

## BRIEFING

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# A Conversational Guide to... Renewable Identification Numbers (RINs) in the U.S. Renewable Fuel Standard

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The U.S. Renewable Fuel Standard (RFS2) promotes the use of biofuels in road transportation fuel (i.e., gasoline and diesel fuel mixtures). It does this through volume mandates, which, as written, increase each year to an eventual target of 36 billion gallons in total of ethanol-equivalent fuel<sup>1</sup> in 2022. The Environmental Protection Agency, which administers the RFS2, each year calculates the percentage of road fuel that must be biofuel based on that year's total fuel consumption forecast. Gasoline/diesel refiners and blenders are then each assigned "renewable volume obligations" or RVOs based on this percentage standard. The RVO specifies the number of gallons of biofuel an individual refiner or blender must blend into road fuel per annum; the sum of every refiner's and blender's RVOs should equal the total mandated volume. EPA has some leeway to adjust the annual volumes based on biofuel availability and other factors.

Renewable Identification Numbers (RINs) are the instrument through which refiners and blenders ("obligated parties," in the text of the regulation) demonstrate that they have met their annual renewable volume obligation. Whenever a gallon of biofuel is produced and reported to the EPA, it is assigned a RIN. EPA does not require reporting of all biofuel production, but most producers do so because having a RIN assigned increases the value of the biofuel.

The RIN is traded down the supply chain with the gallon of biofuel, and when a fuel blender or refiner mixes that biofuel into gasoline or diesel, the blender claims the RIN and can either retire it to EPA to demonstrate compliance with the RFS, or, if they have more RINs than needed for compliance, sell it on to another obligated party with

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Prepared by Adam Christensen, Stephanie Searle, and Chris Malins.

<sup>1</sup> Ethanol has about two thirds the energy density of gasoline, so a gallon of gasoline has the equivalent energy content of 1.5 gallons of ethanol.

a RIN deficit. An obligated party may have an excess of RINs if they sell high biofuel blends such as E85 (51%–83% ethanol in gasoline) or B20 (20% biodiesel in diesel), while another may have fewer RINs than required if selling low biofuel blends or pure gasoline or diesel. These decisions may depend on local demand for various fuel blends. This is effectively a credit-trading system, similar to the trading systems that are used under “cap and trade” programs. This system for demonstrating compliance allows flexibility in how obligated parties meet their obligations under the RFS2, as they have a choice to either blend renewable fuel themselves or to allow others to sell renewable fuel blends and then buy RINs on the market.

In some years, more biofuel has been blended into road fuel than mandated; this happened in 2012 for example. Obligated parties can “bank” or save these excess RINs generated in one year for compliance in the next. There is a limit of 20% on the proportion of one year’s mandate that can be met with carry-over RINs from the previous year.

## WHAT EXACTLY IS A RIN?

A RIN is a 38-digit code that identifies either a single gallon of fuel (termed a “gallon-RIN” in the regulation), or a batch of multiple gallons (a batch-RIN). RINs are generated when a batch of biofuel has been produced or imported into the United States. A RIN contains information about where the biofuel came from, and about what has happened to it (i.e., whether that gallon has been supplied into the fuel market yet). A single batch RIN can represent up to 99,999,999 gallons of ethanol-equivalent fuel. The detail in a RIN is important to allowing accurate tracking and to reduce the risk of fraud.

A RIN code has the following structure:

RIN: KYYYYCCCCFFFFFFBBBBBRRDSSSSSSSEEEEEEEE

Where:

K = Code distinguishing assigned RINs from separated RINs

YYYY = Calendar year of production or import

CCCC = Company ID

FFFFFF = Facility ID

BBBBB = Batch number

RR = Code identifying the Equivalence Value

D = Code identifying the renewable fuel category

SSSSSSS = Start of RIN block

EEEEEEEE = End of RIN block

## C, F AND B — COMPANY, FACILITY, BATCH

The RIN code structure makes it possible to tie a RIN to both a specific company and a specific facility. This information is part of a database at EPA, in which the business activities at each facility location are also tracked (e.g., production or import). Each batch produced in a given year has a unique batch number.

