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The EPA's Proposed 2017 RFS Standards: Is a Push Still a Push?

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The EPA released the final rulemaking for 2014-2016 RFS standards on November 30, 2015. That final rule making reflected a change in EPA policy in that the implied mandate for conventional biofuel (ethanol) in 2016 was large enough to imply a measurable "push" beyond the E10 blend wall. The magnitude of the push was apparently not well understood as there was some confusion about the mechanism of enforcement of the mandate. Specifically, the mandate is not enforced as a strictly volumetric mandate, but instead is enforced as a fractional mandate. That is, the mandate is enforced as a blend rate rather than in volumetric terms. The likely magnitude of the push contained in that final rulemaking was examined in the *farmdoc daily* article of December 4, 2015, with the conclusion that the push likely approached one billion gallons for 2016.

The EPA released the preliminary rulemaking for 2017 RFS standards on May 18. The preliminary rulemaking also established biomass-based diesel (BBD) volume requirements for 2018. Here, we first re-examine the magnitude of the likely conventional biofuels push contained in the final rule making for 2014-2016 and then the likely magnitude of the push in the preliminary rulemaking for 2017. Those calculations will indicate if the EPA is continuing the policy of providing a measurable push for conventional biofuel consumption beyond the E10 blend wall. That analysis requires a forecast of domestic gasoline consumption. Finally, we briefly examine the RINs market reaction to the preliminary rulemaking to judge if the rulemaking came as a surprise to the market. We start with a review of the statutory mandates before proceeding to the analysis.

2014-2018 RFS Volume Requirements

The RFS statutes require the EPA to establish biofuel volume requirements in four categories for each year from 2008 through 2022: cellulosic biofuel, biomass-based diesel (BBD), total advanced biofuel (which includes BBD), and conventional biofuel. The difference between the total advanced mandate and the total of the cellulosic and biodiesel mandate is referred to as the undifferentiated advanced mandate and can be satisfied by a combination of qualified advanced biofuels. Conventional biofuel is generally assumed to be corn-based ethanol but this is actually not explicitly required by the RFS legislation. Instead, corn-based ethanol has been the cheapest alternative for this category that also meets the environmental requirements of the RFS. For ease of discussion, however, we will refer to conventional biofuel as conventional ethanol. In addition, the conventional portion of the mandate can also be satisfied

with discretionary blending of advanced biofuels, so we refer to the conventional mandate as an implied mandate

The first section of Table 1 provides a summary of RFS statutory volume requirements for 2014 through 2018. The biodiesel mandate was established as a minimum of one billion gallons per year from 2012 through 2022, with larger amounts subject to EPA approval. The implied conventional mandate was specified as 14.4 billion gallons in 2014 and 15.0 billion gallons for 2015 and for the remaining life of the RFS. Total statutory renewable fuel requirements increase from 18.15 billion gallons in 2014 to 26 billion gallons in 2018.

Table 1. RFS Volume Requirements for the U.S., 2014-2018

	RFS Statutory					EPA 2014-2016 Final Rulemaking				EPA Preliminary 2017 Rulemaking	
Category	**2014**	**2015**	**2016**	**2017**	**2018**	**2014**	**2015**	**2016**	**2017**	**2017**	**2018**
Cellulosic Biofuel	1.75	3.00	4.25	5.50	7.00	0.033	0.123	0.230	NA	0.312	NA
Biomass-Based Diesel	>1	>1	>1	>1	>1	1.63	1.73	1.90	2.00	2.00	2.10
Advanced Biofuel	3.75	5.50	7.25	9.00	11.00	2.67	2.88	3.61	NA	4.00	NA
Total	18.15	20.50	22.25	24.00	26.00	16.28	16.93	18.11	NA	18.80	NA
Implied Conventional	14.40	15.00	15.00	15.00	15.00	13.61	14.05	14.50	NA	14.80	NA

Note: These volumes are stated in billion gallons of ethanol equivalents, except for biomass-based diesel which is stated in billion gallons of "wet" physical volume terms. NA stands for not applicable.

