NERA
ECONOMIC CONSULTING

Effects of Moving the Compliance Obligation under RFS2 to Suppliers of Finished Products

Prepared for:

Valero Energy Corporation

Final Report

July 27, 2015

Authors

Paul Bernstein, Vice President

Robert Baron, Outside Consultant

Alyssa Lipshultz, Research Assistant

W. David Montgomery, Affiliated Consultant

Timothy Watts, Vice President

The findings contained in this report may contain predictions based on current data and historical trends. Any such predictions are subject to inherent risks and uncertainties. In particular, actual results could be impacted by future events that cannot be predicted or controlled, including, without limitation, changes in business strategies, the development of future products and services, changes in market and industry conditions, the outcome of contingencies, changes in management, and changes in law or regulations. Neither Valero Energy Corporation nor NERA accept responsibility for actual results or future events.

The opinions expressed herein are those of the authors and do not necessarily represent the views of NERA Economic Consulting or any other NERA consultant.

NERA Economic Consulting
1255 23rd Street NW
Washington, DC 20037
Tel: +1 202 466 3510
Fax: +1 202 466 3605
www.nera.com

Contents

List of Figures

EXECUTIVE SUMMARY

The Renewable Fuels Standard (RFS2) is not achieving its original targets for greater renewable fuel use. Supplies of cellulosic biofuels have been one to two orders of magnitude lower than the RFS2 statutory targets. As a result, U.S. Environmental Protection Agency (EPA) has had to reduce the cellulosic biofuel target almost every year. There have also been shortfalls in other RFS2 biofuel categories. As a result, EPA is proposing to set the 2014 renewable fuel standards at the levels actually produced and used. Furthermore, EPA arrives at its proposed renewable fuel standards for 2015 and 2016 by invoking its two waiver authorities[1] to reduce required volumes of not only cellulosic biofuel but also of advanced biofuel and total renewable fuel as well. EPA cites the much lower than expected penetration of E85 (gasoline with up to 85% ethanol by volume) as a key reason for lowering the required RFS2 volumes from those of the original statutes.

The statutory standards for renewable fuels in 2014 and beyond require sales of transportation fuel containing more than 10% ethanol, which cannot be used in most existing vehicles, at volumes far greater than have been achieved to date. Without growing sales of fuels like E15 and E85, this limit to the penetration of ethanol, known as the blend wall, restricts total renewable fuel sales. It has been impossible to bypass the blend wall because E85 prices are not declining relative to E10 prices. As a result, there is no growing economic incentive for consumers to purchase E85.

The failure of the RFS2 program to bring about the needed supplies of E85 is due in part to a fundamental flaw in the policy's current design. Namely, the parties responsible for complying with RFS2 (the "obligated parties") often differ from the ones (the "blenders") that produce the finished products that contain the biofuels. Refiners and importers of gasoline blendstocks and diesel fuel are responsible for compliance with RFS2's renewable fuels requirements, even though many never interact directly with renewable fuels (i.e., do not blend these products with renewable fuels). Blenders, many of which are independent of refiners, determine the amount of E0, E10, E15, and E85 to produce and how they will be priced. It was expected that as the price of compliance rose and drove increases in the price of renewable identification numbers (RINs) that refiners and importers must submit to comply with RFS2, blenders would effectively cross-subsidize the differential between the price of E10 and E85 in order to sell more E85 and obtain additional RINs to sell. This cross subsidization is not happening, as E85 prices remain above E10 prices on an energy equivalent basis. Moving the obligation to blenders would locate it at the point where decisions about production and pricing are made. This alignment of incentives

[1] The two waivers are the cellulosic biofuel waiver and the general waiver authorities.

with control should move the market toward the intended cross-subsidization and induce an increase in E85 sales that would in turn increase the penetration of biofuels.

In addition to failing to induce the needed level of E85 sales, the current system has the perverse effect of subsidizing exports and raising U.S. gasoline and diesel prices. Refiners producing petroleum blendstock for oxygenate blending (BOB)[2] or diesel for export are not subject to the requirement to surrender a RIN; but given current pricing methods in Latin American markets, they can receive the same price for exports as domestic sales. Therefore, a refiner can escape the RFS2 system by exporting and still capture the value of the RIN that a recent paper by researchers from MIT, Michigan, and Harvard (Knittel et al.)[3] find is included in the price of BOB. The increased exports will be some combination of diverted domestic BOB and diesel sales and increased crude runs. These changes shift the balance of supply and demand in the U.S. and may put upward pressure on domestic fuel prices.

Blenders would not be subject to the transaction costs and timing risks[4] now imposed on refiners, who are short RINs. Many refiners must rely on RIN purchases to meet their current obligations because they do not blend enough petroleum blendstocks (BOB and diesel) with renewable fuels to satisfy their RIN obligations. These transaction costs cannot be eliminated efficiently by means of forward integration into blending, as EPA and Burkholder seem to suggest.[5] In fact, the trend in the market has been to become less integrated. This trend suggests that integration is costly and inefficient. In addition, some refiners would likely face antitrust concerns if they were to integrate with blenders.

Moving the obligation from refiners downstream to suppliers of finished gasoline and diesel will eliminate the subsidy to exports from refineries since they will no longer have a RIN obligation to avoid. With no RIN obligation for refiners, the marginal cost of production for refiners will fall by the amount of the RIN price, as will the price of petroleum blendstocks, based on the assumption that there is a 100% pass through of the RIN price into petroleum blendstock prices. Blenders will purchase petroleum blendstocks at this reduced price and incur the RIN obligation as a result. The blender can then either purchase biofuels and obtain RINs or purchase RINs,

---

[2] BOB is produced in different forms. The two principal forms are reformulated blendstock for oxygenate blending (RBOB) and conventional blendstock for oxygenate blending (CBOB).

[3] The Pass-Through of RIN Prices to Wholesale and Retail Fuels under the Renewable Fuel Standard June 2015, Christopher R. Knittel, Ben S. Meiselman, and James H. Stock, p. 20.

[4] Knittel et al., p. 20.

[5] Dallas Burkholder "A Preliminary Assessment of RIN Market Dynamics, RIN Prices, and Their Effects" Office of Transportation and Air Quality, US EPA (May 14, 2015).

thus assuring that the RIN price equilibrates with the cost of biofuels. As long as the price of finished fuel products equals the cost of their respective feedstocks plus a normal blender margin, the blender has no additional incentive to export. It would receive the same market price for the petroleum blendstock as it purchased it for, and the RIN it receives for blending compensates for the cost of biofuel and enables pass-through to retail.

I. INTRODUCTION

A. Assignment

NERA Economic Consulting was retained by Valero Energy Corporation to analyze the effects that assigning to refiners the obligation to blend renewable fuels has on the ability of the Renewable Fuel Standard's (RFS) program to achieve its goals of promoting renewable fuel use at minimum cost to consumers. As part of this analysis, NERA discusses how moving the obligation from refiners to producers of finished transportation fuels (blenders) would remove structural impediments to the program's success and improve the likelihood of the RFS program achieving its goals.

B. Background on RFS2 and RINs

Congress first established a Renewable Fuel Standard in 2005 with the enactment of the Energy Policy Act of 2005 (EPACT). Two years later, Congress passed the Energy Independence and Security Act of 2007 (EISA 2007) which superseded and greatly expanded the biofuels blending mandate. This expanded RFS is referred to as RFS2, which applies to all transportation fuel used in the United States—including diesel fuel intended for use in highway motor vehicles, non-road, locomotive, and marine diesel.[6] RFS2 subdivides the total renewable fuel requirement into four separate but nested categories—total renewable fuels, advanced biofuels, biomass-based diesel, and cellulosic biofuel—each with its own volume requirement or standard.

1. Renewable Volume Obligations

Congress mandated annual renewable fuel volumes for each renewable fuel category and for each year through 2022 in EISA 2007. These targets are referred to as renewable volume obligations (RVOs). The EPA translates the RVOs for each biofuel category into blending percentage standards that are used by obligated parties to determine their individual RVOs.

More specifically, each year, EPA calculates the annual total renewable fuel volume mandate by biofuel category as a percentage of the nation's total projected fuel consumption (which the Department of Energy's Energy Information Administration (EIA) provides) less EIA's projected volume of biofuels that will be consumed in the upcoming year. EPA makes some adjustments for small refinery exemptions. The renewable fuel volume obligation for each obligated party (refiners and importers of transportation fuel) is calculated by applying these ratios, which are referred to as blending percentage standards, to the total volume of gasoline and

[6] Heating oil, jet fuel, and fuels for ocean-going vessels are excluded from RFS2's national transportation fuel supply; however, renewable fuels used for these purposes may count towards the RFS2 mandates.

diesel that the obligated party produces or imports for the year. Obligated parties submit "Renewable Identification Numbers" RINs, which are attached to every gallon of renewable fuel produced or imported, as evidence of meeting their annual RVOs.

The forecasts for gasoline and diesel demand that were used originally to determine statutory volume requirements for renewable fuels have significantly exceeded actual gasoline demand in recent years, due in part to increasing CAFE standards and the 2009 recession. As a result of lower than expected gasoline demand and other factors related to the availability and cost of certain renewable fuels, EPA has found it necessary to reduce the volume requirements for cellulosic, advanced, and total renewable fuel below statutory levels using its two waiver authorities.[7]

2. Simple Structure of Vertical Market

This section discusses the market in terms of gasoline and how it is produced, blended, and delivered to retail outlets as an example of how the industry is structured. Although not discussed in detail here, this structure is also applicable to diesel fuel used in the transportation sector.

