

An Overview of the Federal Renewable Fuels Standard (RFS2)

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Executive Summary

The first Federal Renewable Fuel Standard was established in 2006 as a result of the Energy Policy Act (EPAct) of 2005. Standards for the program went into effect September 1st, 2007. In 2007, the Energy and Independence Security Act (EISA) created new laws, some of which has significant impacts on the Renewable Fuels Standard. Subsequently, the original version of the standard, referred to as RFS1, was modified and released as the updated RFS2. This latest version of the Renewable Fuels Standard has been in effect as of 2009, and since then has had several phase in periods for the implementation of updated specifications. The objective of this document is to provide a basic overview of this standard and the compliance rules, and provide an assessment of its potential impacts on the countries renewable fuel objectives.

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I. REGULATIONS

The Code for the Federal Renewable Fuels Standard can be found under TITLE 40--Protection of Environment, CHAPTER I--ENVIRONMENTAL PROTECTION AGENCY, SUBCHAPTER C--AIR PROGRAMS, in [PART 80--REGULATION OF FUELS AND FUEL ADDITIVES](#) Subpart K.

A). Renewable Volume Obligation - To set specific amounts of renewables for a party, the RFS uses a Renewable Volume Obligation, or RVO. An RVO is a volume of renewables for which an obligated party is required to prove ownership on a scheduled timeline. An obligated party is a refiner that produces, or an importer that imports, gasoline and diesel fuel within the 48 contiguous states. A party that simply adds renewable fuel to gasoline, as defined in 80.1107(c), is not an obligated party. Direct upstream separation for small blenders is to eliminate undue burden on small parties who would otherwise not be regulated by the program. Additionally, Alaska, Hawaii, and US Territories are not subject to the RVO.

The volume is calculated, based on the renewable fuel standard for year i and the renewable deficit carryover from the previous year ($i-1$), with the following equation:

$$RVO_i = (RFStd_i * GVi) + Di_{i-1}$$

Where, RVO_i = The Renewable Volume Obligation for an obligated party for calendar year i , in gallons of renewable fuel; $RFStd_i$ = The renewable fuel standard for calendar year i , determined by EPA pursuant to § 80.1105, in percent; GVi = The non-renewable gasoline volume which is produced or imported by the obligated party in calendar year i , in gallons; and Di_{i-1} = Renewable fuel deficit carryover from the previous year, per § 80.1127(b), in gallons.

An obligated party may comply for all of its refineries in the aggregate, or for each refinery individually. However, they must comply in the aggregate. Marketers that blend and trade less than 125,000 gallons per year of renewable fuel into gasoline and diesel fuel are not required to

generate and report RINs(Renewable Identification Numbers). Parties falling under this category may let the party directly upstream separate RINs on their behalf. They also have the option of generating RINs themselves, but by doing so become subject to RFS standards and RINs reporting requirements.

B). Renewable Identification Numbers - Renewable Identifications Numbers (RINs) serve as markers to track the amount and type of renewable fuels being produced, imported, or exported in or from the United States. A RIN is a unique number generated to represent a volume of renewable fuel. Specifically, each RIN is a 38 character numeric code in the following format: KYYYYCCCCFFFFFBBBBRRDSSSSSSSEEEEEEE. K is a number identifying the RIN as either assigned to a volume of renewable fuel (K=1) or separated from a batch of renewable fuel (K=2). YYYY is the calendar year in which the batch was produced or imported and also the year in which the RIN was originally generated. CCCC is the registration number assigned according to the facility in which the batch was produced or imported. FFFFF is the registration number according to the producer or importer of the batch of renewable fuel. BBBBB is a serial number (chosen by the producer or importer of the batch so that no two batches have the same value in a given calendar year) assigned to the batch. RR is the equivalence value (EV) multiplied by 10. D identifies the type of renewable fuel, where 1 = cellulosic biomass ethanol under RFS 1, 2 = all other renewable fuels under RFS 1, 3 = cellulosic biofuel, 4 = biomass-based diesel, 5 = advanced biofuel, 6 = other renewable fuel, and 7 = cellulosic diesel. Assignment of the D code also includes a consideration of the type of feedstock used (e.g. cellulosic biofuel must be made from cellulosic feedstocks, advanced biofuel cannot be corn starch ethanol), and the process used (e.g. biomass-based diesel cannot be produced from co-processing renewable biomass and petroleum). SSSSSSS is a number representing the first gallon-RIN associated with the batch of renewable fuel. The first gallon-RIN shall be listed as 00000001. EEEEEEE is a number representing the last gallon-RIN associated with the batch of renewable fuel. For a single gallon-RIN, the SSSSSSS and EEEEEEE will be identical.

