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.