The RIN coding also allows for EPA to quickly identify whether the RIN was generated for domestic or imported biofuel.<sup>2</sup>

## S AND E — THE START AND END GALLON RINS

A batch-RIN represents multiple gallons of renewable fuel—it is basically a summary of multiple gallon-RINs. The volume of fuel designated by a batch-RIN is indicated by the start code and end code of the RIN block. The start code identifies the gallon-RIN of the first gallon in that batch, while the end code identifies the gallon-RIN of the last gallon in that batch. For example, if you produced a one-gallon batch of ethanol, the starting and ending RIN block codes would be identical: 00000001. For a batch of 10,000 gallons of ethanol, the start code would be 00000001, and the end code would be 00010000. Every single gallon in the batch would have its own individual gallon-RIN, in which (as with the single-gallon batch example) the start and end RIN block codes were identical. Thus, the starting and ending RIN block codes of the 320th gallon would both be 00000320. It would also be possible to split that 10,000-gallon batch at some point downstream in the supply chain, and thus generate two batch-RINs. For instance, if dividing this 10,000 gallon batch into two equal sized sub-batches to sell to different blenders, the first would have a RIN block start code of 00000001 and an end code of 00005000, while the second would have a start code of 00005001 and an end code of 00010000.

## K — SEPARATED RINS VS. ATTACHED RINS

The first number in the RIN code, the K number, identifies whether a given RIN is “attached” to or “separated” from a physical quantity of biofuel. A RIN is “attached” to a gallon or a batch of biofuel when that fuel is first produced and registered with the EPA, and the ownership of the RIN must be transferred along with the biofuel. This is the way that the vast majority of RINs are transferred from biofuel producers to gasoline and diesel refiners and blenders. The RIN must be separated from the physical biofuel if it is blended into gasoline or diesel motor vehicle fuel,<sup>3,4</sup> and this must occur

<sup>2</sup> The full registration requirements for all fuel producers, importers, and oxygenate blenders can be found in 40 CFR §80.76.

<sup>3</sup> The definition of *motor vehicle fuel* is broader than commonly assumed as it includes fuel for use in motor vehicles, motor vehicle engines, nonroad vehicles, or nonroad engines (except fuel for use in ocean-going vessels). The definition of *nonroad engines* included in the RFS2 references the Energy Policy Act of 2005 (see footnote 21 of 75 FR 14720). This definition includes engines used in construction, handling of cargo, agriculture, mining or energy production (PL 109-58 §792(d)(1)(A)(v)).

<sup>4</sup> When calculating an obligated party’s renewable volume obligation nonroad fuel such as jet or marine fuel is not included; however, if biofuel is blended into nonroad fuel the RINs that are separated from that activity can be used towards an obligated party’s overall compliance. Additional guidance on RIN separation from blending nonroad renewable fuels can be found starting on 75 FR 14724.

before it can be used for compliance with RFS2. The detached RIN can then be traded, with no reference to the disposition of the biofuel it originally represented<sup>5</sup>

It is mandatory for all RINs to be separated upon export of the biofuel.<sup>6</sup> Exporters of renewable fuel are required to satisfy their own obligation under the RFS2. However, an exporter's obligation is calculated differently than other parties. Essentially, an exporter must hold, and later retire, a RIN for every gallon of renewable fuel that is exported, whereas the RFS2 obligations for refiners and blenders who sell fuel domestically are based on the amount of gasoline or diesel product that they sell.<sup>7</sup> Calculating an exporter's obligation this way prevents exporters from selling RINs back into the market and ensures that the quantities of biofuels that are used within the United States are consistent with the overall standard for that year.<sup>8</sup>

Owners of volumes of ethanol and biodiesel are also allowed to separate RINs if the fuel is sold for immediate use without additional blending, and is used in motor vehicles.<sup>9</sup> An example would be pure biomass-based diesel that is sold for use in B100 vehicles. The full details of the circumstances in which RIN separation is allowed or mandated can be found in 40 CFR §80.1429.