The last two sections of Table 1 show the volume requirements established in the November 30, 2015 final rulemaking and the May 18, 2016 preliminary rulemaking. The EPA established final volume requirements for 2014, 2015, and 2016 based on actual and expected production of biofuels during those years. The write-down in the total mandate was from 18.15 billion gallons to 16.28 billion gallons in 2014, from 20.5 to 16.93 billion gallons in 2015, and from 22.25 to 18.11 billion gallons in 2016. The total write-down for the three years was 9.58 billion gallons. The cellulosic mandate for the three years was reduced by a total of 8.614 billion gallons, while the total advanced mandate was written down by 7.34 billion gallons, meaning that non-cellulosic advanced biofuels meet a part of the original cellulosic mandate. This backfilling of the cellulosic mandates totals 1.27 billion gallons. The write downs in the implied conventional mandates are from 14.4 to 13.61 billion gallons in 2014, from 15.0 to 14.05 billion gallons in 2015, and from 15.0 to 14.5 billion gallons in 2016. The write downs to the implied conventional mandates across the three years total 2.24 billion gallons. The BDD mandate increased each year and exceeded the minimum requirement of one billion gallons.

The preliminary rulemaking for 2017 continues the pattern established in the final rulemaking of last November. The total mandate was written down from 24.0 billion gallons to 18.8 billion gallons, or a total reduction of 5.2 billion gallons. The cellulosic mandate for 2017 was written down from 5.5 billion gallons to 312 million gallons, or a total reduction of 5.188 billion gallons. The total advanced mandate was written down from 9.0 to 4.0 billion gallons, meaning that non-cellulosic advanced biofuels once again meet a part of the original cellulosic mandate. This backfilling of the cellulosic mandates totals 188 million gallons in 2017. The write downs in the implied conventional mandate is 15.0 to 14.8 billion gallons, which implies that the total write down of the implied conventional mandate over 2014-2017 is 2.44 billion gallons. This is not as large as may have been projected several years ago but is nonetheless still a substantial write down in total.

The Magnitude of the Conventional Biofuels Push

The calculation of the magnitude of the conventional biofuels (ethanol) push contained in EPA rule making is in theory straight-forward, requiring the comparison of the magnitude of the mandate to the level of expected consumption. A positive difference represents a push above the E10 blend wall. However, as demonstrated in earlier *farmdoc daily* articles (June 3, 2015; June 10, 2015; June 17, 2015; December 4, 2015), those calculations are far from simple in practice and each of the calculations

requires a number of projections and assumptions. Here, we re-examine the magnitude of the likely conventional biofuels push contained in the final rule making for 2014-2016 and then the likely magnitude of the push in the preliminary rulemaking for 2017. A key part of the analysis is updating projections of gasoline and diesel fuel consumption.

The analysis of the degree of push in the conventional ethanol mandates for 2014-2017 is summarized in Table 2. The analysis starts with an estimate of annual domestic gasoline and diesel consumption, which is the total of petroleum based fuels and biofuels. For the EPA scenario, estimates for 2014 are the estimates contained in the EPA's final rulemaking for 2014-2016. The estimates for 2017 are taken from the EPA's May 18 preliminary rulemaking for 2017. The estimates for gasoline consumption for 2015 and 2016 are derived from the EIA's April 2016 Short Term Energy Outlook (STEO) report, while the estimates for diesel consumption are those in the EPA rulemaking. As a side note, the diesel consumption estimates made by the EPA show unusually large annual variation. The variation reflects the wide variation in the annual estimates of consumption by ocean-going vessels which is subtracted form total diesel consumption to derive estimates of domestic surface transportation consumption. The estimates of total ethanol consumption for 2014 are from the EPA's final 2014-2017 rulemaking and 2017 is that contained in the recent proposed EPA rulemaking. The estimate for 2015 is derived from EIA estimates of total production, trade, and changes in stock levels. That calculation results in an implied ethanol inclusion rate of 9.95 percent. That inclusion rate is then used to calculate an estimate of ethanol use in 2016 based on the estimate of total gasoline consumption.