C). Equivalence Values - Each gallon of a renewable fuel shall be assigned an equivalence value by the producer or importer. The EV is based on the energy content of the fuel, and is a number used to determine how many gallon-RINs can be generated for a batch. The following formula is used to calculate a fuel's equivalence value:

$$EV = (R / 0.931) * (EC / 77,550)$$

Where EV = Equivalence Value for the renewable fuel, rounded to the nearest tenth; R = Renewable content of the renewable fuel, a measure of the portion of a renewable fuel that came from a renewable source, expressed as a percent, on an energy basis; EC = Energy content of the renewable fuel, in Btu per gallon (lower heating value); Denatured ethanol shall have an EV of 1.0.

Under the first version of the RFS, RFS1, cellulosic biomass ethanol and waste derived ethanol, denatured and produced on or before Dec 31st, 2012, shall have an EV of 2.5. This equivalence boost for cellulosic ethanol was eliminated by the EISA of 2007, making all RINs ethanol-equivalent upon implementation of RFS2 starting 7/2010.

The equivalence values of common biofuel categories are as follows: Biodiesel (mono-alkyl ester) shall have an EV of 1.5. Butanol shall have an EV of 1.3. Non-ester renewable diesel shall have an EV of 1.7. All other renewable crude-based renewable fuels shall have an EV of 1.0. If a producer does not believe their product deserves an EV as listed above, they have the ability to petition for the assignment of a unique equivalence value for their fuel process. They may submit an application for an alternative EV for all other renewable fuels or if they have reason to believe that an EV other than that listed is warranted, but must provide reasonable cause for a new EV, and must finance a technical evaluation to use as evidence. The application for a EV shall include a technical justification that includes a description of the renewable fuel, feedstock(s) used to make it, and the production process.

D). RIN Generation - With a representative equivalence value assigned to a fuel type, a complete RIN must be assigned by a renewable fuel producer or importer to every batch produced or imported. A batch is a volume of renewable fuel that has been assigned a unique RIN code BBBBBB within a calendar year. The number of gallon-RINs for a batch may not exceed 99,999,999 and cannot represent renewable fuel produced or imported in excess of one calendar month.

The producer or importer of a renewable fuel batch must generate RINs for that batch, including any renewable fuel contained in imported gasoline. The number of gallon-RINs that shall be generated for a given batch of renewable fuel shall be equal to a volume calculated based on EV and a standardized volume. For renewable crude-based renewable fuels, the number of gallon-RINs shall be equal to the gallons of renewable crude used rather than the gallons of renewable fuel produced. The batch volumes shall be adjusted to a standard temperature of 60°F. The following equation is used to determine the RIN volume to be generated from a volume of fuel:

$$VRIN = EV * V_s$$

Where, VRIN = RIN volume, in gallons, for use determining the number of gallon-RINs that shall be generated; EV = Equivalence value for the renewable fuel per § 80.1115; and V_s = Standardized volume of the batch of renewable fuel at 60 °F, in gallons.

Those that produce or import less than 10,000 gallons of renewable fuel each year are not required to use RINs. There are also temporary volume thresholds which allot a time period of exemption from RINs requirements for new facilities. “Renewable fuel production facilities located within the United States that produce less than 125,000 gallons of renewable fuel each year are not subject to the requirements for up to three years, beginning with the calendar year in which the production facility produces its first gallon of renewable fuel.” This is intended to

allow for the facility to develop and find its footing in the business before RVOs and RINs requirements become mandated.

E). RIN Compliance - Each party obligated to meet the RVO must demonstrate ownership of sufficient RINs to satisfy the following equation:

$$(\sum \text{RINNUM})_i + (\sum \text{RINNUM})_{i-1} = \text{RVO}_i$$

Where $(\sum \text{RINNUM})_i$ = Sum of all owned gallon-RINs that were generated in year i and are being applied towards the RVO_i , in gallons; $(\sum \text{RINNUM})_{i-1}$ = Sum of all owned gallon- RINs that were generated in year $i-1$ and are being applied towards the RVO_i , in gallons; and RVO_i = The Renewable Volume Obligation for the obligated party or renewable fuel exporter for calendar year i , in gallons, pursuant to § 80.1107 or § 80.1130.

