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The Renewable Fuel Standard (RFS): In Brief

Kelsi Bracmort

Specialist in Agricultural Conservation and Natural Resources Policy

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Introduction

The Renewable Fuel Standard (RFS), which mandates that U.S. transportation fuel must contain a minimum volume of biofuel, is a federal statutory requirement.¹ The mandated minimum volume increases annually and can be met using both conventional biofuel (e.g., cornstarch ethanol) and advanced biofuels. In order for a biofuel to be applied toward the mandate, it must be used for certain purposes (transportation fuel, jet fuel, or heating oil) and meet certain environmental and biomass feedstock criteria. A variety of factors (e.g., infrastructure, technology, weather, the *blend wall*, and federal assistance) have led to challenges. These challenges include delays by the Environmental Protection Agency (EPA) in setting the annual volume standards and a lack of cellulosic biofuel production. Further, it is not clear how declining oil and gasoline prices will impact the biofuel industry. Challenges in implementing the RFS have led to investigations of the RFS by some in Congress and to court rulings on EPA's regulations.² Because of concerns about the implementation and feasibility of the RFS, some Members of Congress have questioned whether it is time to amend or repeal the RFS, or whether the best course is to maintain the status quo.³

This report provides a basic description of the RFS, including some of the widely discussed issues.⁴

¹ 42 USC 7545(o).

² More specifically, the 113th Congress held seven hearings in which the RFS or renewable fuels was the focus or a recurring topic of discussion, and since 2010 there have been five legal challenges regarding EPA's administration of the RFS. U.S. Congress, House Committee on Oversight and Government Reform, Subcommittee on Energy Policy, Health Care and Entitlements, *Examining EPA's Management of the Renewable Fuel Standard Program*, 113th Cong., December 10, 2014; U.S. Congress, House Committee on Agriculture, Subcommittee on Livestock, Rural Development, and Credit, *To Review the State of the Livestock Industry*, 113th Cong., April 30, 2014; U.S. Congress, Senate Committee on Agriculture, Nutrition, and Forestry, *Advanced Biofuels: Creating Jobs and Lower Prices at the Pump*, 113th Cong., April 8, 2014; U.S. Congress, Senate Committee on Environment and Public Works, Subcommittee on Clean Air and Nuclear Safety, *Oversight Hearing on Domestic Renewable Fuels*, 113th Cong., December 11, 2013; U.S. Congress, House Committee on Energy and Commerce, Subcommittee on Energy and Power, *Overview of the Renewable Fuel Standard: Stakeholder Perspectives*, 113th Cong., July 23, 2013; U.S. Congress, House Committee on Energy and Commerce, Subcommittee on Energy and Power, *Overview of the Renewable Fuel Standard: Government Perspectives*, 113th Cong., June 26, 2013; U.S. Congress, House Committee on Oversight and Government Reform, Subcommittee on Energy Policy, Health Care and Entitlements, *Up Against the Blend Wall: Examining EPA's Role in the Renewable Fuel Standard*, 113th Cong., June 5, 2013; *Monroe Energy, LLC v. EPA*, 750 F.3d 909 (D.C. Cir. 2014); *American Petroleum Institute v. EPA*, 706 F.3d 474 (D.C. Cir. 2013); *Vinmar Overseas, Ltd. v. OceanConnect, LLC*, 2012 Westlaw 3599486 (S.D. Tex. Aug. 20, 2012), 2012 Westlaw 5989206 (S.D. Tex. Nov 29, 2012); *Grocery Manufacturers Association v. EPA*, 693 F.3d 169 (D.C. Cir. 2012); *National Petrochemical & Refiners Association v. EPA*, 630 F.3d 145 (D.C. Cir. 2010).

³ U.S. Congress, Senate Committee on Homeland Security and Governmental Affairs, Subcommittee on Regulatory Affairs and Federal Management, *Re-examining EPA's Management of the Renewable Fuel Standard Program*, 114th Cong., 1st sess., June 18, 2015; Senate Energy and Natural Resources Committee, "Sen. Murkowski Comments on EPA Delay of RFS Standard," press release, November 21, 2014; Senator Chuck Grassley, "Grassley, Harkin Join Bipartisan Group in Calling on EPA to Revise Renewable Fuel Standard," press release, January 23, 2014. Additionally, legislation was proposed in the 113th Congress that would have amended or repealed the RFS (e.g., H.R. 550, H.R. 796, H.R. 1461, H.R. 1462).

⁴ This report presents information that can be found in more detail in CRS Report R40155, *Renewable Fuel Standard (RFS): Overview and Issues*.