Table 2. Conventional Mandate Gap Computations under EPA Final Rulemaking for 2014-2016 and Preliminary Rulemaking for 2017

	EPA				Alternative Scenario			
Item	**2014**	**2015**	**2016**	**2017**	**2014**	**2015**	**2016**	**2017**
(1) Total Gasoline Use	136.480	140.152	142.141	142.050	136.480	140.152	143.656	145.811
(2) Total Diesel Use	55.670	54.050	58.130	54.580	55.670	55.212	54.297	55.823
(3) Total Gasoline and Diesel Use	192.150	194.202	200.271	196.630	192.150	195.365	197.953	201.633
(4) E10 Blend Wall [(1) X 0.10]	13.648	14.015	14.214	14.205	13.648	14.015	14.366	14.581
(5) Total Ethanol Use [(7)+(8)+(9)]	13.420	13.940	14.150	14.210	13.420	13.940	14.350	14.600
(6) Total Ethanol Inclusion Rate [(5)/(1)]	9.83%	9.95%	9.95%	10.00%	9.83%	9.95%	9.99%	10.01%
(7) Cellulosic Ethanol Use	0.001	0.002	0.004	0.030	0.001	0.002	0.004	0.030
(8) Other Advanced Ethanol Use	0.090	0.115	0.126	0.126	0.090	0.115	0.126	0.126
(9) Conventional Ethanol Use	13.329	13.823	14.020	14.054	13.329	13.823	14.220	14.444
(10) Conventional Ethanol Mandate	13.604	14.102	14.933	14.800	13.604	14.193	14.730	15.015
(11) Conventional Mandate Gap [(10)-(9) if >0]	0.275	0.279	0.914	0.746	0.275	0.371	0.510	0.571
(12) Petroleum Gasoline and Diesel Use	177.140	178.502	184.591	180.07	177.140	179.665	182.073	184.683
(13) Fractional Ethanol Mandate [(10)/(12)]	7.68%	7.90%	8.09%	8.22%	7.68%	7.90%	8.09%	8.13%

Notes: All values stated in terms of billion gallons except (6) and (13), which are in percentage terms. Total petroleum gasoline and diesel use (12) is net of renewable fuel use (ethanol and biomass-bsaed diesel) and the small refinery exemption, and therefore, does not equal total gasoline and diesel use (3). The small refinery exemption is set to zero for 2015-2017.

The magnitude of the push (labeled conventional mandate gap) in row 11 of Table 2 is computed as the conventional ethanol mandate (row 10) minus consumption of cellulosic and other advanced ethanol minus the level of conventional ethanol consumption implied by the E10 blend wall. It is important to clarify the calculation of the size of the ethanol mandate. The EPA enforces the biofuels requirements in the form of a fractional mandate. That is, the volumetric mandate contained in rulemaking reflects the

projection of total petroleum gasoline and diesel consumption and the projected blend rate, or fractional mandate that would be required to meet the volumetric standard. If fuel consumption differs from the projected level, the enforced mandate then differs from the volumetric mandate. For 2017, for example, the fractional mandate for conventional biofuel is proposed at 8.22 percent of projected petroleum and diesel use. If that use equals the projection of 180.07 billion gallons, the mandate will equal the volumetric mandate of 14.8 billion gallons. Since the fractional mandates have already been finalized for 2015 and 2016 and gasoline consumption projections have risen, we project the enforced mandates for 2015 and 2016 to be 14.102 and 14.933 billion gallons, respectively, instead of the volumetric standards in the final 2014-2016 rulemaking of 14.05 and 14.5 billion gallons.

The calculation of the conventional ethanol gap for the final EPA rulemaking in Table 2 is based on several assumptions, including: (1) the RFS is implemented as required or proposed in the EPA rulemaking, (2) the estimates and projections relative to gasoline consumption and consumption of cellulosic ethanol, other advanced ethanol, and conventional ethanol included in that rulemaking are used without adjustment, and (3) the level of RINs stocks and biofuels stocks remain constant over 2014-2017. Under the final EPA rulemaking, we estimate the conventional ethanol mandate gap to be 275 million gallons in 2014, 279 million gallons in 2015, 914 million gallons in 2016, and 746 million gallons in 2017. These are estimates of the magnitude of the push in the conventional mandate above the E10 blend wall each year. The gaps can be filled using one or more of the following pathways: (1) drawing down the existing stock of RINs, which the EPA estimated at 1.72 billion gallons in the 2017 preliminary rulemaking (calculations by Nick Paulson in this *farmdoc daily* article (March 3, 2016) suggest a larger inventory of 2.1 billion gallons at the beginning of 2016), (2) increasing the use of higher ethanol blends, such as E15 or E85, or (3) increasing the use of non-ethanol biofuels such as biodiesel and renewable diesel.