Extra RINs may be carried over to the next year or sold on the market. For compliance (2008 and later): $(\sum \text{RINNUM})_{i-1} \leq 0.20 \times \text{RVO}_i$, where the amount of RINs carried over cannot be larger than a fifth of the current years obligation volume. This is to prevent prices from dropping due to RIN accumulation, which would effectively lower their price to practically nothing if too many RINs were on the market at one time.

A party can only demonstrate compliance with the RVO for the calendar year in which the RIN was generated or the following calendar year. A RIN must be unassigned ($K=2$) for use in meeting RVO requirements.

An obligated party (or exporter) that fails to meet the RVO requirements may carry a deficit into year $i+1$ if, and only if, they didn't carry a deficit into year i from year $i-1$ and they subsequently meet requirements for calendar year $i+1$ and $i+2$.

F). RIN Distribution - An assigned RIN cannot be transferred to another party without simultaneously transferring a volume of renewable fuel to the same party. Additionally, the number of RINs transferred must be such that the ratio of gallon-RINs to gallons is equal to the EV. A transfer of ownership of assigned RINs must be documented on product transfer documents. However, unassigned RINs can be transferred from one party to another any number of times.

RINs separated from a volume are classified as unassigned (K=2). A RIN assigned to a volume can only be separated when: the volume that the RIN is assigned to is blended with gasoline or diesel to produce a motor fuel (Biodiesel (mono-alkyl ester) must be blended at 80% concentration or less into diesel fuel to qualify); A volume is exported; or A fuel is designated as a motor fuel and is used as such.

For RINs that an obligated party generates from renewable fuel not blended into gasoline, the obligated party can only separate such RINs if the number of gallon-RINs separated is less than or equal to its annual RVO.

G). Prohibited Acts and Consequences - No person shall produce or import a volume without assigning the proper RIN value or identifying it by a RIN number as required. No person shall: improperly generate a RIN; create or transfer an invalid RIN; transfer to any person a RIN with a K code of 1 without transferring an appropriate volume of renewable fuel to the same person on the same day; fail to acquire sufficient RINs or use invalid RINs to meet the party's RVO; or cause another person to commit an act in violation of any prohibited act under this section.

Any person who violates any prohibition or requirement of this rule is subject to civil penalties of up to \$37,500 per day and per each individual violation, plus the amount of any economic benefit or savings resulting from each violation. Under this rule, a failure to acquire sufficient RINs to meet a party's renewable fuels obligation constitutes a separate day of violation for each day the violation occurred during the annual averaging period.

H). RFS2 Modifications to RFS1 - The EISA requirements passed in 2007 reset the renewable fuel volume requirement for 2022 to 36 billion gallons. It also incorporated specific annual volume requirements for newly established categories of renewables.

The implementation of fuels categories expanded the list of fuels used to meet the mandate under RFS2 to include both on road and off-road, marine, and locomotive diesel fuel.

It also expanded opportunities for petroleum marketers to participate in the RINs trading market. The law set volume standards for 3 new categories of renewable fuels including cellulosic, biomass based diesel, and advanced renewable fuels. This was done with the purpose of promoting the development of new, sustainable and less controversial sources of renewable fuels with significantly lower lifecycle greenhouse gas (GHG) emissions. Figure 1 shows the EISA-mandated renewable fuel volume requirements (in billions of gallons).

Another significant modification seen in RFS2 is the use of lifecycle greenhouse gas assessments for each fuel. The code states that the lifecycle GHG emissions of the 4 qualifying renewable fuels must be less than the lifecycle GHG emissions of the 2005 baseline average gasoline or diesel fuel that they replace. This is measured from planting to production, to estimate the total “lifecycle” emissions.

Once exception from the GHG thresholds is available for fuel from the existing capacity of current renewable fuel production facilities and the capacity of all new facilities that commenced construction prior to December 19, 2007 are exempt or grandfathered from the 20% lifecycle requirement for the renewable fuel category. This is designed to prevent a disruption in the supply of conventional renewable fuel from production facilities that cannot meet the cost of infrastructure upgrades necessary to comply. There is an additional exemption from the 20% threshold for ethanol plants that commenced construction in 2008 or 2009 and are fired with natural gas, biomass, or any combination thereof.

All modifications implemented due to RFS2 have been in effect as of July 1, 2010. All RINs generated through June 30, 2010 will continue to comply with all requirements under the RFS1 rule.