The Statute

The RFS was established by the Energy Policy Act of 2005 (P.L. 109-58; EPL05) and expanded in 2007 by the Energy Independence and Security Act (P.L. 110-140; EISA). The RFS mandate requires that transportation fuel sold or introduced into commerce in the United States contain an increasing volume of a predetermined suite of fuels (the statute requires 4.0 billion gallons of renewable fuel in 2006, ascending to 36.0 billion gallons in 2022, with EPA determining the volume amounts after 2022 in future rulemaking). The statute identifies four renewable fuel categories: conventional biofuel, advanced biofuel, cellulosic biofuel, and biomass-based diesel, each with its own target volume in the statute. To date, the total annual volumes required have been met mostly with conventional biofuel (e.g., cornstarch ethanol). In later years, the mandate holds steady the conventional biofuel volume amounts and increases the requirement of advanced biofuels. For instance, the RFS cellulosic biofuel requirement increases over time from less than 1% of the RFS in 2010 to 44% of the RFS in 2022.⁵ The statutory language does not explicitly mandate the production of biofuels; rather, it mandates the use of biofuel. However, it could be argued that it is difficult to use a fuel that is not being produced, and that the RFS therefore indirectly does mandate the production of certain biofuels.

Statutory Compliance

The EPA regulates compliance with the RFS using a tradable credit system.⁶ Obligated parties⁷ submit credits—called renewable identification numbers (RINs)⁸—to EPA that equal the number of gallons in their annual obligation.⁹ This annual obligation, referred to as the renewable volume obligation (RVO), is the obligated party’s total gasoline and diesel sales multiplied by the annual renewable fuel percentage standards announced by EPA.¹⁰ RINs are valid for use in the year they are generated and the following year.¹¹ Further, obligated parties may carry a deficit from one year to the next but, in the year following the deficit, the obligated party must meet compliance

⁵ Calculations include the annual mandate required by statute in 2007 and do not take into account EPA’s revision of the cellulosic biofuel mandate that occurred for 2010, 2011, 2012, and 2013, and proposed for 2014, 2015, and 2016. EPA is statutorily obligated to revise the cellulosic mandate downward if the agency finds there is insufficient domestic supply.

⁶ 42 USC 7547(o)(5).

⁷ EPA reports that an obligated party is any refiner that produces gasoline or diesel fuel within the 48 contiguous states or Hawaii, or any importer that imports gasoline or diesel fuel into the 48 contiguous states or Hawaii during a compliance period.

⁸ A RIN is a unique 38-character number that is issued (in accordance with EPA guidelines) by the biofuel producer or importer at the point of biofuel production or the port of importation. Each qualifying gallon of renewable fuel has its own unique RIN.

⁹ For more information, see CRS Report R42824, *Analysis of Renewable Identification Numbers (RINs) in the Renewable Fuel Standard (RFS)*.

¹⁰ For 2013, the overall renewable fuel standard was 9.74%, the advanced biofuel standard was 1.62%, the biomass-based diesel standard was 1.13%, and the cellulosic biofuel standard was 0.004%. U.S. Environmental Protection Agency, “Regulation of Fuels and Fuel Additives: 2013 Renewable Fuel Standards; Final Rule,” *78 Federal Register* 158, August 15, 2013. EPA has not yet finalized the 2014 or 2015 standards.

¹¹ §80.1427(6)(i) in the EPA RFS regulations. Exporters of renewable fuel may use RINs generated in the previous year to meet up to 20% of their current year exporter renewable volume obligation. U.S. Environmental Protection Agency, “RFS Renewable Identification Number (RIN) Quality Assurance Program; Final Rule,” *79 Federal Register*, July 18, 2014.

for that year's renewable fuel volume requirement and purchase or generate enough credits to satisfy the deficit from the previous year.¹² RINs may be used by the party that generates them or they may be traded with other parties. The EPA Moderated Transaction System (EMTS) is used to register RIN transactions.

Differences Between the 2005 RFS and the 2007 RFS

The RFS was established in 2005 by the Energy Policy Act. Specifically, Section 1501 (Renewable Content of Gasoline) of EPAAct05 amended Section 211 of the Clean Air Act (CAA) by adding a Renewable Fuel Program. CAA Section 211 requires any gasoline and diesel fuel and fuel additives produced and commercially distributed for use in highway motor vehicles to be registered with EPA. Section 1501 directed the EPA Administrator to ensure that gasoline sold or introduced into commerce in the United States contained a volume of renewable fuel. This "original" 2005 RFS required 4.0 billion gallons of renewable fuel for 2006, ascending to 7.5 billion gallons by 2012. The amount of renewable fuel was described in EPAAct05 for the years 2006 through 2011. Beginning in 2013, the annual volume of renewable fuel was to be determined by the EPA Administrator and the Secretaries of Agriculture and Energy. Additionally, the RFS established in EPAAct05 would have required that 250 million gallons of the renewable fuel be derived from cellulosic biomass starting in 2013.