## D — THE RENEWABLE FUEL CATEGORY

There are five different types of RINs (Table 1), which correspond to biofuel categories defined in the RFS:

- » renewable fuel (any biofuel that has a greenhouse gas (GHG) intensity at least 20% lower than gasoline or diesel)
- » advanced biofuel (any biofuel that is not ethanol made from corn starch, that has at least 50% GHG savings)
- » biomass-based diesel (any biodiesel or renewable diesel that has at least 50% GHG savings)
- » cellulosic biofuel (any biofuel made from cellulose that has at least 60% GHG savings)

These categories are nested, such that cellulosic biofuel and biomass-based diesel are part of the advanced mandate, and the advanced mandate is part of the renewable mandate. Cellulosic biofuel is further subdivided into “cellulosic biofuel” and “cellulosic diesel”; both types count towards the cellulosic mandate, and cellulosic diesel also counts towards the biomass-based-diesel mandate.

5 40 CFR §80.1129 — Requirements for separating RINs from volumes of renewable fuel.

6 Exporters of either neat or blended biofuels must comply with their own renewable volume obligations, although there are special rules used for accounting of these volumes. Those special rules are outlined in 75 FR 14724.

7 40 CFR §80.1430

8 The RVO for obligated parties that export gasoline and diesel products is adjusted to reflect that their RIN requirement is only based on the volume of gasoline and diesel that is used within the United States. 40 CFR §80.1407.

9 When blending biodiesel for use as a transportation fuel, it must be blended at 80% by volume or less. If a producer wants to separate a RIN from a biodiesel blend that is above 80% by volume, the producer must specify that this fuel must be used for immediate use without additional blending.

**Table 1:** RFS2 fuel categories and their corresponding D codes.

D Code	Fuel Category	RFS2 mandates fulfilled by this RIN type
<b>D7</b>	Cellulosic Diesel	Biomass-based Diesel, Cellulosic Biofuel, Advanced Biofuel, Renewable Fuel
<b>D6</b>	Renewable Biofuel	Only Renewable Biofuel
<b>D5</b>	Advanced Biofuel	Advanced Biofuel, Renewable Biofuel
<b>D4</b>	Biomass-based Diesel	Biomass-based Diesel, Advanced Biofuel, Renewable Biofuel
<b>D3</b>	Cellulosic Biofuel	Cellulosic Biofuel, Advanced Biofuel, Renewable Biofuel

Generally, RINs for the biofuel categories with higher GHG savings have been more valuable, as these RINs have the most flexibility for compliance (they can be retired to meet several mandate categories) and these types of biofuels tend to be more expensive to produce. While it is technically possible for a producer of, say, cellulosic ethanol to generate a D6 RIN for that fuel, there is no market incentive to do this, because the D3 RIN will always be at least as valuable as a D6 RIN.

## RR – THE EQUIVALENCE VALUE

The number of RINs awarded for a given volume of a biofuel is based on the energy content of that fuel. One gallon of ethanol generates one RIN, but since biodiesel is more “energy dense,” or packs more energy per gallon, it is awarded extra RINs. The equivalence value (EV) is the approximate ratio of the energy density of the produced fuel to the energy density of ethanol. More energy-dense products like biomass-based diesels have an EV greater than one. Table 2 shows EVs for major categories of fuels. This table is not comprehensive, and biofuel producers can petition EPA to change the EV for their biofuel type based on new evidence.

**Table 2:** Energy equivalence values for various biofuel types compared to ethanol. Higher EV values indicate higher energy density of the fuel.

Produced Biofuels	EV
<b>Ethanol</b>	1
<b>Butanol</b>	1.3
<b>Biodiesel (FAME)</b>	1.5
<b>Non-ester renewable diesel</b>	1.7

The RR element of the RIN code must be equal to the equivalence value multiplied by ten (essentially, the equivalence value without a decimal point). The RR code for biodiesel (FAME) would therefore be 15, while the RR code for ethanol would be 10. RINs with RR codes greater than 10 go further towards fulfilling an obligation towards the RFS2; for example, two biodiesel RINs (RR=15) could replace three ethanol RINs (RR=10) under the Renewable Fuel mandate.