The refined petroleum product used in gasoline prior to it being blended with ethanol is referred to as "blendstock." There are two principal types of blendstocks: a "Conventional Blendstock for Oxygenate Blending" (CBOB) which is used in conventional gasoline that is used in ozone attainment areas of the U.S.; or "Reformulated Blendstock for Oxygenate Blending" (RBOB), which is used to make reformulated gasoline that is required in ozone non-attainment areas of the country.[8] Gasoline blendstocks are fungible and may be traded between many entities before reaching the terminal at which finished gasoline is produced. Finished gasoline is produced at a terminal by blending ethanol and the proprietary additives that differentiate individual brands of gasoline.[9] Non-branded suppliers do not necessarily use their own unique fuel additives but may use those of the supplier of branded products. More importantly, ethanol can only be added to gasoline at the terminal from where it is distributed to retail outlets. The mixture of blendstock,

---

[7] Cellulosic Waiver Authority: If the EPA determines that the projected volume of cellulosic biofuel production for the following year is less than the applicable volume provided in the statute, then the EPA must reduce the applicable volume. General Waiver Authority: The EPA Administrator may reduce the applicable volume if it is determined that implementation of the requirement would severely harm the economy or the environment of a State, regions or the United States; or there is an inadequate domestic supply, Clean Air Act section 211(o)(7)(A)(i)).

[8] CARBOB is another type of blendstock that complies with California Air Resource Board requirements.

[9] These additives are only added when producing finished gasoline.

ethanol, and additives that constitutes finished gasoline cannot be transported long distances by pipeline or barge because ethanol can absorb water and contaminate the product.

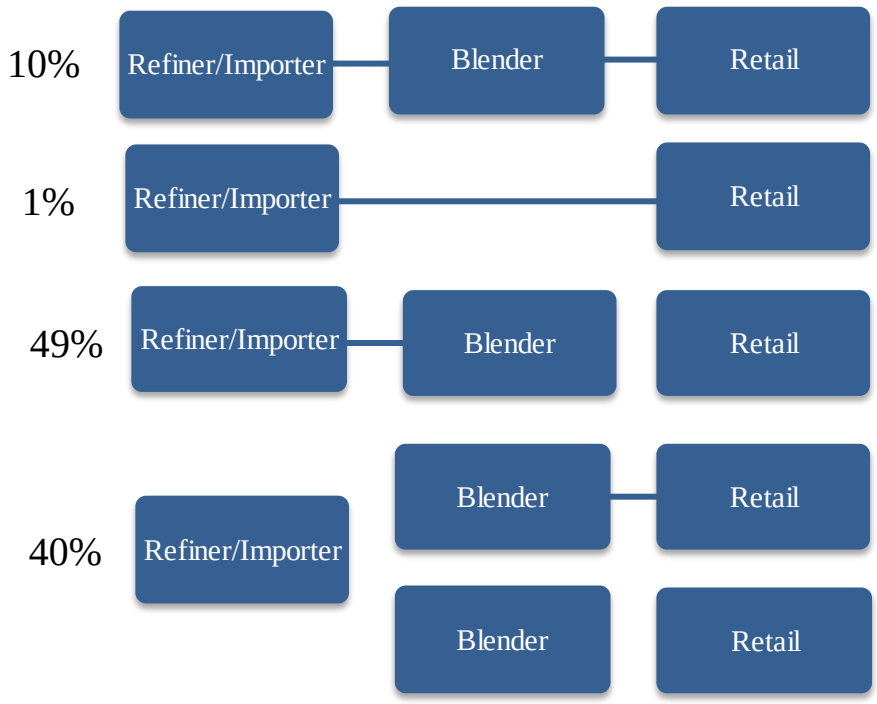
The last party to own the BOB before mixing with ethanol is called the blender. Thus in the simplest terms, BOB flows from a refiner (or importer) to a blender to a retail outlet. Ethanol flows to the blender that mixes BOB and ethanol together in the proper proportions and delivers finished products with different ratios of ethanol to BOB to retail outlets. Finished gasoline is referred to as E0 if it contains no ethanol, E10 if it contains 10% ethanol by volume, and E85 if it contains between 51% and 83% ethanol by volume.

There are four different ways in which refiners can be integrated with the other downstream segments of the industry (see Figure 1). All three levels could be under one ownership (as denoted by the first line of Figure 1 with the lines connecting each level to show all levels are under the same ownership), two of the three under one ownership, or each separately owned. An integrated refiner could be integrated into blending and retail, into only blending, or into only retail. In addition, it could have one organization for one geographic area or product and an entirely different one in another. All these forms are common, as is a refiner with no downstream activities. The shares of obligated refiners or importers with each type of organization are indicated by the values to the left. [10]

The lines connecting refiner/importers with blenders and/or retailers represent common ownership. If we also indicated how gasoline or diesel flows from refiners to blenders or retailers, we would have arrows pointing from each refiner/importer box to each blender box and to each retailer box. That is, any given refiner sells gasoline or diesel to independent blenders, to affiliated blenders, and to blenders owned by other refiners. Relatively little physical product flows directly from a refinery to a wholly owned blender or retail outlet.

[10] EPA provides a list of all registered participants in the Renewable Fuels Program. From this data and information on the named companies, we made a count of the number of companies that were active in refining or importing, blending and retail, in refining or importing and retail only, in refining or importing and blending only, or in refining only. The numbers in the left hand column represent the number of companies in that category divided by the total number of companies in all four categories.

Figure 1: Integration of Three Levels: Obligated Party, Blender, and Retail



Note: Percentages are based on the number of obligated parties.
Sources: EPA Fuels Programs Registered Company/Facility ID List; EIA Refinery Capacity Data; OPIS Retail Market Share Data.

Our interest is in how obligated parties are related to non-obligated parties further downstream. In the aggregate, about 60% of U.S. refiners and importers (obligated parties)[11] also perform blending. However, for each obligated party that also does blending, the relative size of the refining and blending operations varies. For example, gasoline blended by Valero is about 30% of what Valero refines.

These shares show that a very substantial percentage of obligated parties do not generate RINs within their own companies and do not sell E10, E85, or other finished products that contain renewable fuel. Major oil companies have divested many of their company owned and operated stations. Only about one percent of retail outlets are owned and operated by major oil companies, about fifty-two percent are operated by independent business owners who sell fuel under a major oil company brand name, and the remaining retail outlets are owned by independent business

[11] 60% is based on the number of refiners and importers and not on their volume throughput.

owners who provide unbranded gasoline. [12] Therefore as a whole refiners lack the wide spread ability to promote renewable fuel sales.

3. Obligation versus Generation of RINs

Renewable fuel producers or importers generate RINs when they produce or import a gallon of renewable fuel. One gallon of ethanol generates one RIN, while one gallon of biomass-based diesel generates between 1.5 to 1.7 RINs depending on its energy content per gallon relative to that of ethanol. Renewable fuel producers and importers must register with the EPA and report to the EPA RINs that they generate.

The RIN remains with the renewable fuel until it is blended with a petroleum blendstock. At that point, the blender can separate the RIN from the fuel. The party owning the petroleum blendstock at the point of blending has ownership of the RIN and is free to sell it to any third party, including an obligated party.

Obligated parties are producers of transportation fuel, i.e., refiners and importers.[13] They produce and/or import biofuel-free gasoline and/or petroleum diesel fuel that must be blended with ethanol or biomass-based diesel, respectively, to produce a finished gasoline or diesel product. They must submit RINs to EPA each year to demonstrate that they have met their annual RVOs. These obligated parties are made responsible for incorporating certain volumes and categories of renewable fuels into their fuel supply each year in correspondence with their individual RVOs, but many do not carry out that blending step themselves.

EPA itself recognized in its notice of proposed rulemaking for RFS2 in 2009 that this assignment detached responsibility from control:

> By eliminating RBOB and CBOB from the list of obligated fuels, these blenders would become directly responsible for ensuring that the volume requirements of the RFS program are met, and the cost of meeting the standard would be more evenly distributed among parties that blend renewable fuel into gasoline. With obligations placed more closely to the points in the distribution system where RINs are made available, the overall

---

[12] Government Accountability Office, "Biofuels: Challenges to the Transportation, Sale, and Use of Intermediate Ethanol Blends," June 2011, available at http://www.gao.gov/assets/320/319297.pdf .

[13] An *obligated party* is any entity that holds title to gasoline or diesel fuel prior to transfer across the rack to retail outlets or wholesale purchasers/consumers for distribution within the 48 contiguous states or Hawaii during a compliance period.

market prices for RINs may be lowered and consequently the cost of the program to consumers may be reduced.

While eliminating the categories of RBOB and CBOB from the list of obligated fuels would result in a significant change in the distribution of obligations among transportation fuel producers, it could help to ensure that the RIN market functions as we originally intended. As a result, RINs would more directly be made available to the parties that need them for compliance.[14]

4. RIN Short and RIN Long Parties

Within the market, there is a continuum from entities that are naturally short RINs to those that are naturally long RINs. Parties that are short RINs are importers and refiners that blend less than 100% of their gasoline and diesel output with ethanol or biodiesel, and there is continuum from 100% short (i.e., merchant refiners) to long depending on the ratio of gasoline and diesel output to blended output. Merchant blenders are naturally long RINs as they have no obligations. Integrated refiners have the potential to be long RINs. To do so, their blending operations must be such that they create more RINs than their obligation. An example of such an integrated refiner would be one who blends more E10 than the BOB that it refines and imports.

For 2014, 2015, and 2016, the EPA's 2015 Notice of Proposed Rulemaking (NPRM) proposes fuels percentage standards of 9.02%, 9.04%, and 9.63%. Once accounting for real market conditions, such as the demand for E0, blending infrastructure and market access limits on the amount of biomass-based diesel that can be blended, and the mix of diesel and gasoline sales, the renewable fuel percentage for the market as a whole is about 9% ignoring all E85 sales.

