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Comments on White Paper 1*, Blend Wall / Fuel Compatibility Issues,* by the House Energy and Commerce Committee

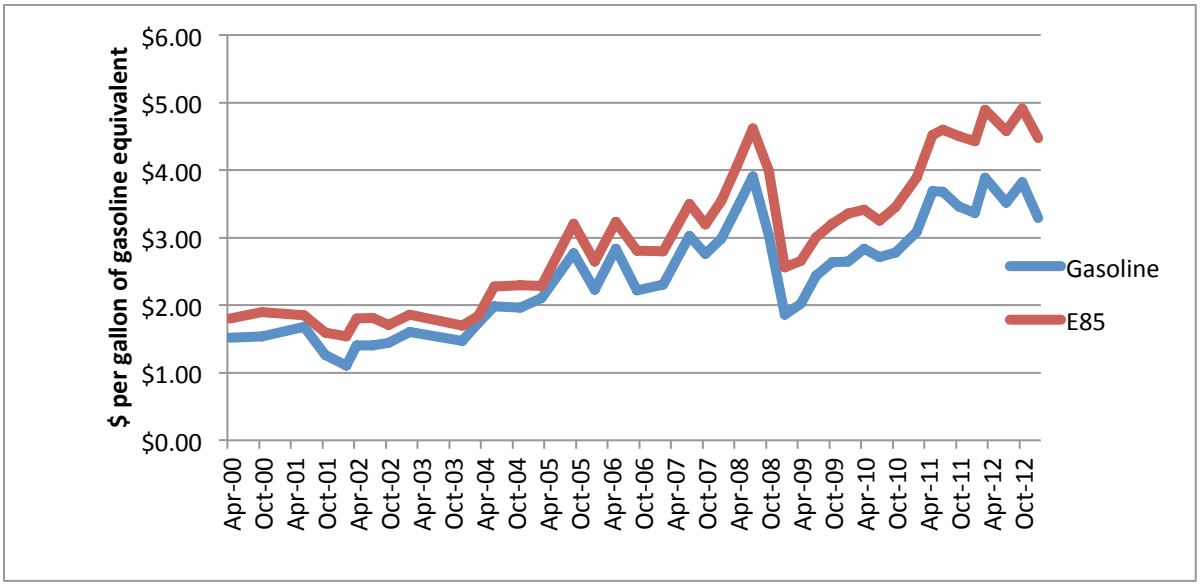
Introduction

The Energy Policy Research Foundation, Inc. (EPRINC) has undertaken research and analysis on ethanol's role in the domestic gasoline pool since 2006. A list of our major research reports and links to those studies are provided in the bibliography.

Ethanol when blended into gasoline can play an important and cost effective role in meeting both automobile and environmental fuel specifications. The use of ethanol in the gasoline pool, when adjusted for both market and technology limitations, presents no major economic or technical risks as a supplement to the production of gasoline. The fundamental policy challenge today is directly attributable to a regulatory regime that requires annual upward adjustments in volumetric targets in ethanol use, without regard to either its contribution to the cost of gasoline or technical limitations in the use of ethanol within the U.S. automobile fleet. It is not ethanol per se that presents a risk of a price spike in gasoline or a major risk to automobile engines, but the federal mandate requiring ever larger volumes of ethanol into the gasoline pool. The current regulatory regime, if not reformed in some substantial manner, will likely spike gasoline prices, perhaps by over $1/gallon in the next 18 months.

As federal mandates take the U.S. gasoline pool above 10 percent ethanol by volume, increased use of ethanol can only enter the transportation fuels market through a separate gasoline product, E85 (60-85% ethanol). This fuel can only be used in so-called flex fuel vehicles. Consumers have been resistant to E85 because of its high cost when adjusted on a BTU basis to regular gasoline (E85's lower energy content corresponds directly to reduced fuel economy in flex-fuel vehicles), limited availability and higher frequency of refill. As shown in Table I below, at no time since 2000 has E85, when adjusted for BTU content, been less expensive that E-10 gasoline. This is a fundamental and potentially lasting condition in the domestic gasoline market and the principal reason it will be both difficult and costly to encourage consumers to purchase larger volumes of E85.

Price Comparison, Energy Content Adjusted, E-10 vs E85, 2000 – 1st Quarter of 2013



Source: U.S. DOE, Alternate Fuels Data Center. National retail average, quarterly data.

EPA has recently approved another gasoline product, E15 (gasoline blended with 15% ethanol), for a large portion of the U.S. automobile fleet. But neither the driving public nor the U.S. auto industry is prepared to use E15 in large volumes. E15 also faces the same cost constraints as E85, although to a lesser extent. For the most part higher volumes of ethanol blending will require higher sales of E85.