The alternative scenario presented in Table 2 increases the 2016 and 2017 estimates of domestic gasoline consumption. Consumption in 2016 is projected to be 2.5 percent larger than in 2015 rather than the plus 1.4 percent assumed by the EPA and consumption in 2017 is projected to increase by 1.5 percent rather than decline. These projections are plausible given recent data on how fast vehicle miles travelled and gasoline use in the U.S. have been increasing. Projections of diesel consumption relative to 2014 reflect growth rates found in the EIA's May 2016 STEO. All other assumptions are the same as under EPA rulemaking computations in Table 3. Finally, it is interesting to observe that the projected increase in gasoline consumption would allow the EPA to nudge the fractional conventional ethanol mandate down to 8.13 percent but still increase the effective conventional ethanol mandate for 2016 to the statutory level of 15.0 billion gallons.

Under the alternative projections, we estimate the conventional ethanol mandate gap to be 275 million gallons in 2014, 371 million gallons in 2015, 510 million gallons in 2016, and 571 million gallons in 2017. The difference in the magnitudes of the 2016 gap relative to the EPA scenario is influenced by the different projections of diesel consumption. However, the magnitude of the conventional mandate gap calculated for 2017 is relatively large for both scenarios, suggesting the EPA is continuing to provide a substantial push above the E10 blend wall for conventional biofuels.

RINs Market Reaction to 2017 Proposed Rulemaking

Since RINs prices represent the marginal cost of complying with RFS mandates, it is important to monitor any changes in RINs prices after the release of EPA rulemakings. Changes up or down in RINs prices indicate whether the market was surprised about the standards in the rulemaking. Figure 1 shows the prices of 2016 vintage D4 biodiesel and D6 ethanol RINs prices over November 2, 2015 through May 26, 2016. A 2016 "vintage" RIN indicates the RIN is generated within the 2016 calendar year and can be used for RFS compliance in 2016 and 2017. This means that any prices reported in 2015 for 2016 vintage RINs are forward contract transactions rather than spot transactions. Figure 1 reveals that D4 and D6 prices had much more muted reactions to the May 18 preliminary 2017 rulemaking than the final rulemaking for 2014-16 last November. Since the May 18 release of the latest rulemaking, D4 RINs have increased 2.75 cents per gallon, or 3.5 percent, and D6 RINs have increased 4 cents per gallon, or 5.5 percent. This suggests that the market largely anticipated the level of the standards in the 2017 proposal.