The RFS was expanded in 2007 by the Energy Independence and Security Act. There are at least five major changes in the RFS as expanded by EISA:

- much larger annual volumes,
- the establishment of separate requirements for different classes of biofuels (e.g., cellulosic, advanced),
- the addition of greenhouse gas accounting requirements,
- a more selective renewable biomass definition, and
- an expansion of EPA's waiver authority to lower RFS volumes.

The renewable biomass definition for the 2007 RFS does not allow for biomass removed from federal lands, and excludes crops from forested lands. Further, the 2007 RFS waiver authority directs the EPA Administrator to set the annual standard for cellulosic biofuels under the RFS for the following year by November 30 of each year, and to lower the cellulosic biofuel standard if projected production is less than the volume in the statute. The 2007 RFS waiver authority also allows the EPA Administrator to reduce the renewable fuel and advanced biofuel requirements of the standard, if the cellulosic biofuel requirement is lowered.

Different biofuels are not treated equally within the RFS, meaning that some biofuels can be used to meet the annual standard for multiple RFS categories. The categories are nested within each other, such that some fuels qualify for multiple categories (e.g., cellulosic ethanol), while others (mainly cornstarch ethanol) may only be used to meet the overall RFS but not the advanced category or its nested subcategories. For example, a gallon of cellulosic biofuel may be used to meet the cellulosic biofuel mandate, the advanced biofuel mandate, and the overall RFS, possibly making it a more highly-valued fuel.¹³

A key part of the definition of each fuel category is whether the fuel achieves certain greenhouse gas (GHG) reductions relative to gasoline and diesel fuel. Each fuel is assigned a lifecycle GHG emission threshold (in proportion to baseline lifecycle GHG emissions for gasoline and diesel).¹⁴ For example, a fuel must achieve at least a 50% GHG reduction to be considered an "advanced

¹² 42 USC 7547(o)(5)(D).

¹³ The value of any biofuel within the RFS depends on the RIN price at a given time. As different categories of RINs are used to meet the various standards, there is often a price difference between RINs (e.g., advanced biofuel RINs are generally more expensive than conventional RINs).

¹⁴ For more information, see CRS Report R40460, *Calculation of Lifecycle Greenhouse Gas Emissions for the Renewable Fuel Standard (RFS)*.

biofuel,” at least a 60% reduction to be considered a “cellulosic biofuel,” and at least a 50% reduction to be considered “biomass-based diesel.” Similarly, biofuel from new facilities must achieve at least a 20% GHG reduction to qualify as a generic renewable fuel.

In addition, some biofuels generate more RINs per volume than others because of the equivalence value (EV) of the biofuel. Biofuels vary in energy content, and the EV takes this into account.¹⁵ The EV of a renewable fuel represents the number of gallons that can be claimed for compliance purposes for every physical gallon of renewable fuel used, and it is generally the ratio of the energy content of a gallon of the fuel to a gallon of ethanol. For example, because biodiesel has an EV of 1.5 when being used as an advanced biofuel,¹⁶ 1,000 physical gallons of biodiesel would equal 1,500 RIN gallons of advanced biofuels.

The 2014, 2015, and 2016 RFS Proposed Rule

Each year, EPA is to issue the annual RFS standards partly so that obligated parties can plan for mandate compliance. Before finalizing an annual standard by November 30 of the preceding year, as required by the statute, EPA issues a proposed rule to explain its rationale for the renewable fuel volumes that will be required for the coming year and gather public comment. EPA has been late in issuing the annual standards.¹⁷ On May 29, 2015, EPA issued a three-year proposed rule for the RFS for 2014, 2015, and 2016, with the intent to finalize the rule by November 30, 2015, which could put the program back on its statutory schedule for the 2016 calendar year.¹⁸

EPA proposes to reduce the total renewable fuel volume compared with the volume identified in statute for all three years.¹⁹ Total renewable fuel for the RFS consists of conventional biofuel (e.g., cornstarch ethanol) and advanced biofuel (e.g., cellulosic biofuel, biomass-based diesel, and other advanced biofuels). This proposed rule is unique in that it is the first time EPA has proposed to reduce the share of the RFS for conventional biofuels. It is also unique because it reduces the total advanced biofuel category, whereas in previous years only the cellulosic biofuel component was reduced and other advanced biofuels were allowed to make up for the cellulosic biofuel reduction.