**Figure 1 - New Annual Renewable Fuel Volume Obligations under RFS2
(to be determined by EPA through a future rulemaking)**

Year	Cellulosic biofuel requirement	Biomass-based diesel requirement	Advanced biofuel requirement	Total renewable fuel requirement
2008	n/a	n/a	n/a	9.0
2009	n/a	0.5	0.6	11.1
2010	0.1	0.65	0.95	12.95
2011	0.25	0.8	1.35	13.95
2012	0.5	1.0	2.0	15.2
2013	1.0	A	2.75	16.55
2014	1.75	A	3.75	18.15
2015	3.0	A	5.5	20.5
2016	4.25	A	7.25	22.25
2017	5.5	A	9.0	24.0
2018	7.0	A	11.0	26.0
2019	8.5	A	13.0	28.0
2020	10.5	A	15.0	30.0
2021	13.5	A	18.0	33.0
2022	16.0	A	21.0	36.0

II. COMPLIANCE

To fully comply with all EPA requirements for renewable fuels, a fairly extensive list of steps must be completed. All renewable fuels must meet the registration, recordkeeping, and reporting standards set by the most recent version of the RFS. For producers of renewable fuels, there are additional requirements under related categories of EPA regulations. Biodiesel producers must also comply with the Fuels and Fuel Additives Registration System through a series of tests and registration forms.

A). Registration under RFS - Any obligated party or exporter must receive EPA-issued identification numbers prior to engaging in any transaction involving RINs. Any importer or producer must do the same as well as receive facility and company identification numbers prior to generating or assigning any RINs. Any other party owning or intending to own RINs must receive an EPA-issued company identification number prior to owning any RINs.

B). Recordkeeping Requirements - Any producer or importer must keep all the following records: Product transfer documents; copies of all reports submitted to EPA; records related to the generation and assignment of RINs for each facility; batch volume in gallons, batch number, RIN number, identification of batches meeting the definition of cellulosic biomass ethanol, date of production or import, results of any lab analyses of batch chemical composition; and records related to each RIN transaction, including the following: list of the RINs owned, purchased, sold, or retired, parties involved, date of transfer, and records related to the production or importation of any volume of renewable fuel that the producer or importer designates as motor vehicle fuel and intends to use as such. Requirements are similar for obligated parties and exporters.

Any producer of a renewable fuel must keep verifiable records of the following: Amount and type of feedstocks used; equivalent amount of fossil fuel associated with the use of off-site generated waste heat; plot plan and process flow diagram for plants producing cellulosic

biomass and waste derived ethanol; and an independent 3rd party verification. All transactions (to generate, separate, sell, buy, and retire) must be submitted to EMTS within 5 business days of the transaction date. Records shall be kept for 5 years from the date created, and records related to transactions shall be kept for 5 years from date of transfer.

All producers must also keep Product Transfer Documents (PTDs), copies of all reports submitted to EPA, and copies of registration documents. There are specific requirements regarding feedstocks used by producers as well.

Domestic Producers must keep documents associated with feedstock purchases and transfers that identify where the feedstocks were produced and are sufficient to verify that feedstocks used are renewable biomass. This must be done for feedstocks including: planted tree or tree residue from actively managed tree plantations; slash and pre-commercial thinnings from forestlands; and any other type of renewable biomass.

For feedstocks identified as planted trees or tree residue from actively managed tree plantations or slash and pre-commercial thinnings from forestlands, the following records must be maintained: Maps or electronic data identifying the boundaries of the land where each type of feedstock was produced; and bills of lading, product transfer documents, or other commercial documents showing the quantity of feedstock purchased from each area and showing each transfer of custody from feedstock production location to fuel production facility.

For fuel made from planted trees or tree residue from actively managed tree plantations, producers must keep records that serve as evidence that the land from which the feedstock was obtained was cleared prior to December 19, 2007 and actively managed on December 19, 2007. They must also provide records which include one of the following: sales records for planted trees or tree residue; purchasing records for fertilizer, weed control, or reseedling, including seeds, seedlings, or other nursery stock; written management plan for silvicultural purposes; documentation of participation in a silvicultural program sponsored by a Federal,

state, or local government agency; documentation of land management in accordance with a silvicultural product certification program, an agreement for land management consultation with a professional forester; and evidence of the existence and ongoing maintenance of a road system or other physical infrastructure designed and maintained for logging use, together with one of the aforementioned documents. Domestic producers of renewable fuel made from any other type of renewable biomass must have documents from their feedstock supplier certifying that the feedstock qualifies as renewable biomass as defined in §80.1401.