All refiners and other obligated parties (such as importers) must document that they have blended ethanol into gasoline by acquiring RINs (renewable identification numbers). Ethanol producers generate RINs when product is produced. RINS are then acquired from ethanol producers by obligated parties when blended into gasoline. In recent years, the ethanol fuel mandate (also known as the Renewal Fuel Standard or RFS) permitted ethanol blending below 10% of the gasoline pool. Refiners and other obligated parties could, however, blend above their mandated requirement and then retain those extra RINs for sale to obligated parties who had not met their volumetric mandates. Historically, RINs have sold for a few pennies a gallon, but in recent weeks RIN prices have risen to $1 gallon or more. The cause of rising RIN prices is complicated, but is largely driven by expectations among obligated parties that they will soon face very high costs of blending ethanol at levels above 10% of the gasoline pool and will require RINs from an ever diminishing supply to meet the requirement.

As the U.S. gasoline pool has approached 10% ethanol concentration over the past year, the supply of RINs has declined as U.S. refiners cannot physically blend above RFS mandated volumes to generate surplus RINs as they could in the past when volumetric mandates were far below the 10% threshold. Other refiners who are already at (or will soon hit a 10% blending volume) are now entering the market to buy RINs to meet the newer and higher RFS volumetric blending requirements. RIN values are rising now because markets are forward looking and expectations remain that EPA will take the entire transportation fuels market head-on into the blend wall.

Instead of purchasing high cost RINs, obligated parties could attempt to distribute increased ethanol volumes through E85 or E15, but this option is highly limited and expensive. The remaining options are: (1) cut throughput (gasoline production) so a refiner's or importer's renewable fuel obligation (RVO) can be lowered and bring requirements under 10%, (2) expand exports so incremental capacity utilization is not captured by the mandated volume obligations, or (3) pay a large fine for not meeting the mandated blending volume. Each of these options means that RINs are likely to continue to increase in value and it also means a spike in gasoline prices is inevitable.

EPRINC notes that a study recently completed by Informa Economics concludes that ethanol, instead of increasing the price of gasoline, has led to a reduction in the price of gasoline by 2-4 cents a gallon, and that in any case, gasoline prices are determined largely by crude oil costs and gasoline taxes.[1] We agree that any kind of long-term assessment of gasoline markets will conclude that crude oil and taxes account for 80-90% of the cost of gasoline. The remainder is determined by refinery margins, distribution costs and retail margins. While in general feedstock costs and taxes determine gasoline prices, the Informa Economics study fails to explain ethanol's prospective role (and more importantly, the role of the RFS fuel mandate) in driving up refinery margins. The principal confusion in such analyses is that as mandated ethanol use exceeds 10% of the gasoline supply, a large differential opens up between the cost of purchasing ethanol and the much higher cost of "using" (or blending) ethanol into the gasoline pool.

Responses to Questions

Question 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?

Although there was substantial agreement in the years preceding the passing of EPACT and EISA that U.S. gasoline consumption would continue to grow to 150 billion gallons, thus accommodating the conventional renewable fuel volumes proposed in EISA at ethanol blend rates below 10%, this forecast was neither universally accepted among independent energy analysts nor was acceptance of this forecast necessarily evidence that fuel mandates were a wise decision. The drawback of both EPACT and EISA is not that the legislation was based on a poor forecast. Any forecast is likely to be incorrect because advances in technology, changes in demand, automobile technology, and feedstock prices are all inherently uncertain. The fundamental flaw in the legislative program was that the fuel mandate provided for no flexibility for changes in either the technology or economics of producing gasoline should new conditions prevail in the marketplace. The legislation did provide for a waiver for economic harm, but this appears to be an extremely high threshold for EPA. Note that for every penny increase in retail gasoline prices, consumers pay an additional $1.4 billion. An increase in gasoline prices acts as a substantial excise tax.

[1] **Retail Gasoline Price Impact of Compliance with the Renewable Fuel Standard,** Informa Economics, http://ethanolrfa.org/page/-/PDFs/RIN%20Price%20Impact%20Whitepaper%203-25-13.pdf?nocdn=1

A 2006 EPRINC report pointed out that, "At the very least, additional measures to promote ethanol should not aggravate supply risks by reducing flexibility in how the overall mandates are met."[2] In addition, EPRINC research released in November 2007, before EISA was signed into law, had determined that ethanol could easily be absorbed into the gasoline pool at levels of approximately of 5%, but that volumes above 10% would be problematic. The study pointed out that,