EPA intends to use its waiver authority to reduce the volume amounts for 2014, 2015, and 2016 for total renewable fuel and advanced biofuel.²⁰ EPA reports that the volume reductions are necessary due to

¹⁵ 40 CFR 80.1415.

¹⁶ All EVs are in relation to the energy content of ethanol. The EV for ethanol is 1.0. One gallon of biodiesel contains roughly 1.5 times the energy of one gallon of ethanol, and thus has an EV of 1.5.

¹⁷ For more information on EPA’s delayed issuance of the annual standards, see the “Administering Agency” section of this report.

¹⁸ U.S. Environmental Protection Agency, “Renewable Fuel Standard Program: Standards for 2014, 2015, and 2016 and Biomass-Based Diesel Volume for 2017; Proposed Rule,” 80 *Federal Register*, June 10, 2015.

¹⁹ The proposed rule contains other major actions (e.g., rescinding the cellulosic biofuel standard for 2011). However, the reduction of the total renewable fuel volume amount and EPA’s reasoning for the reduction (e.g., the blend wall, lack of certain types of advanced biofuel production) is viewed as the most significant action in the proposed rule by many stakeholders.

²⁰ For more information on waiver authority, see CRS Report R44045, *The Renewable Fuel Standard (RFS): Waiver Authority and Modification of Volumes*.

substantial limitations in the supply of cellulosic biofuel, insufficient supply of other advanced biofuel to offset the shortfall in cellulosic biofuel, and practical and legal constraints on the supply of ethanol blends to the vehicles that can use them (in the form of E10, E15, and higher level ethanol blends), driven in part by lower gasoline consumption than was expected in 2007 when the target statutory volumes were established.²¹

Table I. Renewable Fuel Standard Statute, EPA Final and Proposed Volume Amounts
(in billions of gallons)

	2010		2011		2012		2013	
	S	F	S	F	S	F	S	F
Total Renewable Fuel	12.95	12.95	13.95	13.95	15.2	15.2	16.55	16.55
Cap on Conventional Biofuel	12	12	12.6	12.6	13.2	13.2	13.8	13.8
Total Advanced Biofuels	0.95	0.95	1.35	1.35	2	2	2.75	2.75
Cellulosic	0.1	0.0065	0.25	0.006	0.5	0.0105 ^a	1	0.0008
Biomass-Based Diesel	0.65	1.15	0.8	0.8	1	1	≥1	1.28
Date of Final Rule	Nov 2009	Feb 2010	Nov 2010	Nov 2010	Nov 2011	Dec 2011	Nov 2012	Aug 2013
	2014		2015		2016		2017	
	S	P	S	P	S	P	S	P
Total Renewable Fuel	18.15	15.93	20.5	16.3	22.25	17.4	24	TBD
Cap on Conventional Biofuel	14.4	13.25	15	13.4	15	14	15	TBD
Total Advanced Biofuels	3.75	2.68	5.5	2.9	7.25	3.4	9	TBD
Cellulosic	1.75	0.033	3	0.106	4.25	0.206	5.5	TBD
Biomass-Based Diesel	≥1	1.63	≥1	1.7	≥1	1.8	≥1	1.9
Date of Final Rule	Nov 2013	TBD (Nov 2015)	Nov 2014	TBD (Nov 2015)	Nov 2015	TBD (Nov 2015)	Nov 2016	TBD

Source: Energy Independence and Security Act of 2007 (EISA; P.L. 110-140); Contact the author for EPA final and proposed rule citations.

Notes: S = Statute, F = Final, P = Proposed, TBD = To be determined by EPA. All volumes are ethanol equivalent, except for biomass-based diesel, which is actual. The 2010 biomass-based diesel requirement of 1.15 billion gallons equals the 0.5 billion gallon requirement for 2009 plus the 0.65 billion gallon requirement for 2010.

a. RFS Final Rule 2012, *Federal Register*, January 9, 2012. Subsequently vacated under *American Petroleum Institute v. EPA*.

²¹ U.S. Environmental Protection Agency, “Renewable Fuel Standard Program: Standards for 2014, 2015, and 2016 and Biomass-Based Diesel Volume for 2017; Proposed Rule,” 80 *Federal Register*, June 10, 2015.