Therefore, the industry as a whole would be naturally short RINs during these compliance periods if it produced no E85. Thus the ability of the industry as a whole to meet the total RIN obligation depends on sales of E85 and certain other biofuels that provide additional RINs. Inability to meet the industry-wide percentage requirement is equivalent to demand for RINs greater than the supply.

In its NPRM for the 2015 RVO, EPA states that "Our proposal includes volumes of renewable fuel that will require either ethanol use at levels significantly beyond the level of the E10 blend wall, or significantly greater use of non-ethanol renewable fuels than has occurred to date, depending on how the market responds to the standards we set."[15] Consequently it remains to be determined whether the total market will or will not be short of RINs in 2015, however.

---

[14] 24964 Federal Register/Vol. 74, No. 99/Tuesday, May 26, 2009/Proposed Rules.

[15] 33102 Federal Register/Vol. 80, No. 111/Wednesday, June 10, 2015/Proposed Rules.

However with structural disincentives stemming from the current point of obligation, meeting EPA's goal of increasing renewable fuels consumption is unlikely.

5. Regulatory Uncertainty

Regulatory uncertainty regarding the annual renewable fuel standards has persisted throughout the enforcement of RFS2 becoming an even more acute problem in 2014 and 2015.

As called for in EISA 2007, by November of each year, EPA is supposed to finalize the four renewable fuel standards for the following year. But problems have persisted in meeting these deadlines. Technical reasons and inability to gain agreement between stakeholders has contributed to the difficulty. Stakeholders, such as biofuel producers, oil companies, human rights groups and cattle companies, have competing interests and therefore prefer very different outcomes for renewable fuel regulations.

Problems with building capacity to produce cellulosic biofuel illustrate the technology problems. Figure 2 shows the statute requirements, actual volumes produced for cellulosic biofuels, and the percentage of the obligation that EPA waived through the last six years. Actual volumes produced have been no more than 7% of that called for in the statute and in some years less than 1%.

Figure 2: Cellulosic Biofuel Volume Standards (Million Ethanol Equivalent Gallons)

	Statutory Volume Requirement	EPA's Volume Requirement	% Waived	Notes
2010	100	6.5	93.5%	EPA revised downwards to 6.5 m ethanol equivalent gallons in its February 2010 finalized standards.
2011	250	6	97.6%	EPA revised downwards to 6 m ethanol equivalent gallons in its November 2010 finalized standards.
2012	500	10.45	97.9%	EPA revised downwards to 10.45 m ethanol equivalent gallons in its December 2011 finalized standards. The U.S. Court of Appeals for D.C. vacated EPA's initial cellulosic mandate for 2012 in January 2013 and remanded EPA to issue a revised mandate. EPA dropped its 2012 RFS for cellulosic biofuels to zero on February 28, 2013.
2013	1,000	0.811	99.9%	EPA proposed a standard of 14 m ethanol equivalent gallons in January 2013. EPA revised the mandate to 6 m ethanol equivalent gallons in its August 2013 finalized rule. EPA issued a direct final rule for the 2013 cellulosic standard of 810,185 ethanol equivalent gallons in April 2014.
2014	1,750	33	98.1%	In November 2013, EPA proposed a standard of 17 m ethanol equivalent gallons for 2014. EPA proposed 33 m ethanol equivalent gallons for 2014 in its June 2015 NPRM.
2015	3,000	106	96.5%	EPA proposed 106 m ethanol equivalent gallons in its June 2015 NPRM.
2016	4,250	206	95.2%	EPA proposed 206 m ethanol equivalent gallons in its June 2015 NPRM.

Notes: 2014, 2015, and 2016 levels include biogas. Source: EPA.

EPA's constant revising of the 2013 cellulosic target provides a good example of the regulatory uncertainty. EPA proposed a standard of 14 million ethanol equivalent gallons for 2013 in January 2013. EPA revised the mandate to 6 million ethanol equivalent gallons in August 2013 and issued a final order for 0.8 million gallons in April 2014.

Furthermore, EPA first released its proposed rule for 2014 percentage standards in November 2013. In May 2015, it issued a revised proposed rule. As of July, 2015, no final rule has been issued. This delay has contributed to market uncertainty and reflects the challenge that EPA faces in setting standards that balance the interests of the competing parties. It further remains unclear how EPA will proceed beyond 2016.

There is an inverse relationship between regulatory uncertainty and investment. High levels of regulatory uncertainty have contributed to lower investment in terminal blending and retail infrastructure and in new technology for advanced biofuels that are needed to meet the original RVOs.

6. Decision Makers about Production and Sale of Blended Fuel

The RFS lays the responsibility for putting biofuels into blendstocks on refiners and importers (obligated parties), not the blenders that actually mix petroleum based blendstocks and biofuels and supply the finished products to retail markets. This assignment of responsibility continues to be rationalized by supporters of renewable fuels as necessary to force major oil companies to stop being obstacles to the economic use of renewable fuels and to compel them to develop advanced renewable fuels.[16] These supporters believe that if only oil companies would put pumps for E85 into enough retail stations and sold E85 at a low enough price, the public would flock to buy ethanol-rich gasoline. This whole notion seems to be based on the belief that the U.S. gasoline market is 100% integrated, with refiners owning the entire wholesale and retail distribution network for their branded products.[17] In fact, there has been a rapid movement away from this model, and gasoline is often sold unblended by refiners to independent blenders. Since these independents do the actual blending, they make the decisions about how much renewable content is blended into the finished fuels they sell and how to promote and price them. Since the refiner does not produce the finished products (i.e., E0, E10, E85 and B5 – B20 blends), it cannot influence the price differential among them, nor what portion of the RIN value is extended to consumers to incent demand for renewable fuels. Furthermore, the refiner rarely owns the retailer[18] and for many does not even lease the station; thus it has little influence over pump selection. This effectively takes away any ability refiners have to control the sale of E85.

A similar situation exists for diesel. In this case, blenders decide how much biomass-based diesel to mix with petroleum diesel. An expansion of these facilities is necessary to create additional capacity, but blenders do not necessarily have the financial incentives in the current system to make these investments.

---

[16] Protecting the Monopoly: How Big Oil Covertly Blocks the Sale of Renewable Fuels Renewable Fuels Association March 2014

[17] See, for example, EPA statement that in Final Rule "while gasoline refiners [sic] and markets will always have a greater profit margin selling ethanol in low-level blends to consumers based on volume, they should be able to maintain a profit selling it as E85 based on energy content in the future." 14762 Federal Register/Vol. 75, No. 58/Friday, March 26, 2010/Rules and Regulations.

[18] According to EIA, in 2014 refiners sales through company owned retail outlets amounted to 6.4% of total gasoline sales.

7. Blend Wall

As RFS2 targets increase, it becomes impossible to incorporate sufficient ethanol volumes into the fuel supply to meet these targets without exceeding the 10% ethanol concentration limit. In 2013, EPA acknowledged that this constraint, called the blend wall, had been reached.[19] If gasoline demand continues to decline as forecasts predict, then incorporating more ethanol into the fuel supply would require increased use of higher ethanol blend fuels such as E15 and E85. The only class of vehicles certified to use high content ethanol gasoline such as E85 is termed Flexible Fuel Vehicles (FFVs). Although flexible fuel vehicles can use blends up to E85, the market potential for high ethanol content fuels remains constrained by terminal blending infrastructure, retail infrastructure and limited consumer demand. In particular, only about 3,000 of the 150,000 refueling stations have an E85 pump.

8. RIN Prices

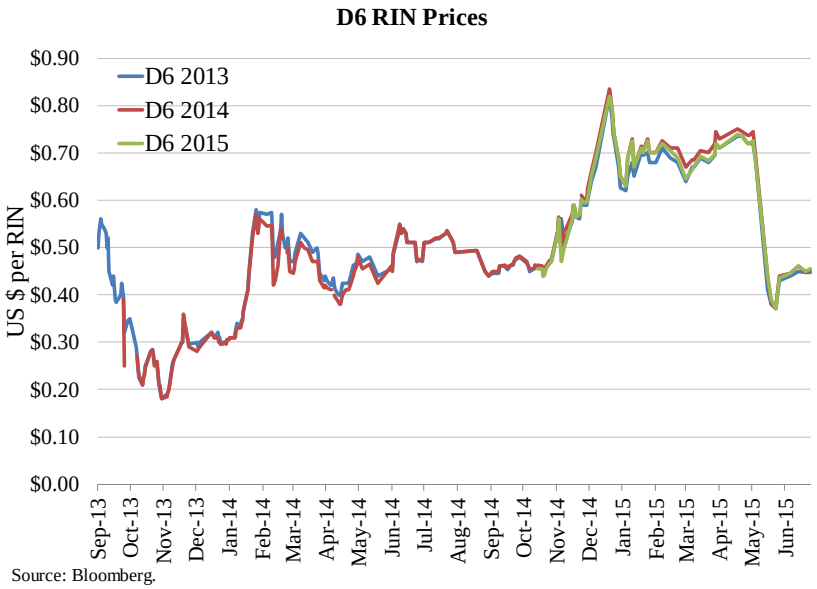
RIN prices exhibit considerable volatility, as seen below. This introduces an additional source of risk for refiners in that a significant new source of uncertainty in their production costs is established by the requirement to procure RINs to cover all gasoline and diesel they produce. Managing this risk will add to the cost of marketing, as additional staff and expertise will be required to make decisions about when and at what price to purchase RINs to cover their RIN shortfall.