For renewable fuel made from planted crops or crop residue from existing US agricultural land, it is not required to maintain feedstock records unless EPA publishes a finding that the 2007 baseline amount of agricultural land has been exceeded. The EPA will make a finding concerning the baseline, and whether it has been exceeded, by November 30th of each year preceding a compliance period, and if the baseline is determined to have been exceeded, then requirements listed under section (g) of §80.1454 will be implemented.

Existing agricultural land is defined as “cropland, pastureland, and land enrolled in the Conservation Reserve Program (administered by the US Department of Agriculture’s Farm Service Agency) that was cleared or cultivated prior to December 19, 2007, and that, on December 19, 2007, was: (1) non-forested; and (2) actively managed as agricultural land or fallow, as evidenced by records which must be traceable to the land in question, which must include one of the following: (i) Records of sales of planted crops, crop residue, or livestock, or records of purchases for land treatments such as fertilizer, weed control, or seeding. (ii) A written management plan for agricultural purposes. (iii) Documented participation in an agricultural management program administered by a Federal, state, or local government agency. (iv) Documented management in accordance with a certification program for agricultural products”.

C). OTAQ and CDX Registration - Registration for RFS starts at the Office of Transportation and Air Quality (OTAQ) Registration website. Parties subject to the Renewable Fuels Standard must

register for a CDX Account and be approved by OTAQREG. Easy Step-by-Step Instructions are available on several prepared documents, including a User Manual for Fuels Programs Registration (OTAQREG and CDX), First Time User Guide, and a My CDX Getting Started Guide. Parties must be registered with OTAQ and have a CDX Account for 60 days prior to generating any RINs. One must be registered for at least 60 days in order to own RINs as well.

CDX Registration requires the following information to be submitted: Company Name, Company Address, Company Telephone and Fax Numbers, Responsible Corporate Officer Name, Responsible Corporate Officer Title (e.g., President, CEO), Program Type (e.g., Gasoline, Diesel, RFS), Business Activities (RIN Generator, Biodiesel Producer, RIN Owner), Facility Information (if applicable), and Record Storage.

A RIN Holding Account is created for each organization. Multiple users may be associated with an organization, but all users must have their own CDX Account. An initial 3rd Party Review is also required. Producers must submit a 3rd Party Engineering Review for evaluation and will not be fully registered until submitted and approved. This outside review is mandated to ensure that the following required pieces of information are accurate: Types of renewable fuels, where for each type there is: a list of all feedstocks the facility is capable of utilizing, production processes, co-products, and a process heat fuel supply plan including the facility's baseline volume. Any renewable diesel must meet standards for biodiesel defined by ASTM D 6751. The review is also to check that all facilities have copies of the most recent applicable air permits and are accurate in their reporting of their actual peak capacities.

There are three levels of registration that can be obtained in the CDX System. A complete registration is one that has all the required information for EPA to determine if the registration will be accepted. For RIN Generators Only, a registration that is complete and has been submitted to EPA for review but has not yet been approved by EPA is deemed to be "accepted". Approval requires the submission and subsequent EPA review of a facility engineering report. Finally, an approved registration is one that is both complete and has been reviewed and

approved by EPA. For all users, registration is complete once the CDX registration has been completed and the appropriate paperwork has been signed and approved by EPA. For RIN generators only, all of the above must be completed, plus a reviewed engineering report that validates all initial registration information that the user supplied in CDX.

D). EPA Moderated Transaction System - Newly created regulations under RFS2 called for the implementation of a new tracking system, the EMTS (EPA Moderated Transaction System). It is a closed, moderated system for screening and RINs for tracking all RINs generated under the RFS2 regulations. The EMTS was created due to previous issues with the manual nature of handling 38 digit RINs and the added complexity with 4 Renewable Volume Obligations and 5 RIN types. It provides industry with the ability to generate and trade RINs in a structured, uniform environment and gives the ability to receive immediate feedback.