Considerations

Implementation of the RFS has been complex, and compliance with some of its parts has been challenging. These challenges have raised concerns with many stakeholders. This section briefly explains some of the general issues and associated challenges.

Administering Agency

EPA administers the RFS.²² This includes evaluating renewable fuel pathways eligible for the RFS.²³ In addition, EPA must evaluate the ability of the biofuel industry to produce enough fuel to meet the annual volume standard, release an annual volume standard based on its research findings,²⁴ and ensure that annual compliance by obligated parties is met. All of the above must be completed within a one-year time frame, taking into consideration comments from other government agencies, the public, and, recently, court decisions. These responsibilities could be viewed as a significant addition to EPA's regulatory workload, and they have required EPA to develop new capabilities in order to carry them out. It is not clear, more than five years after the 2010 issuance of the amended RFS final rule,²⁵ whether EPA has those capabilities, in large part because it must rely on critical information from the very biofuel plants that it is evaluating.

One of the concerns some have raised is the accuracy of EPA's projections of the annual renewable fuel production capacity. Using its waiver authority,²⁶ the EPA may lower the volume requirements for biofuels if the projected production is lower than what is in the statute. For instance, EPA used this waiver authority to consistently lower the cellulosic biofuel mandate from 2010 to 2013, and it has proposed to do so again for 2014, 2015, and 2016 because industry has yet to meet the mandate.²⁷ Legal challenges have been brought against the EPA regarding its annual fuel volume projections. For instance, the American Petroleum Institute objected to EPA's 2012 cellulosic biofuel production projection, among other things, and challenged it in court. The federal court vacated the 2012 cellulosic biofuel standard and provided principles that EPA will have to apply to future annual projections.²⁸

²² Although the RFS is administered by EPA, programs under other federal departments may indirectly assist biofuel production that may be used to meet the mandate. For example, the U.S. Department of Agriculture provides resources and support for biofuel feedstock development and supply (e.g., Biomass Crop Assistance Program) as well as biofuel infrastructure development (e.g., Rural Energy for America Program, Biorefinery Assistance Program, etc.).

²³ A fuel pathway consists of three components: a biomass feedstock, a biofuel production process, and a fuel type (e.g., ethanol made from cornstarch using a dry mill production process). The fuel pathway is assigned to a renewable fuel category (known by its D code provided in Table 1 of § 80.1426 in the RFS regulations) which signifies which RIN the biofuel is eligible for to be in compliance with the RFS. EPA maintains a list of approved fuel pathway and fuel pathway petitions on its website.

²⁴ On occasion, EPA has approved annual standards for some biofuels different from what was originally scheduled in statute.

²⁵ Environmental Protection Agency, "Regulation of Fuels and Fuel Additives: Changes to Renewable Fuel Standard Program; Final Rule," 75 *Federal Register*, March 26, 2010.

²⁶ For more information, see CRS Report R44045, *The Renewable Fuel Standard (RFS): Waiver Authority and Modification of Volumes*, by Kelsi Bracmort.

²⁷ U.S. Environmental Protection Agency, "Renewable Fuel Standard Program: Standards for 2014, 2015, and 2016 and Biomass-Based Diesel Volume for 2017; Proposed Rule," 80 *Federal Register*, June 10, 2015. EPA has not yet finalized the 2014 standard.

²⁸ American Petroleum Institute v. EPA, 706 F.3d 474 (D.C. Cir. 2013). More information about this legal challenge is (continued...)

Another pressing issue for EPA is the timing of the annual announcement of the volume requirements. For the last five years, EPA has announced the final rule on time for the RFS standards for the following year only once.²⁹ Even if EPA is exercising the highest level of due diligence and using the most dedicated suite of federal resources, the agency's lack of timely rulemaking and inaccurate volume projections can affect private investment. An additional concern is the amount of time it takes the agency to approve new fuel pathways.

Qualifying Biofuels

One potentially confusing aspect of the RFS is understanding which biofuel is eligible for which part of the mandate.³⁰ There are a number of nested categories within the RFS, and a fuel may qualify as a biofuel for one or more portions of the mandate.³¹ Difficulty in understanding which advanced biofuels qualify for the RFS can lead to more difficulty in determining how compliance is being met.