Even a company that normally followed a strategy of minimizing exposure by purchasing RINs simultaneously with production would, according to a recent study done for EPA, face significant timing risks. Knittel et al. find that although on average 100% of changes in the price of RINs are passed through into RBOB prices, it takes several days for this to occur. Moreover, this happens on average. In some time periods or areas pass through may be higher or lower than 100%, which is an additional source of risk. In the real time of petroleum marketing, this introduces a risk that RINs will be purchased on days in which their change in price is not yet reflected in gasoline prices. As Knittel et al. state: "Even with full pass-through, however, an obligated party could face RIN price risk because of timing differences between when the RIN obligation is incurred and when RINs are acquired."[20]

[19] A Preliminary Assessment of RIN Market Dynamics, RIN Prices, and Their Effects, Dallas Burkholder, Office of Transportation and Air Quality, US EPA May 14, 2015, p. 7.

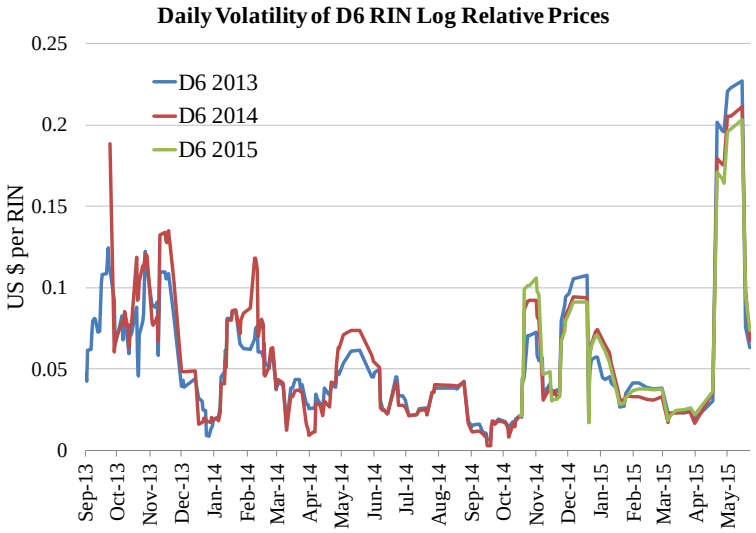
[20] Knittel et al., p. 20.

Figure 3: Historic D6 RIN Prices



Source: Bloomberg.

Figure 4: Volatility of D6 RIN Prices



Source: Bloomberg.

9. Low Demand and High Price for E85

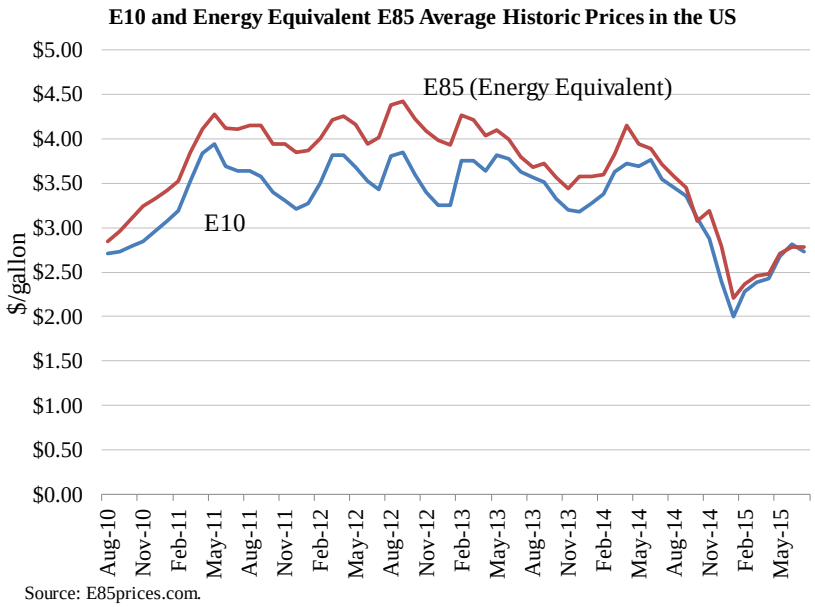
Figure 5 shows how E85 is consistently priced above E10 on an energy equivalent basis regardless of the prevailing RIN prices. Knittel et al. comment on this market failure:

> "To us, the most intriguing and challenging finding here is the near absence of pass-through of RIN prices to retail E85 prices. While RIN prices might be passed through at

some retail outlets at some times, this is not the case on average using national prices. The goal of the RFS program is to expand the use of low-carbon domestic biofuels, and the key economic mechanism to induce consumers to purchase high-renewables blends is the incentives provided by RIN prices. If the RIN price savings inherent in blends with high biofuels content are not passed on to the consumer, then this key mechanism of the RFS is not functioning properly." [21]

This is not the price relationship that EPA intended or expected in forecasting that the RIN program would incentivize use of E85. EPA commented in 2010 on the future price relationship it expected to see: "Overall, we estimate that E85 would need to be priced about 25% lower than E10 at retail in 2022 in order for it to make sense to consumers."[22]

Figure 5: E10 and Energy Equivalent E85 Historic Prices in U.S. ($/gallon)



Source: E85prices.com.

[21] Knittel et al., p. 20.

[22] 14762 Federal Register/Vol. 75, No. 58/Friday, March 26, 2010/Rules and Regulations.

II. BREAKDOWN OF RFS2 MARKET: EVIDENCE AND UNDESIRABLE CONSEQUENCES

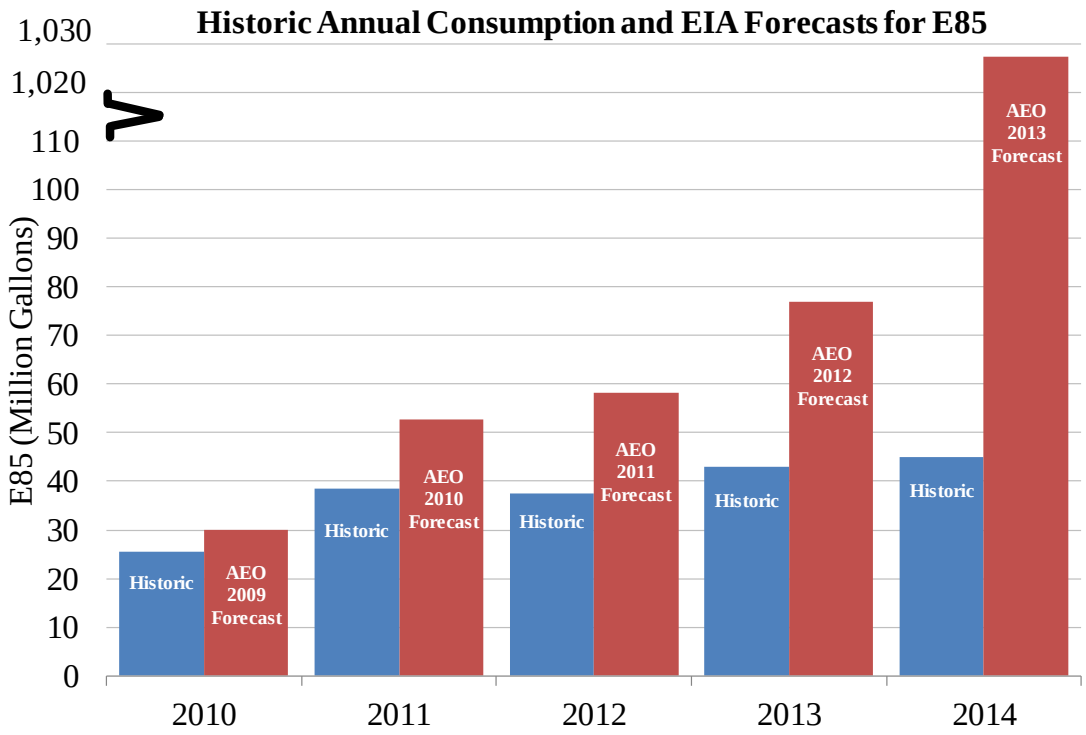
RFS2 is not achieving its original quantitative goals for greater use of renewable fuels in the transportation sector. In particular, actual volumes of renewable fuels sold in the past two years have been less than the original statute targets. Because of these shortfalls, EPA has proposed a total renewable fuel requirement for 2015 of 16.30 billion gallons, which is 4.2 billion gallons lower than the original statute requirement of 20.5 billion gallons.

In doing so, EPA recognizes the challenges to producing large quantities of these fuels at competitive prices and the inability of the market to produce cost-competitive volumes at a commercial scale. The blend wall, which EPA has acknowledged as one reason for proposing standards below the original statutes for 2015 and 2016, represents a major factor in limiting any increase in the concentration of renewable fuels in transportation fuels. Due to increasing CAFE standards for new cars and other factors, EIA forecasts declining consumer demand for gasoline. Given this, the blend wall restriction will continue to limit total renewable fuel demand in the future.

A major obstacle to absorbing more biofuels in the market is the lack of consumer demand for high ethanol content gasoline, such as E85. As shown in Figure 6, consumer demand for E85 has historically remained relatively flat, consistently underachieving EIA's expectations for increased use of E85.

EPA is faced with a difficult choice. If it leaves the RFS2 program as currently designed it must accept the fact that there will be little potential for increasing renewable fuel use in the transportation sector. Therefore if EPA wants RFS2 to have any chance of meeting its original goals, it must consider changes to its design.

Figure 6: Historic versus Projected E85 Consumption



Sources: AEO 2009, 2010, 2011, 2012, and 2013 Reference Case Forecasts, EIA U.S. Refinery and Blender Production of Motor Gasoline, Finished, Greater Than Ed55.

There is little if anything that EPA can do to increase consumer demand for gasoline but there are steps that EPA can undertake that will provide more effective economic incentives for consumers to use higher ethanol content gasoline such as E85.