EMTS is accessed via the CDX system. All users must have a CDX login and register with OTAQREG: Fuels Programs Registration prior to interacting with the EMTS. There is a link to access EMTS from the CDX web page in the "Available Account Profiles" section. For detailed instructions, go to the EPA fuel registrations web site at:

<http://www.epa.gov/otaq/regs/fuels/fuelsregistration.htm>

To submit data to EMTS, you must use EPA's central Network Authentication and Authorization Services (NAAS). One needs to test their node in the testing environment and can do so by sending a request to EMTS Support at support@epamts-support.com to receive a pre-production NAAS ID. Once a successful node submission in the testing environment is complete, one can test their node in the production environment. To do this, one must have a production CDX account that is registered and approved in OTAQREG.

To obtain a production NAAS ID, send an email to the CDX Node Help Desk at nodehelpdesk@epacdx.net that contains: a Production Account User ID, pre-production NAAS ID used for testing, CDX Transaction ID of successful testing node submission, and request for a

production NAAS ID that is mapped to your production CDX User ID and has all access privileges.

An alternative tracking requirement may be used to meet protocol as well. A party may comply with the following alternative renewable biomass tracking requirement instead of the recordkeeping requirements: They must either arrange to have an independent third party conduct a comprehensive program of annual compliance surveys or, participate in the funding of an organization which arranged to have an independent third party conduct a comprehensive program of annual compliance surveys, to be carried out in accordance with a survey plan which has been approved by EPA.

E). Fuels and Fuels Additives Registration (FFARS) - For producers of motor vehicle fuel, Part 79 Registration is required. This process has the longest registration period, at around 6 months, and therefore is best to be started first in the RFS registration process. Part 79 of the Code of Federal Regulations “requires that each manufacturer or importer of motor vehicle gasoline, motor vehicle diesel fuel, and their additives, have their product registered by EPA prior to its introduction into commerce.” Registration involves providing a chemical description of the product and certain technical, marketing and health-effects information. This is to allow the EPA to identify the likely combustion and evaporative emissions.

Subheading (i) of Part 79 specifically addresses the fuels requirement, stating that: “(i) The manufacturer of any fuel which will be sold, offered for sale, or introduced into commerce for use in motor vehicles manufactured after model year 1974 shall demonstrate that the fuel is substantially similar to any fuel utilized in the certification of any 1975 or subsequent model year vehicle or engine, or that the manufacturer has obtained a waiver under 42 U.S.C. 7545(f)(4)”.

For biodiesel, producers must complete and submit EPA registration forms 3520-12, 3520-20A, and 3520-20B1. All diesel fuels must show similarity to tested standard diesel to be approved

for engine certification as compared to the selected ASTM D 975 specifications as a baseline, available for purchase at <http://www.astm.org/Standards/D975.htm>. For straight Fischer-Tropsch diesel, it is suggested to make an argument at the time of registration that the fuel is substantially similar to the standards. Any differences need to be explained, including reasoning for why the differences will not be detrimental to the baseline emissions threshold. The option of blending F-T fuels with conventional diesel makes similarity easier to argue. Lastly, there is the option of to submit own test results, but this process can be very expensive and time-consuming.

III. POTENTIAL IMPACT ON THE FUTURE RENEWABLE FUELS MARKET

Several concerns have been voiced with the RFS since its creation in 2007 and modification in 2009. Some believe that the policy approach is flawed in its basic construction and that the regulation of such specific fuels categories is too restrictive and does not do enough to foster innovation in the renewable fuels market.

Additionally, there has been worry over any possible issues with demand and hitting a “blend wall”. Invested parties are concerned with the current restriction on gasoline blends, which limits the amount of ethanol that can be blended into gasoline at 10 percent. It has been proposed that one way to avoid hitting this “blend wall” is to waive the current restriction under the Clean Air Act that limits blends for conventional fuel vehicles to 10 percent ethanol. The ethanol industry is seeking such a waiver asking the EPA to approve an E-15 blend. However, the evaluation of such a proposal must take into account any adverse effects on engine performance and emissions that may stem from the use of more dense blends.

Finally, one of the largest concerns with the RFS is that its volume obligations are not capable of being met. It is estimated that RFS2 volumes will exceed demand within a few years, possibly as early as 2012. The EPA has announced that it may need to implement cellulosic biofuel credits if the volume obligations for the category (currently the sum of the 2009 and 2010 volumes) are not likely to be attainable. Section 80.1456 of the code states that if EPA reduces

the applicable volume of cellulosic biofuel, then EPA will provide cellulosic biofuel waiver credits for purchase for that compliance year. Credits will be available for purchase by parties with cellulosic biofuel volume obligations only, and the amount will be equivalent to the difference between the original annual volume requirement and the new adjusted applicable volume.