Not all fuels from a renewable source are eligible biofuels under the RFS. The RFS operates as a biofuel standard, with priority assigned to liquid transportation fuels from biomass feedstocks.³² Other renewable sources (e.g., wind) do not qualify. Notably, imported biofuels that meet the biomass feedstock qualifications and GHG reduction thresholds are eligible to meet the RFS volume requirements (e.g., Brazilian sugarcane ethanol). Before a fuel can generate RFS RINs, that fuel pathway must be approved by EPA, a process that can take a considerable amount of time.

Cellulosic Biofuel Production

Cellulosic biofuel is the fuel category poised to comprise nearly half of the total renewable fuel mandate in 2022. However, the annual cellulosic biofuel production volume established by Congress is not being met, and actual cellulosic biofuel production volumes (e.g., cellulosic ethanol) are below expectations. This is due to several factors, including lack of private investment, technology setbacks, and uneven support from the federal government (among other

(...continued)

provided in CRS Report R41106, *The Renewable Fuel Standard (RFS): Cellulosic Biofuels*.

²⁹ Under the CAA, each year's standards are required to be announced by November 30 of the previous year. EPA's late announcement of the annual requirements may be due to the depth of the analysis (e.g., difficulty in obtaining reliable and timely information from the industry) or to other factors.

³⁰ For example, there were questions by some about the eligibility of algae-based biofuels for the RFS. For more information, see CRS Report R42122, *Algae's Potential as a Transportation Biofuel*.

³¹ Approved RFS fuels and feedstocks are provided by EPA at <http://www.epa.gov/otaq/fuels/renewablefuels/new-pathways/approved-pathways.htm>.

³² In July 2014, EPA approved new cellulosic and advanced biofuel pathways to include the production of compressed natural gas, liquefied natural gas, and electricity from biogas from landfills, municipal waste-water treatment facility digesters, agricultural digesters, and separated municipal solid waste digesters. Another category of a compliant fuel for the RFS is heating oil—fuel oils which are produced from qualifying renewable biomass and used to generate heat to warm buildings or other facilities where people live, work, recreate, or conduct other activities. U.S. Environmental Protection Agency, "Regulation of Fuels and Fuel Additives: RFS Pathways II, and Technical Amendments to the RFS Standards and E15 Misfueling Mitigation Requirements; Final Rule," 79 *Federal Register* 138, July 18, 2014. U.S. Environmental Protection Agency, "Regulation of Fuels and Fuel Additives: Modifications to Renewable Fuel Standard Program," 78 *Federal Register*, October 22, 2013.

factors).³³ These factors, coupled with the fact that annual volumes in the statute were established when market conditions for raising investment capital for new biofuel technologies were more favorable, may indicate unrealistic targets for some advanced biofuels for the near future.

EMTS data indicate a significant jump in the number of cellulosic biofuel RINs issued for cellulosic biofuel production in 2014. A majority of the cellulosic biofuel RINs produced are for two new pathways approved by the EPA in 2014: cellulosic renewable compressed natural gas and cellulosic renewable liquefied natural gas.

RIN Market³⁴

The RFS created a market for RINs, which may be traded and sold like other commodities. If a party has RINs beyond those it needs for compliance in a given year, that party may bank the RINs for the following year, or sell the RINs to other parties.³⁵ Two key questions have been raised about the RIN market and how the system operates: (1) what safeguards are in place to prevent fraud in the system; and (2) what safeguards exist to prevent volatility and excessively high RIN prices?

RINs are currently a largely unregulated market, although various stakeholders are considering ways to increase regulation and oversight of the market. EMTS is the clearinghouse for RIN transactions registered with the EPA; trading parties are responsible for all due diligence. Under this “buyer beware” system, trading parties must verify the legitimacy of the RINs they are selling or purchasing. The parties are responsible for any fraudulent RINs they pass on to other buyers or submit to EPA for compliance.³⁶ In the past, questions have been raised about the validity of the RINs due to fraudulent activity that occurred in the biodiesel RIN market in 2010 and 2011. EPA has since taken steps to establish a voluntary quality assurance program (QAP) for verifying the validity of RINs.³⁷

While the QAP could help prevent RIN fraud going forward, concerns over high prices and volatility remain. Starting in January 2013, spot prices for conventional ethanol RINs rose dramatically through the first half of the year, spiking to particularly high prices in mid-March and mid-July. After mid-July 2013, when the possibility was raised by some stakeholders that the 2014 obligations might be lowered, prices dropped steadily. Some stakeholders have questioned the level of transparency surrounding RIN transactions and the role of non-fuel market players. The March 2013 spike in RIN prices led some lawmakers, as well as stakeholders in the petroleum, livestock, and other industries, to request EPA’s intervention in the RIN market to help lower RIN prices.³⁸ However, others, including biofuel proponents and many economists, have

³³ For more information, see CRS Report R41106, *The Renewable Fuel Standard (RFS): Cellulosic Biofuels*.