> *There is an easy amount of ethanol that can be absorbed in the gasoline pool. That is about 5%, and that is where the market is now: about 8 billion gal/year, or 500,000 b/d. At that level, ethanol is a necessary and complementary component of the gasoline pool. It is the current situation. It represents the replacement of MTBE in an economic environment that accommodates ethanol prices higher than gasoline prices.*
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> *…For years beyond 2012, there are proposals for ethanol sales mandates that assume concentrations in gasoline above the current 10% cap. How that might be achieved is an unanswered question, given that only US automakers espouse the plan, and they account for only about half of US vehicle sales. Proposals or sharply increased ethanol sales simply assume that auto manufacturers will warranty existing cars for fuel blends containing far more than the current 10% maximum…*
>
> *The policy aims driving ethanol expansion are sound: controlled growth and perhaps a reduction in petroleum imports; protection of the economy against oil price shocks; domestic fuel supply capacity more in line with consumption than it is now and less vulnerable to mishap.*
>
> *Depending on an agricultural commodity to accomplish these goals, however, just adds the risk of the crop cycle to present instabilities. That dependency will be a concern until ethanol from cellulose becomes economic and available in large amounts. More immediately, the ethanol industry faces the stresses of consistently high corn prices, weakening product prices, the consequent compression of margins, and the possibility of producer consolidation. How the immediate stresses affect the ultimate shape of an industry still in its formative stages remains uncertain. What is certain is that the modern energy economy has constraints on how much ethanol it can absorb.*[3]

[2] **Goldstein, Larry and Ron Gold,** *Update on Ethanol*, July 2006, , http://eprinc.org/download/UpdateOnEthanol.pdf
[3] **Kumins, Larry,** *Energy Systems Limit Future Ethanol Growth*, EPRINC Report, November 2007

Question 4) What is the likely impact, if any, of the blend wall on retail gasoline prices, and

Question 6) Could the blend wall be delayed or prevented with increased use of E85 in flexible fuel vehicles? What are the impediments to increased E85 use? Are there policies that can overcome these impediments?

Crossing the blend wall is certain to increase gasoline prices. The U.S. refined products market has entered a phase in which the RFS discourages the supply of gasoline and diesel into the U.S. market and incentivizes its export. Low cost RFS compliance options such as blending ethanol at less than 10% concentration, the banking of carryover RINs and the purchase of sub-$0.05 per gallon RINs are nearly exhausted. Obligated parties must now move up the compliance cost curve. While the refining industry, and perhaps the ethanol industry, is likely to absorb some cost increases, much of these costs will be passed on to consumers in the form of higher pump prices.

Obligated parties have several options before them to temporarily delay the blend wall. These options are problematic as they are both high cost and temporary and do not provide a workable long-term solution to the blend wall. Options to meet obligations in 2013 and 2014 include purchasing expensive and diminishing RINs, reducing the production of certain refined products, exporting greater volumes of gasoline and diesel (only fuel supplied to the U.S. market falls under the RFS, therefore exports do not count towards renewable volumetric obligations), importing less gasoline (imports do require RFS compliance) and blending more biodiesel (currently 10% more expensive than petroleum based diesel).[4] These options reduce the supply of gasoline and diesel to the market while raising the cost of the product that is supplied into the domestic market.

E15 and E85 are of course options, but the discussion of fuel costs in the introduction explains why mid-level blends are not feasible economic solutions (not to mention the cornucopia of infrastructure issues afflicting mid-level ethanol blends). E85 exceeded the cost of E10 gasoline by $1.19 per gallon or more during the 1st quarter of 2013 when adjusted for energy content, according to the Department of Energy. For E85 to be competitive in early 2013, its price would have had to be reduced by $1.19 per gallon (not including discounts to incentivize additional refueling trips to the gas station) or the price of gasoline would have to rise by $1.19 per gallon.

Theoretically, obligated parties could blend and sell E85 at a loss in order to generate RINs. Assuming a gallon of E85 contains 0.85 RINs, incurring a loss of $1.19 on the sale of E85 would generate a RIN with a value of $1.40. This implies a marginal cost of $0.14 per gallon to supply E10 to the market as RINs dry up in 2014. Since prices are set by the marginal (or higher cost) producer, it can be expected that gasoline prices will rise by at least $0.14 per gallon (since 1/10th of a RIN will be needed to cover mandated volumes above the 10% level). This would increase U.S. gasoline expenditures by nearly $20 billion over the course of one year. This is the low-cost scenario.