As the total renewable fuel standard became more severe, RIN prices should have increased. It was thought that as the RVO was raised and RIN prices increased, the price of RINs would provide an incentive for producers to develop and market greater quantities of renewable fuel and simultaneously cause the price of E85 to fall relative to that of E10, so that motorists would have an increasing incentive to purchase E85. This change in relative prices has not happened. [23]

A. Misplaced Incentives to Induce Production and Consumption of Renewable Fuel

The key question then is what in the structure of the RFS2 program is causing this lack of response in the E10-E85 price spread to higher RIN prices and the lack of investment in blending infrastructure. There are several categories of participants in the program that should be

[23] Knittel et al., p. 20.

examined: renewable fuel producers, blenders, obligated parties, and retailers. When a renewable fuel producer creates a gallon of renewable fuel, they also create a RIN (1.0 RINs per gallon of ethanol and 1.5-1.7 RINs per gallon of bio-massed based diesel). This RIN cannot be separated from the renewable fuel even though the renewable fuel may be bought and sold multiple times. When an obligated party, produces or imports a gallon of petroleum blendstock (BOB or diesel), they incur a RIN obligation based on the RFS blending percentage obligation. At year's end, an obligated party must turn in to EPA sufficient number of RINs in order to satisfy its renewable volume obligation (RVO). Its RVO is the product of the gallons of petroleum blendstocks it produced times the blending percentage standard.

However, refiners and importers as a category do not purchase renewable fuels for blending, and thus do not receive RINs as part of their BOB or diesel production activity. These obligated parties must obtain RINs from others. A RIN is separated from the renewable fuel when the renewable fuel is mixed with the petroleum blendstock in order to produce finished gasoline or diesel. The party who owns the petroleum blendstock when the blending occurs is called the blender. The blender can choose to hold, exchange, or sell the RIN. There is no requirement as to when the blender must make a transaction. The blender has no obligation to EPA to turn in any RINs as a result of its activity of mixing petroleum blendstocks with renewable fuels. It is the blender who sells the finished transportation fuel (E0, E10, E15 and E85 or ULSD B0 and B5-B20) and has the capability of stimulating the greater use of high renewable content fuels by consumers by adjusting the relative prices of the different types of finished gasoline.

Further, as the blender carries no exposure to the RFS obligation, it has less incentive to expand its blending infrastructure to allow for higher level blends (E85 and E15) or additional advanced renewable fuels (B5-B20). In fact, doing so would be contrary to the blenders' financial interest, as the more renewable fuel the blender purchases and blends, the more RINs will be created and those excess RINs will decrease the value of RINs. Adding incremental renewable fuel blending requires the installation of infrastructure at third-party terminals where non-obligated blenders are the terminal operator's primary customers. Whereas obligated parties (i.e. refiners) have a direct incentive to expand infrastructure and blending (E15, E85 and B5-B20) in order to meet their renewable fuel obligations, non-obligated parties using the same terminal may be less willing to make such investments to gain some potential additional RINs. For both, the profitability of such investment depends on how EPA uses its waiver authority to set the renewable fuel standard. The obligated party faces both RIN price risks and potentially large penalties for missing its RVO that could justify such investments even if their long-term profitability is risky due to uncertainty about how much EPA will adjust future requirements. For the non-obligated party, the expansion would be no more than a normal business investment made quite risky by the same uncertainty.

If the third-party owner requires all parties holding capacity to contribute to such expansions, there will be high transaction costs to expanding the fueling infrastructure needed for high-

ethanol or high-biodiesel blends. This is especially problematic when the industry confronts the blend wall and additional capital or marketing is required to generate RINs that would be necessary to achieve renewable fuel levels set in the statute. There are greatly asymmetric losses between an obligated party that needs new infrastructure to be in position to comply if EPA sets tighter requirements and a non-obligated party that is taking a risk on investing in infrastructure that might or might not be useful depending on EPA's decisions.

The source of the problem with adding blending infrastructure being the existence of both obligated and non-obligated parties as terminal users, moving the point of obligation to final suppliers of fuels for resale would turn all terminal users into obligated parties. This would greatly reduce the difficulties of reaching agreement on adding blending capacity.

Specific to E85, there are a number of factors that affect the choice between E10 and E85 beyond the blender including, terminal blending infrastructure, retail capacity to accept additional volumes, number of local FFVs that can use E85, and consumer awareness of the performance characteristics of E85 versus E10.

The evidence that the E10-E85 price spread does not respond to changes in RIN prices implies that the blender, the party that actually sells E10, E85, or other blends to retailers or wholesalers, is not responding to the financial incentive of obtaining additional RINs from E85 sales when the RIN price rises. The lack of response in the fuel price spread means that RIN economics do not affect the blender's decision process about the relative pricing of finished fuels. In other words, the blender is not passing through the value of the RIN to the retailer in order to encourage greater E85 sales, and RIN profits are being retained by the blender.[24]

No obligated party, unless it is also a blender, has any ability to increase the renewable fuel content in sales of finished gasoline that generates more RINs than E10 or in finished diesel with biodiesel content in response to RIN price signals. Nor can it increase such sales in order to work its way out of a short position in RINs when the deadline for submitting RINs to EPA approaches. Nor are obligated parties in a position to change the terminal blending infrastructure to enable blending E85 at the rack for sale to retailers, or to add pumps or operating hours for sale of E85 in more locations so as to attract owners of FFVs to E85. Only a small fraction of refiners own retail outlets, as discussed below, in which they could make those changes. At least 50% of the gasoline produced by obligated parties moves through unaffiliated blenders, so that a very substantial portion of obligated parties have no way to increase production or promote sales of E85. Whereas an obligated party that is long RINs under the current assignment of obligations would see a clear advantage in installing terminal blending infrastructure and subsequently discounting E85 in order to increase sales and RIN acquisition, non-obligated

[24] Burkholder, p. 12, second paragraph.

parties have not responded to the incentive of rising RIN prices by increasing their blending activity, remaining satisfied with RIN-price driven profits on existing sales of high-biofuel blends. The result is to block blending infrastructure investment at terminals for both obligated and non-obligated parties.

It could well be that blenders perceive that the cost of promoting E85 sales in their affiliated retail outlets, of which there are many, or by discounting E85, would be high enough to offset the gains they would achieve in RIN sale revenues. In particular, the different motivations of obligated and non-obligated parties that share space at third-party terminals makes coordination on the expansion of capacity to blend fuels with higher renewables content difficult. In other words, the transaction costs for blenders to promote additional E85 sales could be responsible for their lack of response to RIN price signals.

The result is a market in which the number of RINs is affected by total fuel sales but not by RIN prices, which is the basic mechanism in RFS2 to increase renewable fuel demand. As a result, RINs are in tight supply relative to the RFS volume standards, which can cause greater RIN price volatility and RIN price spikes. Unless the E85 pricing problem is cured, reductions in the obligation below statutory volumes will be required for the foreseeable future. As a consequence, the incentive of a growing market to stimulate future investment in advanced biofuels or R&D to develop biofuels compatible with existing vehicles and fueling infrastructure will be nonexistent.

B. Impact of RINs on Ethanol Production

U.S. corn ethanol producers currently provide product to both domestic and international clients. The exporting of corn ethanol implies that there is more corn ethanol supply available for the U.S. market than there is demand. Consequently, it is reasonable to assume that there is no need for the blender to pass through the RIN value in the form of a higher price paid for corn ethanol in order to encourage additional production because the domestic market for corn ethanol to be mixed into fuels is saturated. As such, producers of ethanol do not benefit from high RIN prices. The blend wall which restricts the share of ethanol in motor gasoline to 10% and is the majority of gasoline sold in the U.S. is one limiting factor. The other limiting factor is the lack of growth in gasoline demand.

C. Excess Burdens on Refiners that Do Not Blend

The limited supply of RINs particularly impacts refiners and importers, the current obligated parties, because they are ultimately responsible for turning RINs in to the EPA in order to comply with their RVO obligations. Obligated parties that both produce/import petroleum

blendstock and blend their petroleum blendstock with renewable fuels to produce finished gasoline or diesel are shielded from this if they are at minimum balanced.[25] Those refineries that are not balanced, often referred to as merchant refiners, are exposed to various types of market uncertainty, including the uncertainty of future RVOs and the price volatility of RINs.

Merchant refiners who purchase RINs also incur transaction costs and portfolio management costs related to their RIN acquisition operation.

D. Incentive to Export

With the EPA's NPRM proposed percentage standard set below 11% for total renewable fuels, E10 generates more RINs per gallon than required under this percentage standard. However, biomass based diesel, especially B5, does not. As a result, RINs generated from E10 effectively subsidize the RIN deficit incurred when producing petroleum diesel blendstock. This deficit also creates an incentive for obligated parties to export their petroleum diesel. Since the RVO obligation does not apply to petroleum diesel when it is exported, obligated parties can reduce their RVO by exporting a greater share of the petroleum diesel that they produce from refining. As renewable fuel standards increase with time, the greater incentive to export diesel rather than sell it into the domestic market will create upward pressure on diesel prices as it results in less domestic diesel supply.

A similar incentive exists in the gasoline market for exports. U.S. refiners enjoy a cost competitive advantage relative to Latin America refiners due to several cost related factors. For one, U.S refineries have historically higher operating factors (utilization rates) than their Latin America counterparts. In the U.S. the hydrogen and energy consumed in a refinery during the production of refined products is supplied by relatively inexpensive natural gas. In Latin America refineries, the hydrogen and energy needed is often produced from petroleum. Finally, the U.S.'s crude oil export ban means that certain U.S. refineries can utilize advantaged domestic crude oil versus Latin American refineries that process crude oil that can be traded on the global market.

We understand that gasoline blendstock sold into Latin America is priced based on U.S. Gulf Coast price indices plus transportation plus any quality adjustments.[26] If the value of the RIN is

[25] Balanced means that the integrated company generates sufficient RINs from its blending operations to meet the RVO created by its refining and importing operations.