## Y – YEAR OF RIN GENERATION

Finally, the batch- or gallon-RIN must include the year in which the RIN was generated (i.e., the year in which the batch of fuel was produced or imported). Only RINs generated in the current or previous compliance year are eligible to be retired to demonstrate compliance with the standard, and therefore it is important that the year of RIN generation be easily identified. It would also be possible that a batch generated in one year could have an identical RIN number to a batch generated in a previous year, if not for the inclusion of the year code.

## EXAMPLE RIN

The following RIN is given as an example in the EPA's Renewable Fuel Standard (RFS) Report Instructions<sup>10</sup>: 12007999979999000011020000000100001000. Given the description above of the elements of the RIN, it is possible to learn a substantial amount about this batch of biofuel by decomposing this RIN:

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K YYYY CCCC FFFFF BBBB RR D SSSSSSS EEEEEEE
1 2007 9999 79999 00001 10 2 00000001 00001000
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The K code of 1 tells us that this RIN is still attached to a volume of biofuel and has not yet been supplied for use as motor fuel. The RIN was issued in 2007. The company and facility code are 9999 and 79999 respectively; based on these codes, the EPA database would show the location of the facility where the RIN was issued and indicate whether the fuel is imported or domestically produced. The batch code is 00001, suggesting that this was the first batch produced by that facility in 2007 (although facilities are not obliged to award batch codes sequentially, so this is not guaranteed). The equivalence value is 10, which tells us that this was a batch of ethanol. The D code is 2, telling us that it qualified as renewable fuel only – it's therefore likely but not guaranteed that this is a batch of corn ethanol. The start code is 00000001, telling us that the batch-RIN starts at the first gallon of this batch, and the end code is 00001000, telling us that the batch contains 1,000 gallons in total.

## RECORDING RINS

RINs are self-generated by producers of a renewable fuel and registered in a computer tracking system housed within EPA, called the EPA Moderated Tracking System (EMTS). It is through the EMTS platform that RINs can be traded between obligated parties. It is important to note that the EMTS enables trading but does not exactly facilitate it like the electronic trading markets NYMEX or CBOT, rather EMTS is simply a way to transfer ownership of a RIN or a batch of RINs and is used by EPA to verify compliance. Trading of RINs typically occurs through over-the-counter transactions between parties. When RINs are still attached to biofuel, they are included in the biofuel transaction; in such cases a formal product transfer document (PTD) is also necessary to include with the transfer.<sup>11</sup>

<sup>10</sup> <http://www.epa.gov/otaq/regs/fuels/rfs0400.pdf>

<sup>11</sup> Regulations around the creation of the Product Transfer Document can be found in 40 CFR §80.1453.

## THE RIN EXPERIENCE TO DATE

Two issues with the RIN mechanism have been controversial in recent years. The first is RIN prices (Figure 1). Prices for D6 (renewable) RINs, the most common type of RIN generated mostly from corn ethanol, have exceeded \$1/RIN over the past year, which is a significant cost compared to a current price of about \$3 for one gallon of wholesale gasoline. Biofuel opponents argue that these higher RIN prices are being passed on to consumers in the form of higher gasoline prices, but it is not clear if this is actually happening and if so, to what extent.

Some speculate this price spike happened because obligated parties were not able to blend enough additional ethanol to meet their obligations. Most gasoline sold in the U.S. is capped at 10% ethanol, a limit known as the “blendwall.” Auto and fueling equipment manufacturers have identified ethanol blends higher than 10% as potentially harmful to vehicle components and other equipment. In late 2013, EPA unveiled a proposal to reduce the RFS2 mandate in future years in recognition of this issue, and the final percentage it sets for 2014 will directly affect RIN prices. This proposal has been strongly opposed by biofuel producers and advocates.



**Figure 1:** Prices of D4 (biomass-based diesel), D5 (advanced) and D6 (renewable) RINs from the beginning of the RFS2 program to the present (where data was available).