[4] See Department of Energy's January 2013 "Alternative Fuel Price Report," http://www.afdc.energy.gov/uploads/publication/alternative_fuel_price_report_jan_2013.pdf

Such a scenario is highly optimistic, but provides some insight into what the low-end of the RFS price shock might be. Obligated parties would have to take on billions of dollars of losses with the hope that they can later be passed through. Many refiners do not own terminals or retail stations, so they cannot simply set the price at the retail level or order loss-making ethanol blending. Geographic and infrastructure constraints would limit the amount of E85 that could be sold and where it might be sold, giving some obligated parties a compliance advantage over others.

The high-cost end of the range (of exceeding the 10% blend wall) would require gasoline prices to rise to make E85 competitive. An increase of $1.19 for a gallon of E10 gasoline at the pump would boost E85 sales and generate RINs, but would cost U.S. consumers about $160 billion over one year.[5] This situation assumes that infrastructure constraints are sufficiently resolved and flex-fuel vehicle demand is adequate enough that E85 freely enters the market, thus generating RINs. Any hiccups in this scenario will only increase gasoline prices and volatility.

The blend wall affects each obligated party differently. Some have more carryover RINs than others. Midwest refiners have better access to ethanol supplies and E85 outlets, while coastal refiners have direct access to export markets. Obligated parties will take different steps to reduce their RVO (by exporting) or generate RINs (with E85) depending on their individual operations. But regardless of individual circumstances, the RFS sends all obligated parties the same message: the U.S. is going to be a very difficult and expensive place to sell gasoline. Additional regulatory initiatives such as recently announced Tier 3 standards to reduce the sulfur content of gasoline only amplify the disincentive to sell gasoline into the U.S. market: domestically sold gasoline must contain 10 ppm of sulfur, while exports to anywhere but Europe may contain higher levels.

> ***Question 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 EPA waiver process has at least two important limitations. The first is that EPA may only issue a waiver for one year at a time. This is an inadequate time horizon for participants in the gasoline market to adjust blending levels as obligated parties face a resumption of higher mandates after the waiver expires. As long as blending and the cost of achieving those levels remain highly uncertain (and costly) short-term waivers do not address what is essentially a long-term system constraint in absorbing higher volumes into the gasoline pool.

A second major flaw is that a waiver may be issued only if EPA determines that the RFS is causing "significant" economic damage. It is not clear how EPA defines significant. EPA set itself a high bar for "significant" when it denied drought-related waiver requests in 2012. As there is no nominal dollar value associated with EPA waiver criteria and EPA remains vague on how high gasoline prices will have to rise before a waiver might be issued, this opens up the domestic gasoline market to substantial price and dislocation risks.

[5] EPRINC first raised the issue of using E85 to alleviate a blend wall crisis in a 2009 report, 'Will the Ethanol Mandate Drive Up the Cost of Transportation Fuels', http://eprinc.org/pdf/costofethanolmandate.pdf

Regarding changes to programs that promote the use of renewable fuels into the gasoline pool, any legislative remedy should provide adequate market flexibility for refiners and importers to adjust to large movements in feedstock prices, production costs, and automobile technology. Removing volumetric fuel mandates, which cannot by definition, adjust to uncertainty in market conditions is clearly an important starting point in any reform program. RINs or any tradable credit cannot overcome an inherently costly transportation fuel. Ethanol is a very important component of the gasoline supply at concentrations levels of approximately 5% of the gasoline pool. It replaced MTBE as the primary oxygenate for U.S. gasoline and serves as an octane booster. However, as blends approach 10% concentration, the relative cost of ethanol increases as its value declines. Mid-level blends such as E15 and E85 are simply uneconomic under current market conditions. Sustainable legislative solutions will be those that promulgate strategies for renewable fuels that hold up well under a wide range of future market conditions.

Bibliography: EPRINC Research on Ethanol and Gasoline

Get Ready for a Bumpy Ride – *It could be a turbulent year for gasoline prices*, March 2013, Ben Montalbano

Ethanol's Lost Promise: An Assessment of the Economic Consequences of the Renewable Fuels Mandate, September 2012, Ben Montalbano

Implementation Issues for the Renewable Fuel Standard, April 2011, Ben Montalbano

Will the Ethanol Mandate Drive Up the Cost of Transportation Fuels? , February 2009, Lucian Pugliaresi and Ben Montalbano

A report on the EPRINC-EIA Ethanol Roundtable Discussion that took place on April 15th, June 2008

Energy System Limits Future Ethanol Growth, as it appears in O&G Journal, November 2007, Larry Kumins

Ethanol II: Is Home-Grown Fuel Policy Undermining U.S. Energy Security?, April 2007, Larry Kumins

Update on Ethanol, July 2006, Larry Goldstein and Ron Gold

MTBE, Ethanol – Sorting Through the Oxygenate Issues, December 2001