³⁴ This section prepared by Brent Yacobucci, CRS Section Research Manager. For more information on the RIN market, see CRS Report R42824, *Analysis of Renewable Identification Numbers (RINs) in the Renewable Fuel Standard (RFS)*.

³⁵ It should be noted that the RIN market is not limited to obligated parties. Individuals and companies that are not involved with fuel production and/or supply may also own, buy, and sell RINs.

³⁶ Obligated parties who purchase fraudulent RINs must pay fines for each RIN submitted, and must submit valid RINs to offset the fraudulent RINs.

³⁷ Environmental Protection Agency, “RFS Renewable Identification Number (RIN) Quality Assurance Program; Final Rule,” *79 Federal Register* 42078, July 18, 2014.

³⁸ See, e.g., Letter from The Honorable David Vitter, Ranking Member, Senate Committee on Environment and Public (continued...)

argued that high RIN prices are a necessary market signal to promote the development of new fuels and infrastructure that otherwise would be uneconomical.³⁹ Biofuel proponents and others also have observed that the volume of trade on which RIN prices are based is an important indicator that is not disclosed. RIN price fluctuations similar to what occurred in 2013 were not observed in 2014.

Blend Wall

The *blend wall*—the upper limit to the total amount of ethanol that can be blended into U.S. gasoline and still maintain automobile performance and comply with the Clean Air Act—is viewed by many to be in direct conflict with the biofuel volumes mandated in the RFS.⁴⁰ Thus far, the largest volume being met under the RFS is for the non-advanced (conventional) biofuel segment of the mandate, and this has been met mainly with cornstarch ethanol blended into gasoline. Due to a variety of factors, ethanol content in gasoline is generally limited to 10% (E10). With a relatively fixed supply of gasoline, the amount of ethanol that can be supplied this way is also limited. If the ethanol content of gasoline remains at 10%, and depending on fuel consumption rates, in the near future the RFS may actually require more ethanol than can technically be blended into gasoline. If ethanol remains the primary biofuel produced to meet the RFS, at some point the blend wall would have to be addressed or the scheduled levels of biofuels in the RFS would not be achievable. The EPA proposed to reduce the 2014, 2015, and 2016 advanced biofuel and total renewable fuel standards below what was in the statute, acknowledging that the blend wall is a concern.⁴¹ EPA announced that it intends to finalize the 2014, 2015, and 2016 standards by November 30, 2015. In the longer term, the development of non-ethanol biofuels may obviate these concerns, but currently these fuels are not available in sufficient supply to help meet the expanding RFS mandates.

Some recent developments could alleviate blend wall concerns in the near term. One option would be to blend higher levels of ethanol into conventional gasoline. In 2010 EPA granted a Clean Air Act waiver that allows gasoline to contain up to 15% ethanol for use in model year 2001 and newer light-duty motor vehicles. However, infrastructure and automobile warranty concerns have precluded widespread offering and purchase of E15, gasoline blended with 10.5% to 15% ethanol. Widespread use of E15 could postpone hitting the blend wall for a few years.

Another option to address the blend wall would be an aggressive push for the use of ethanol in flexible-fuel vehicles capable of using E85, a gasoline-ethanol blend containing 51% to 83% ethanol.⁴² There are infrastructure concerns with the use of E85. For example, the number of E85

(...continued)

Works, and The Honorable Lisa Murkowski, Ranking Member, Senate Committee on Energy and Natural Resources, to The Honorable Gina McCarthy, Assistant Administrator, Office of Air and Radiation, Environmental Protection Agency, March 20, 2013, <http://www.vitter.senate.gov/newsroom/press/vitter-murkowski-ask-epa-to-protect-americans-from-rising-gas-prices>.

³⁹ For example, see Bruce A. Babcock and Sebastien Pouliot, *The Economic Role of RIN Prices*, Iowa State University Center for Agricultural and Rural Development, CARD Policy Brief 13-PB 14, Ames, IA, November 2013.

⁴⁰ For more information, see CRS Report R40445, *Intermediate-Level Blends of Ethanol in Gasoline, and the Ethanol “Blend Wall.”*

⁴¹ U.S. Environmental Protection Agency, “Renewable Fuel Standard Program: Standards for 2014, 2015, and 2016 and Biomass-Based Diesel Volume for 2017; Proposed Rule,” 80 *Federal Register*, June 10, 2015.

