure that RFS delivers its designed benefits as elaborated, any changes made must reinforce our Nation's commitment to these objectives and preserve the basic structure with categories and RINs to create market incentives for the continued growth in advanced biofuels. Changes to the RFS which undercut these objectives will harm our Nation's energy future, force our Nation to continue to be dependent on foreign oil, and will penalize those parties that have invested in new technologies and infrastructure to support this policy. We believe such changes are ill advised.

Should any changes include liability relief or additional consumer protections for addressing misfueling concerns?

Butamax believes that introduction of higher ethanol blends, including those containing biobutanol, should be done in a manner that best protects consumers while advancing the goals of the RFS2 as enumerated.

9. Have the 2017 and Later Model Years Light Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy standards for cars and light trucks changed the implementation outlook of the RFS?

Not fundamentally. The 2007 EISA included targets for both biofuel blending and significantly improved fuel economy. In order for this to be implemented, a solution was necessary to permit higher levels of renewable fuels to be blended into fuels, be it either high renewable fuels such as E85, or drop-in biofuels that could be blended at higher levels. Subsequent implementation of even more stringent fuel economy standards have only modestly accelerated the need to make the fuel transitions which were already required by the provisions of EISA and this acceleration only gradually phases in after 2017.

These standards will reduce the total volume of fuel demanded by applicable vehicles. The practical effect of that dynamic is that the fixed annual volume targets of RFS will need to be reached in a smaller pool. Thus, the percentage biofuel content in gasoline must ramp up somewhat more quickly. Drop-in fuels are specifically designed to mitigate this concern by providing solutions which are applicable to current vehicles and infrastructure. It is

important that this dynamic be considered as a key factor in discussion of the RFS and of any RFS reform. Certain drop in fuels, specifically biobutanol as patented and produced by Butamax, meets the goals of the RFS while eliminating the necessity of hitting the so called blend wall. Butamax has been working to bring biobutanol to market for this very reason.

10. What other methods, including the use of drop-in fuels, are available to industry to ease the challenge posed by the blend wall?

The use of certain drop-in fuels mitigates the blend wall because they are not constrained by the capabilities of existing vehicles and infrastructure. Integrating these drop-in fuels into the market requires substantial investment in R&D and as well as achievement of necessary EPA approvals. Having made the R&D investment, these private sector investments are now maturing and initial volumes are beginning to enter the commercial market. Timely action by EPA to register new fuel formulations and approve new production pathways is needed to accelerate this option. It is vitally important the Committee understand how the use of these drop in fuels will materially ease concerns associated with the blend wall – regardless of why the blend wall is being hit.

Overcoming the blend wall challenge requires not only initial commercial deployment, but also rapidly growing production. Some specific drop-ins, such as biobutanol, offer the ability to rapidly scale up from initial deployment through their ability to re-purpose existing ethanol facilities. Butamax's Early Adopters Group, composed of corn ethanol producers interested in adopting biobutanol technology, has eight member firms who own eleven existing ethanol plants with 900mgal of capacity. Butamax has demonstrated production of this fuel at its purpose built demonstration facility and is in the process of establishing commercial production capacity in the US.

The private investment to complete the commercialization of these new fuels requires confidence in a stable, predictable regulatory environment sufficient to incentivize the multiple years and substantial cost of development. The existing RFS supports such confidence and the current operation of the RIN market provides assurance that there will be incentive for refiners to adopt these fuels as they reach commercial availability. Changes which alter the fundamental structure of the RFS or mute the pricing signal provided by RINs will deter efforts to commercialize drop-in biofuels.

11. What are the impacts on renewable fuel producers if the RFS is changed to avoid the blend wall?

The RFS, as currently structured, includes mechanisms that enable new biofuel technologies to compete on an equal basis, such that the market can find the most efficient route to increasing renewables energy in the fuel pool, thereby delivering the strategically vital policy objectives of the RFS and fulfilling the goals set forth by the Congress. However, these market mechanisms only work when the proportion of renewables in the fuel mix exceeds what can be readily included with incumbent products. The result, therefore, of the RFS being changed to avoid the blend wall would be that new technologies would be seriously disadvantaged and

greatly hindered from gaining a material position in the market. An additional, and equally serious concern, is that investors would view any material change to the RFS as a lack of commitment to the policy by the Government and that private sector funding for non-petroleum based fuels would evaporate.

The result of changing the RFS would be greater U.S. dependence on petroleum based fuel. This would be extremely unfortunate. The fact is that the RFS, as passed by the Congress with strong bi-partisan support and signed into law by President George W. Bush, has successfully stimulated large scale private sector investment in new biofuels technologies which has resulted in this industry growing at a rapid pace and bringing new jobs into the economy. These technologies have taken many years of committed investment to bring to market, and advanced renewable fuels producers are now at a stage where technical progress is being translated into real new commercial projects. In short, changes to the RFS to avoid the blendwall at this stage would be catastrophic for the emerging advanced biofuels industry, crippling its development and stopping the economic growth and new jobs that it is bringing to the U.S.

Please respond by April 5, 2013, to RFS@mail.house.gov. Should you have any questions, you may contact Majority staff Ben Lieberman at (202) 225-2927, or Minority staff Alexandra Teitz at (202) 225-4409.