[26] Gulf coast indexes are widely used; there are no comparable pricing indexes available in Latin America. Marylone Montoyatorres Facultad de Minas, Universidad Nacional de Colombia, Adriana Martínez Castro Facultad de Minas, Universidad Nacional de Colombia, Giovanni Franco Sepúlveda Universidad Nacional de Colombia, Analysis Of The Gasoline Price In Colombia:Approximation Dyna, year 77, Nro. 163, pp. 282-283.Medellin, September, 2010.

captured in the pricing of blendstock as reported,[27] then selling into the Latin American market has two advantages for a merchant refiner. First, the merchant refiner does not have an RVO for fuel exported outside the U.S, and does not need to purchase a RIN from a blender or third party (financial trader). Second, the sale price to Latin America includes the value of the RIN which now becomes profit to the gasoline exporter.

A similar situation exists for the integrated refiner. The integrated refiner captures the RIN value as profit when he sells production into the Latin America market, but no longer has need for the RIN generated from the integrated blending operation. Moreover, under the current point of obligation, the integrated refiner will now purchase non-obligated blendstock on the spot bulk fuel market to meet his downstream blending needs. That refiner is now free to sell the unneeded RIN on the domestic RIN market and capture the RIN value a second time.

This flaw in the policy leads to this unintended consequence of subsidizing exports. Making the blender the obligated party should eliminate this flaw because the RIN value would no longer be included in the price of the petroleum blendstock. With no RIN obligation, the marginal cost of production for refiners will fall by the amount of the RIN price, and the Gulf Coast price of BOB gasoline, based on the assumption that there is a 100% passthrough of the RIN price into BOB prices, will also fall by the amount of the RIN price. Blenders will purchase gasoline at this reduced price and incur the RIN obligation as a result. The blender can then either purchase ethanol and obtain a RIN or purchase a RIN, thus assuring that the RIN price equilibrates with the cost of ethanol. As long as the price of finished gasoline equals the cost of BOB plus the cost of ethanol plus a normal blender margin, the blender has no additional incentive to export. It would receive the same Gulf Coast price for BOB as it purchased it for, and the RIN it receives for blending compensates for the cost of ethanol, which is below the cost of gasoline. Thus the blender is incentivized to maximize renewable fuel content and able to pass on the benefits to the consumer, increasing demand.

Exports to Central and Latin American countries will likely be supplied by PADD 3 refiners who otherwise would provide refined product to PADD 2 and PADD 1. When their refined products are redirected to Latin American exports, they are likely to be replaced by additional imports to the U.S., most likely into PADD 1 and possibly PADD 2. If the marginal cost of the new refiner is greater than that of the current incremental refiner, then the cost of gasoline to U.S. consumers will increase. If not, the cost of gasoline to U.S. consumers will remain the same.

Not only are diesel and gasoline exports affected by the current design of RFS2, but so is the investment of capital. New infrastructure is being built in order to support the export of gasoline and diesel. To the extent that these capital investments are driven by the U.S. competitive

[27] Knittel et al., p.19.

advantage in supplying gasoline and diesel to foreign markets, these investments are good for U.S. economic growth. However, to the extent that these investments are made to support the exports of gasoline and diesel that are made to avoid RIN requirements of the RFS2 program, capital is being redirected away from its optimal mix resulting in a less efficient use of capital, which retards economic growth.

III. WHY DOWNSTREAM INTEGRATION IS NOT A SOLUTION

In theory merchant refiners could eliminate their exposure to the secondary market for RINs by integrating downstream into blending.[28] If refiners blend motor gasoline and biodiesel in sufficient quantities, they can cover their RVOs without having to purchase RINs on the open market. Increased integration between refining and blending, however, is not without challenges.

Refiners who seek to increase their degree of downstream integration must swim across the long-term industry current of increasing separation between refining, distribution, and retailing. The changing supply chain economics that underlie this trend make integration between refining and marketing/retailing less attractive than it was in decades past. Aside from these trends, refiners cannot enter (or expand their activities in) the next link in the supply chain without bearing substantial costs, including capital expenditures, logistical costs, and customer acquisition costs. Antitrust regulations create another hurdle for downstream integration, as competition authorities may limit refiners' ability to acquire the needed assets. Finally, all of these concerns must be considered not in the light of a single merchant refiner seeking to integrate downstream, but as a structural change at the industry level where all refiners seek to blend at least enough fuel to cover their RVOs.

A. Integration into Marketing is No Longer Industry Norm

Broadly speaking, the petroleum supply chain can be broken up into exploration and production, feedstock transportation, refining, products distribution, wholesale marketing, and retail marketing. Blenders belong to the wholesale marketing segment of the supply chain, and they may also be integrated into refining and further upstream segments as well as downstream into retail marketing. However, over the past decades, all segments of the petroleum supply chain have become increasingly vertically disintegrated. For example, in 2008 Conoco-Phillips sold 600 company owned retail stations, and Exxon Mobil sold 2,220 retail stations.[29] Valero divested most of its former retail assets in 2013. Refiners have exited retail marketing in part because it is a low-margin part of the supply chain.

As a result of these changes, retailers obtain only a small portion of fuel from refiners. In 2014, the share of gasoline sold by stations that are owned or directly supplied by refiners was less than 14%.[30] The largest part of refiner sales (79%) is "rack" sales, which are sold at terminals and

[28] The same applies to integrated refiners that do not blend enough fuel to cover their RVO internally.

[29] http://www.reuters.com/article/2008/08/27/us-conocophillips-idUSWNAB840420080827.

[30] Energy Information Administration, "Refiner Motor Gasoline Sales Volumes," http://www.eia.gov/dnav/pet/pet_cons_refmg_c_nus_EPM0_mgalpd_a.htm.

may be blended by the refiner that manufactured the blendstock or another refiner that acquired the blendstock in bulk from the producing refiner. Bulk sales, which are sales of volumes that are not blended by the refiner, account for the remaining 7% of the volume. These numbers reflect the disposition of refinery sales in aggregate, and specific refiners may blend significantly higher or lower portions of their production than is suggested by the aggregate numbers.

B. Integration into Marketing is Costly

This trend toward disintegration suggests that integration is costly. As discussed above, finished motor gasoline products that contain renewable fuels, such as E10 or E85, are created by a process known as inline blending. This occurs at light petroleum products terminals that store gasoline blendstock and ethanol in separate tanks. The blendstock and ethanol are mixed together – or blended – only when they are loaded on a tanker trunk that will deliver the finished fuel to retail outlets. Thus downstream integration into blending requires integration into marketing. Refiners can integrate into blending by acquiring existing blenders or starting up their own blending operations. Each of these options involves significant costs. First, to the extent that blending reduces refiners' costs of complying with RFS, the price of acquiring a blender should include a premium that reflects this cost savings. In an efficient acquisition market, buying a blender will not make merchant refiners better off because they must pay for cost savings in advance.

De novo entry into marketing and blending is also costly. Such entry requires (1) access to terminal services, (2) reliable bulk supplies of fuel at the terminal and (3) a reliable outlet for product. Each of these requirements may pose a challenge to non-integrated refiners. In order to obtain access to terminal services, refiners would need either to contract for use of open access terminal facilities, acquire existing terminals, or build new terminals. Open access terminals are owned and operated by companies such as Kinder Morgan or Buckeye that are not integrated into refining or marketing and earn money by charging storage and throughput fees for use of their terminals. While obtaining services at open-access facilities typically requires the least investment, this is not an option in all areas. Some areas are only served by proprietary terminals. In other areas, all capacity at open-access terminals may be dedicated to existing blenders under long-term contracts.

When open-access terminals are not available, acquiring or building terminals can be expensive. In 2014, CorEnergy recently paid $40 million for a single petroleum products terminal in Portland, OR.[31] In 2013, Buckeye acquired 20 LPP terminals from Hess for $850 million.[32]

[31] http://www.businesswire.com/news/home/20140114006688/en/CorEnergy-Acquire-Portland-Terminal-Facility-40-Million#.VbFtjmNH744.

Building terminals requires similar expenditure and more time than acquiring terminals. An FTC report notes that terminals have large sunk costs relative to total costs.[33] Local zoning requirements and environmental permits may increase costs of de novo entry.

Acquiring a terminal alone does not solve the merchant refiner's short RIN position. In some instances, terminal operators and blenders may be one and the same; often the terminal owner has title to the terminal hardware but rents/leases storage and rack capacity to other parties who own biofuel and petroleum blendstock. The blenders are the owners of the biofuel and petroleum blendstock who actually perform the blending to produce finished gasoline and diesel. Renting/leasing space at a terminal may be costly or not possible for a merchant refiner. There is an already existing structure of supply for refined products in the industry. Displacing an existing market participant through acquisition of their contracts could be costly. But even acquiring capacity to blend at a terminal may be insufficient because it is necessary to transport the biofuel and petroleum blendstock to the terminal by pipeline in some cases and barges or ships in others. Capacity on pipelines is already owned so this means additional cost to acquire capacity from an existing shipper. Therefore the cost to become a blender can be much greater than just acquiring an existing terminal.

Arranging reliable bulk supply at terminals can also pose a challenge. This requires ensuring access to allocated pipeline space (e.g., Colonial Pipeline Company, Magellan Midstream Partners, L.P) or marine deliveries of gasoline or diesel blendstock as well as deliveries of ethanol and biodiesel (typically by rail). If the blending location is remote from the refinery operations, the refiner may need to negotiate exchange agreements with another refiner that is located closer to the blending location.

Blenders must have an outlet for their fuel. The FTC has recognized that in certain areas, markets require a critical mass of retail stations to compete.[34] In some areas, many retailers may be under contracts with current wholesalers, and acquiring these customers will require buying out their contractual obligations as well as other more typical customer acquisition costs.