⁴² The U.S. Energy Information Administration reports that in 2011, there were close to 10 million flexible-fuel vehicles (FFVs) on the road designed to use any mix of gasoline and/or E85. However, most of these FFVs are not (continued...)

fueling stations is limited, and stations are largely clustered in the Midwest, where many flex-fuel vehicles are concentrated. Most of the rest of the flex-fuel vehicles in the United States are located on the East Coast and in Texas, areas that contain far fewer E85 stations.⁴³

Other Factors

The RFS is not a stand-alone policy. It interacts with many factors that are not easily controlled. For example, cellulosic biofuel production, at a minimum, requires conversion technology, which itself requires technical expertise and time to ramp up to commercial scale. The massive quantity of biomass feedstocks needed to produce such biofuels requires factors such as appropriate weather conditions and an expectation of stable markets for feedstock commodities. Further, some types of biofuel production thus far have proven to be dependent on tax incentives in order to be economically feasible (e.g., biodiesel).⁴⁴ Unexpected occurrences (e.g., drought, failed technology, tax incentive expiration) can impact an entire industry, especially for some advanced biofuels that are nascent industries compared to conventional transportation fuels.

Congressional Issues

The RFS was established at a time when Congress foresaw the need to diversify the country's energy portfolio, strengthen the economy of rural communities by encouraging certain agricultural commodities that contribute to biofuel production, bolster U.S. standing in an emerging segment of the energy technology market, and protect the environment, among other objectives. Whether the RFS has met, and will meet, those congressional intentions remains to be seen.

The RFS is a policy with an ambitious agenda. Policy questions surrounding future consideration of the RFS might include

- What should be the purposes of the RFS?
- Is the RFS properly designed to achieve those purposes?
- What happens when, and if, the RFS achieves its purposes?

At the outset, some would argue that the first question may seem straightforward; the RFS exists to introduce more biofuels into the transportation fuel market. However, upon deeper reflection, it could be argued that the RFS exists to find another market for biomass feedstocks, or to promote the economy of rural America (e.g., the construction of biofuel facilities that create jobs).

The second question is perhaps the most difficult to answer. Many questions have been raised about the challenges in achieving the ambitious RFS targets, given concerns over the blend wall and the slow development of some advanced biofuels. Additionally, the delay in announcing final

(...continued)

using E85.

⁴³ Bruce A. Babcock and Sebastien Pouliot, *How Much E85 Can Be Consumed in the United States*, Iowa State University Center for Agricultural and Rural Development, CARD Policy Brief 13-PB 15, Ames, IA, November 2013, <http://www.card.iastate.edu/publications/dbs/pdf/13pb15.pdf>.

⁴⁴ For more information, see CRS Report R41282, *Agriculture-Based Biofuels: Overview and Emerging Issues*.

annual standards by EPA has led to significant uncertainty for biofuel producers, feedstock growers, and refiners. Whether the RFS should be eliminated, or amended, to address the current challenges in the program, or maintained in its current form is an ongoing question for Congress. A related question is whether the current provisions for EPA to waive various portions of the RFS mandates, as the agency has proposed doing for 2014, 2015, and 2016, are sufficient to address the current supply challenges, or whether the use of these waivers runs counter to the goals of the program.

The third question relates to congressional debate regarding the elimination of the conventional biofuel (e.g., cornstarch ethanol) portion of the mandate. If a segment of the biofuels industry has consistently reached the annual mandate set by Congress, is the mandate still necessary? Some contend that the conventional biofuel segment of the biofuels industry is well established, so it should not require a use mandate, although it is not clear what impact decreasing oil and gasoline prices may have on the industry. In addition, it has been argued that a demand exists regardless of congressional involvement. Others counter that the RFS is needed to help lower GHG emissions and to assure that the biofuels industry continues to have access to a fuel distribution infrastructure that is largely controlled by petroleum interests.

CRS Experts

For additional information on policy relating to the RFS and biofuels, please consult any of the CRS policy specialists identified below.

RFS-Relevant Legislative Issues	Name	Phone	E-mail
Renewable Fuel Standard, Biofuels, Bioenergy	Kelsi Bracmort	7-7283	kbracmort@crs.loc.gov
Agricultural commodities, Farm Bill energy title	Mark McMinimy	7-2172	mmcminimy@crs.loc.gov

Author Contact Information

Kelsi Bracmort
Specialist in Agricultural Conservation and Natural
Resources Policy
kbracmort@crs.loc.gov, 7-7283