The other widely reported challenge experienced in the RIN market has been RIN fraud. In 2012, a number of biodiesel companies created fraudulent RINs by claiming to have produced biodiesel, sold it unblended as transport fuel and separated the RINs—but no such biodiesel was actually ever produced.<sup>12,13</sup> A number of obligated parties who bought these fraudulent RINs and tried to use them for compliance were fined. EPA does not

<sup>12</sup> *Biodiesel RIN fraud causes industry, obligated parties anxiety.* Biodiesel Magazine. November 29, 2011. <http://www.biodieselmagazine.com/articles/8210/biodiesel-rin-fraud-causes-industry-obligated-parties-anxiety>

<sup>13</sup> *U.S. charges 6 people, 3 firms with \$100 millions biofuels fraud.* Reuters. September 18, 2013. <http://www.reuters.com/article/2013/09/18/us-usa-biofuels-fraud-idUSBRE98H16W20130918>

have the resources to assign all RINs upon generation, but in an effort to protect against RIN fraud it has since issued a new voluntary quality assurance program, wherein third-party auditors verify RINs.<sup>14</sup> There haven't been as many reported cases of fraud within the ethanol market, possibly because, unlike biodiesel, which is sometimes consumed as B100, there is almost zero demand for pure ethanol as a fuel making it difficult to exploit an equivalent fraud opportunity in the ethanol market.

D3 (cellulosic biofuel) and D7 (cellulosic diesel) RINs have not been traded in high volumes. Since production of cellulosic biofuels has been much slower than anticipated when the RFS2 was created, EPA has waived this part of the mandate down to a small fraction of the target in the statute. For example, the RFS2 originally targeted 1 billion gallons in 2013, but EPA reduced this to 6 million gallons—and even this reduced target was not achieved. In years that EPA reduces the cellulosic mandate (every year of the RFS2 so far) the agency must also offer “cellulosic waiver credits” (CWCs). In the case that obligated parties are unable to obtain cellulosic RINs they can purchase CWCs and retire them alongside an identical number of D5 or D4 advanced RINs, to fulfill their cellulosic obligation for the year. The price of cellulosic waiver credits is set as the greater of: 1) \$0.25; or 2) \$3.00 less the wholesale price of gasoline, adjusted for inflation in comparison to calendar year 2008. The CWC mechanism and price cap is in place to limit the compliance cost of the cellulosic mandate. Without it, the price of cellulosic (D3 and D7) RINs could potentially be very high in years of low availability. For 2010 the waiver credit was set at \$1.56/RIN<sup>15</sup> and for 2011 the waiver credit was set at \$1.13/RIN.<sup>16</sup> Unlike RINs, these credits must be used the year they are bought. The CWC price, combined with the price of D5 or D4 RINs, sets an effective cap on the price that an obligated party is likely to be willing to pay for any D3 or D7 cellulosic RINs that are actually available. Stakeholders from the biofuel industry have claimed that the low price of the waiver credit combined with the authority to waive the cellulosic mandate part of the RFS2 have only served to add market uncertainty to the cellulosic biofuels industry and slow investment in these technologies—however, there seems to be little question that the original targets for cellulosic fuel use have been unachievable.

## WHAT WILL AFFECT THE RIN MARKET IN FUTURE YEARS?

In theory, prices for advanced and cellulosic RINs should come down over time as biofuel production scales up and becomes more efficient. But some of the major issues affecting RIN prices, especially D3 renewable RINs, have little to do with production costs. Pressure from the blendwall could continue to affect RIN prices depending on how it is addressed by EPA's volume rules for 2014 and future years. In addition, if the biodiesel production tax credit is reinstated it may play a role in re-allocating some of the cost of RFS2 compliance from refiners and blenders to taxpayers. Political uncertainty around possible revision or repeal of the RFS2 as well as the expiration of several tax credits will continue to complicate the RIN valuation process. These issues must be addressed in serious ways over the next few years, and whatever the changes, it is guaranteed that there will be impacts on the RIN market.

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14 <http://www.epa.gov/otaq/fuels/renewablefuels/documents/420f13005.pdf>

15 75 FR 14682

16 75 FR 76824