C. Antitrust Regulations Prevent Some Forms of Integration

In the United States the Clayton Act and related laws allow regulatory agencies, the Department of Justice (DOJ) and the Federal Trade Commission (FTC), to review mergers and acquisitions.

---

[32] http://www.buckeye.com/LinkClick.aspx?fileticket=idzFY8SvuAA%3D&tabid=84.

[33] Federal Trade Commission, Bureau of Economics, "The Petroleum Industry: Mergers, Structural Change, and Antitrust Enforcement," August 2004, 224.

[34] See FTC "The Petroleum Industry: Mergers, Structural Change, and Antitrust Enforcement,"41.

If the agencies deem that a proposed transaction would harm competition, they can file suit to block the transaction. Historically the FTC has reviewed mergers in the refining and marketing segments of the petroleum industry.

Mergers and acquisitions can be classified as horizontal (if the parties belong to the same segment of the same industry), vertical (if the parties belong to different segments of the same industry), or conglomerate (if the parties belong to different industries). Refinery acquisitions of blending assets necessarily entail a vertical component because they combine two stages of the supply chain under common control. These acquisitions may also have horizontal components to the extent that they affect the concentration of ownership of blending assets.

The FTC recognizes that vertical mergers are typically competitively benign or even procompetitive to the extent that they reduce costs, for example by eliminating double margins. Even so, the FTC reviews vertical transactions for potential anticompetitive effects. The main channels of anticompetitive vertical effects that the FTC identifies are raising rivals' costs, evading price regulation, facilitating coordination, and making entry more difficult. The FTC has taken enforcement actions to prevent vertical combinations of assets in the oil and gas industry. These actions include required divestitures of ethanol terminals in California in the Valero/Kaneb (2005) transaction on the grounds that the transaction otherwise would have allowed Valero to make it more difficult for its competitors to access ethanol terminaling services. The FTC also required divestiture of a significant amount of assets in the Shell/Texaco (1997) transaction on the grounds that the transaction otherwise would have allowed Shell to make it harder for its competitors to obtain inputs for asphalt. Finally in the Exxon-Mobil (1999) transaction, the FTC required a commitment that ExxonMobil would continue to offer access to a wharf because of vertical concerns that it otherwise may use its control of the wharf to prevent competitors from receiving gasoline shipments. Notably, each of these transactions also raised horizontal concerns that required additional divestitures to obtain the FTC's approval.

Transactions could raise horizontal concerns if they increase concentration in terminaling or wholesale marketing. For example, suppose that a refiner wants to acquire multiple blenders in an area. This transaction would reduce the number of suppliers of blending services, making the market for blending more concentrated. The Horizontal Merger Guidelines describe a measure of supplier concentration known as the Herfindahl-Hirschman Index ("HHI") that is calculated as the sum of squared supplier market shares.[35] For example, if a market is supplied by four suppliers of the same size, the HHI would be calculated as $25^2 + 25^2 + 25^2 + 25^2 = 2{,}500$. The Guidelines also set forth thresholds for post-transaction HHI levels and changes in HHIs that may indicate competitive problems.

[35] U.S. Department of Justice and Federal Trade Commission, "Horizontal Merger Guidelines," August 19, 2010.

These thresholds classify markets with HHIs below 1,500 as unconcentrated, those with HHIs between 1,500 and 2,500 as moderately concentrated, and those with HHIs above 2,500 as highly concentrated. Mergers that result in highly concentrated markets and an increase in the HHI of more than 200 points "will be presumed to be likely to enhance market power," and those that result in highly concentrated markets and an increase in the HHI between 100 and 200 points or those that result in a moderately concentrated market with an increase in HHI greater than 100 points "potentially raise significant competitive concerns and often warrant scrutiny."[36]

The table below illustrates potential downstream acquisitions that would receive scrutiny according to these standards. In the first example, a market is served by five blenders, each with a 20 percent share. If the refiner needs to buy two blenders to integrate downstream, the HHI would increase by 800 points from 2,000 to 2,800. Based on these concentration statistics, the FTC would find the merger anticompetitive unless the refiner could offer "persuasive evidence showing that the merger is unlikely to enhance market power." In the second example, a market is served by six blenders whose shares range between 16 and 18 percent. If a refiner acquired two of the smaller blenders, the HHI would increase from 1,672 to 2,184, meaning that it would warrant scrutiny according to the Guidelines standard and potentially be challenged by the FTC.

Here net costs savings may not be available because many blenders are integrated with retailers. If the refiner buys the blender but not the retailer (refiners are prohibited from owning retail outlets in some states), then the refiner eliminates double margins at the refining and wholesale stage, but creates a new double margin at the wholesale to retail stage.

[36] "Horizontal Merger Guidelines," § 5.3.

Figure 7: Changes in Blender Concentration for Hypothetical Downstream Integrations

Market A			Market B		
	Blending Shares Before Integration	Blending Shares After Integration		Blending Shares Before Integration	Blending Shares After Integration
Blender A	20%	20%	Blender A	18%	18%
Blender B	20%	20%	Blender B	18%	18%
Blender C	20%	20%	Blender C	16%	16%
Blender D	20%	0%	Blender D	16%	0%
Blender E	20%	0%	Blender E	16%	0%
Refiner	0%	40%	Blender F	16%	0%
			Refiner	0%	32%
HHI	**2,000**	**2,800**	**HHI**	**1,672**	**2,184**

The FTC has taken many enforcement actions in the terminaling and marketing segments due to increases in concentration. Since 1981, the FTC has required divestitures of terminals or required other remedies related to terminaling in at least 12 transactions.[37] Notably, the FTC appears to use a lower threshold for HHIs when evaluating mergers in the oil industry compared to other industries. From 1996 – 2011, the FTC took enforcement actions in oil industry mergers for 56 markets with post-merger HHIs below 1,800 and for 34 markets with post-merger HHIs

[37] Terminal divestitures were required in the Sun/Atlantic (1988), Shell/Texaco (1997), BP/Amoco (1998), Exxon/Mobil (1999), Chevron/Texaco (2001), Phillips/Conoco(2002), Magellan/Shell(2004), Valero/Kaneb (2005), Irving/Exxon Mobil (2011), and Tesoro/Chevron (2013) transactions. The FTC obtained a preliminary injunction to block the PRI/Shell (1987) transaction involving terminals in Hawaii and in the Kinder Morgan/Carlyle Group and Riverstone Holdings (2007) transaction involving terminals in the Southeast. See "FTC Merger Enforcement Actions in the Petroleum Industry since 1981," FTC.

between 1,800 and 2,000. In all other industries, the FTC took no enforcement actions for markets with post-merger HHIs below 2,000.[38]

The FTC has also taken enforcement actions related to marketing of light petroleum products. For example, the Shell/Texaco transaction would have increased the HHI for marketing in San Diego by 250 points to 1,815 and the FTC required a divestiture of retail outlets.

According to a GAO report, wholesale gasoline suppliers were highly concentrated in eight states as of 2007: Alaska, Hawaii, Indiana, Kentucky, Michigan, North Dakota, Ohio and Pennsylvania.[39] This high level of concentration would make it difficult for any downstream integration that would further consolidate wholesale supply in these areas.

If the FTC had serious vertical or horizontal concerns, it would not hesitate to challenge a merger even if the merger helped meet some other policy objective, such as compliance with RFS. The FTC's actions in the health care industry provide a good example. The sweeping changes brought about by the Affordable Care Act and other initiatives have brought about a wave of restructuring, including acquisitions, in order to reduce costs and better meet health care policy mandates. The FTC has not accepted these motivations as a defense for reducing competition. In fact, in 2013 the FTC filed a federal lawsuit challenging the acquisition of a physician's group by St. Luke's health system (an Idaho-based operator of hospitals and other healthcare facilities).[40] The court ruled that the acquisition violated federal and state antitrust rules, despite St. Luke's arguments that the transaction would allow it to better meet the goals of the Affordable Care Act.

[38] "Horizontal Merger Investigation Data: Fiscal Years 1996 – 2001," Federal Trade Commission, January 2013, https://www.ftc.gov/sites/default/files/documents/reports/horizontal-merger-investigation-data-fiscal-years-1996-2011/130104horizontalmergerreport.pdf.

[39] GAO, "Energy Markets: Analysis of More Past Mergers Could Enhance Federal Trade Commission's Efforts to Maintain Competition in the Petroleum Industry," GAO-08-1082, September 2008, page 29.

[40] FTC v. St. Luke's Health Sys., Case No. 01:12-cv-00560-BLW-REB (D. Idaho) (compl. filed Mar. 12, 2013).

IV. HOW MOVING THE RVO TO BLENDERS SOLVES PROBLEMS

In its 2010 Final Rule, EPA recognized the need to reconsider which entities should be the obligated party:

> "When the RFS1 regulations were drafted, the obligations were placed on the relatively small number of refiners and importers rather than on the relatively large number of downstream blenders and terminals in order to minimize the number of regulated parties and keep the program simple. However, with the expanded RFS2 mandates, essentially all downstream blenders and terminals are now regulated parties under RFS2 since essentially all gasoline will be blended with ethanol. Thus the rationale in RFS1 for placing the obligation on just the upstream refiners and importers is no longer valid…
>
> We will continue to evaluate the functionality of the RIN market. Should we determine that the RIN market is not operating as intended, driving up prices for obligated parties and fuel prices for consumers, we will consider revisiting this provision in future regulatory efforts."[41]

Moving the obligated party from the refiner and importer to the owner of gasoline or diesel fuel at the rack would improve the market efficiency by creating a situation whereby the obligated party has greater control over the type of fuel that is produced and sold in the market and thus can influence the number of RINs created. It would also create a situation where incentives of the RFS2 program become closely aligned with those of the obligated party.

A. Policy Misspecification

The RFS2 program directly influences only the behavior of the obligated party, which frequently is not the party that decides whether to sell E0, E10, or E85. Currently RFS2 requires each year that refiners and importers, the obligated parties, show evidence that a specified volume of renewable fuels are incorporated into their petroleum blendstock to produce finished gasoline and diesel even though the refiners and importers do not necessarily blend the renewable and petroleum blendstocks. RINs are used as evidence of compliance to meet the obligated party's RVOs after being separated from the renewable fuel. So the party being regulated does not control the production of the product - RINs - that demonstrates compliance.

The current design of the regulatory enforcement of RFS2 is analogous to placing the burden of meeting fuel economy standards on the parts suppliers to automobile manufacturing companies, rather than on the automobile manufacturers themselves who decide the final vehicle design including its miles per gallon. Just as CAFE standards place the burden on the manufacturers of

[41] 14722 Federal Register/Vol. 75, No. 58/Friday, March 26, 2010/Rules and Regulations.

the product responsible for meeting the standards – the vehicle – the RFS2 policy should place the RVOs on the parties that produce, price, and sell the different finished fuels that contain the product being regulated (i.e., the renewable fuel). In order to correct this misspecification with RFS2, regulators should change the obligated party from the refiners and importers to the blenders who mix petroleum blendstocks with renewable fuels to produce the finished product and are the party authorized to separate the RINs from the renewable fuel.

B. Incentives and E85 Infrastructure

Meeting increasing percentage standards for total renewable fuels requires greater levels of E85 sales, which requires new infrastructure investment by terminals and retailers. Terminals need to add or dedicate tanks and injection equipment to blend ethanol with the BOB used for E85. Retailers would need to add storage tanks and E85 pumps. Under the current regulatory design, blenders and retailers have little incentive to make the necessary level of investment because under RFS2 they do not have any obligation to blend fuels with higher concentrations of renewable fuels. As a result investment in E85 infrastructure has not been occurring. Because blenders have little incentive to produce E85, terminals have little incentive to invest in E85 blending infrastructure and retailers have little incentive to invest in E85 retailing infrastructure to dispense E85 to consumers.

C. Volatility of RIN Prices as a Reason for Under Investment

It was envisioned that the additional revenues that blenders would receive for the sale of RINs would stimulate blenders to reduce the price of high ethanol content gasoline to increase the sales of high ethanol content fuel relative to low ethanol content fuels. But that has not happened. Uncertainty in future RIN prices creates doubts among investors whether or not investments with high front end commitments will be successful. Uncertainty is highly correlated with volatility so the high volatility of RIN prices means that there is great uncertainty around RIN prices (see Figure 4). All else being equal, the level of investment is inversely proportional to risk or uncertainty.

If the blender is made the obligated party, RIN price volatility is likely to be smaller because blenders in contrast to refiners and importers have direct control over the number of RINs produced through the mix of different types of finished fuel (E0, E10, E15, E85 and B5-B20) that they choose to produce and sell.

The farther removed the obligated party is from the party that faces the capital investment decision and hence handles the uncertainty; the less likely the capital investment will be made. Thus, changing the obligated party from the refiner and importer to the blender reduces RIN price volatility and hence lowers the barriers to invest in the needed infrastructure for higher content renewable fuel blends (E15, E85 and B5-B20). Since increased sales of higher

renewable fuel blends are needed, a policy that directly incentivizes the sale of higher blends is better than a policy that has a diffuse incentive for renewable fuels to be blended.

D. Aligning Incentives in the Industry for Decision Maker on Blending and Sales

When the obligated party is the refiner or importer, the policy is rather blunt as the obligated parties are essentially demanding gallons of renewable fuels to be blended. Thus, they have no control over whether these RINs come from the production of E10, E85, or B5-B20. But if the obligation falls on the blenders, then regulators provide a direct incentive to produce higher level blends (E15 and E85) or additional advanced renewable fuel blends (B5-B20) as these fuels generate more RINs for the obligated party, namely the blender.

Put differently, when the obligation falls on the refiner/importer, there is a separation between the party needing RINs and the party producing the RINs. Changing the regulatory structure so the obligated party and the party that obtains RINS as it blends fuels are the same can only increase the incentive to generate RINs and improve the efficiency of the regulation. Therefore, regulators could increase the incentive to generate RINs by changing the obligated party to be the blender.

E. Removing Discriminatory Burden on One Class of Refiner

The merchant refiner is at a disadvantage because it has no facilities that produce RINs so it must go to the market to purchase all its RINs. Thus it must pay a bid-ask spread and commission on every RIN it purchases, which puts the merchant at a strategic disadvantage to the integrated refiners.

F. Removing Disincentives from the Installation of Blending Infrastructure

Moving the obligated party from the refiner and importer to the blender will improve market penetration of renewable fuels, via the installation and expansion of terminal blending infrastructure. Under the current point of obligation, the blender, who is by definition the terminal owner-operators customer, directly impacts the operator's capital projects, including the expansion and installation of renewable fuels infrastructure. The upgrade and installation of renewable fuel blending projects can cost millions of dollars and terminal owner-operators need the financial commitment of blenders to proceed with capital investments. However, because not all blenders are obligated parties under the RFS, critical consensus for investing may never mature. This can delay or foreclose the necessary investments in renewable fuels blending infrastructure. This would not happen if all of the terminal customers were equally obligated to blend renewable fuels, as the terminal would recognize uniform demand for the investment in blending infrastructure, access to project economy of scale, and improve market competition by leveling the playing field at the terminal. Improving the market conditions for biofuels is especially critical for the viability of RFS2 as the industry confronts the blend wall and increased

biomass based diesel obligations and additional capital or marketing is required to generate the RINs necessary to meet EPA's goals of increasing renewable fuels consumption.

G. Increasing Liquidity of the RIN Market

There could be an issue with the purchasing of RINs if the market is thin, which is increasingly the case based on EPA's latest NPRM and its forward looking statements regarding surpassing the blend wall. A thin market will force the uncovered obligated parties to pay significantly more for RINs to cover the larger bid-ask spread. But if the obligated party were to move to the blender, then fewer transactions would be required, and the blenders who are short RINs would have two options for compliance: purchase RINs or blend more biofuels. Thus, there would be a natural arbitrage that would likely tighten the bid-ask spread and hence lower costs of compliance. Thus blenders would not be at the mercy of the RIN market.

H. Eliminating an Unintended Export Subsidy

Under the current policy, a refiner must acquire RINs for all gallons of fuel that are sold domestically, but not for fuels that are exported. Since exported fuels command the same price in the Gulf Coast as fuels sold domestically, the refiner can clearly make more by exporting than by selling domestically. The transaction costs associated with RINs portfolio management are also avoided by exports, thus increasing the incentive. The blender, on the other hand, would gain no advantage from selling gasoline for export at the same price it purchased it from a refiner. Thus moving the RIN obligation downstream would eliminate the incentive to export.

I. Concern about Lack of Blendstocks Unwarranted

Arguments have been made that moving the obligation from the manufacturers and importers to blenders will remove all incentives for producing the necessary blendstocks (e.g., correctly specified BOBs) that can be blended with renewable fuels to produce a product that can be sold lawfully. This issue would be resolved by making those entities that produce finished products into obligated parties, for example by defining an obligated party to be any entity that holds title to gasoline or diesel fuel prior to transfer across the rack to retail outlets or wholesale purchasers/consumers for distribution.

Defining obligated parties this way means that importers and refiners will have the same incentive as under the current system to produce blendstocks that can be blended with renewable fuel to produce a product that can be sold lawfully. For generating a fuel that cannot be blended means generating a finished product that has no biofuels. Doing so will leave the refiner or importer with a financial obligation to purchase RINs. Therefore, the RINs will induce the refiners and importers to produce blendstocks rather than finished products.

J. Allowing for Increasing RVOs

Moving the obligated party from the refiner and importer to the blender would improve the market efficiency by creating a situation whereby the obligated party has greater control over the renewable fuels blending infrastructure and therefore, the type of fuel that is produced and sold in the market and thus can influence the number of RINs created. It would also create a situation where incentives of the RFS2 program become closely aligned with those of the obligated party.

K. Returning design of RINs Market to the Standard Form for Emission Trading

The purpose of environmental markets is not to promote trading *per se* but rather to achieve the environmental objective in the most cost-effective way.[42] The natural way to do this is to endow each of the parties responsible for the activity being regulated, in this case the sale of fuels containing a mixture of ethanol and gasoline, with credits equal to the physical requirement it must meet. Each party that meets the physical requirement will have no need to trade. Trading occurs only when it is more costly for one regulated party to comply than another, but each regulated party has control over the means of compliance. Thus even if the allowance market breaks down or is highly inefficient, the outcome is no worse than a uniform regulation without trading. This is an important safeguard.

The RIN system eliminates this safeguard, by necessitating trading by any regulated entity (obligated party in the RIN idiom) that does not also blend ethanol into gasoline. Data presented in this report demonstrate that a large percentage of obligated parties fall into this category. They have no physical capacity to comply with the requirement, and therefore must trade no matter how thin or distorted the market becomes. The problem of the blend wall that was not anticipated at the time the RIN system was devised has made the market dysfunctional, for the reasons we describe. Returning to the natural system of allocating allowances to the party with actual control of the compliance method removes these problems.

[42] W. D. Montgomery, "Markets in Licenses and Efficient Pollution Control Programs" Journal of Economic Theory, 1971.

NERA
ECONOMIC CONSULTING

NERA Economic Consulting
1255 23rd Street NW
Washington, DC 20037
Tel: +1 202 466 3510
Fax: +1 202 466 3605

www.nera.com