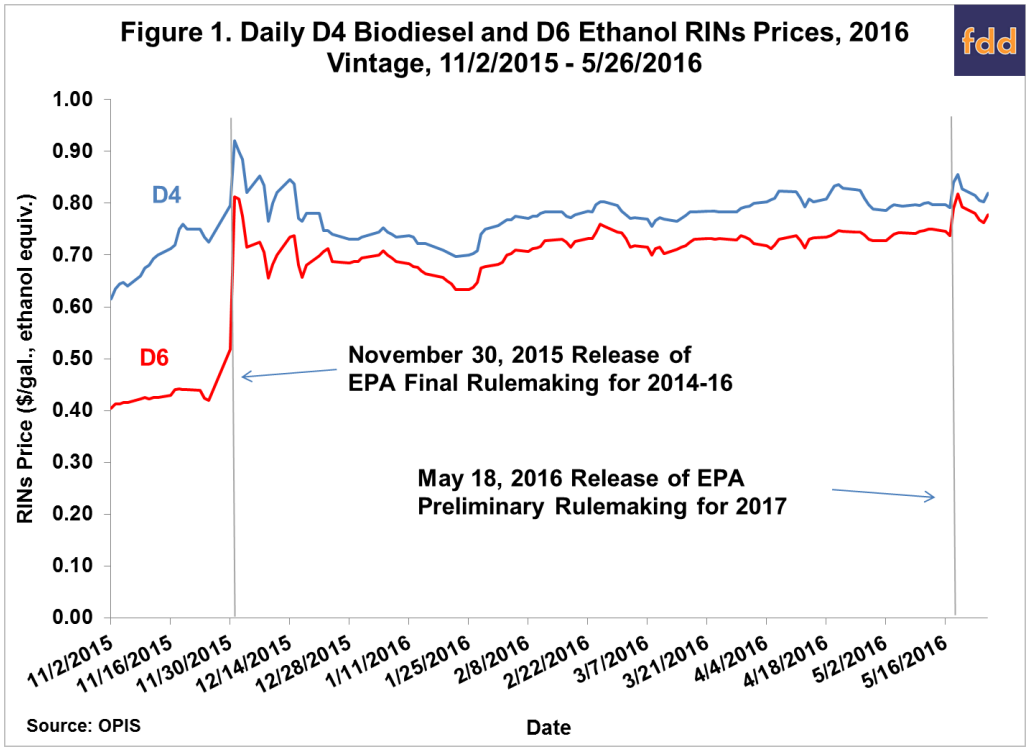
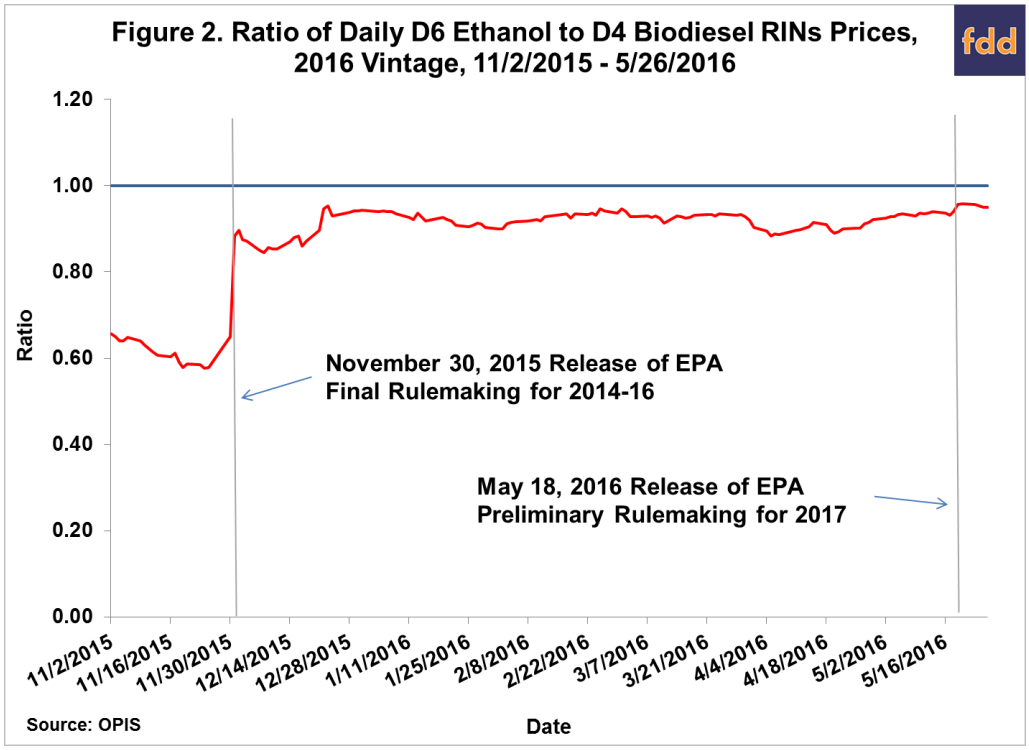


Figure 2 provides an alternative view of market reaction by plotting the ratio of D6/D4 RINs prices. As we have discussed extensively in previous *farmdoc daily* articles (e.g., December 4, 2015), this ratio shows whether ethanol or biodiesel is the marginal gallon for compliance with the conventional ethanol mandate. When the ratio is near one this signals that biodiesel is the marginal gallon and when the ratio is closer to zero the marginal gallon is ethanol. Since the ratio stood at 0.93 before the release of the 2017 preliminary rulemaking and only moved up to 0.93 after the release, one can surmise that market expectations changed very little and that biodiesel remains the marginal gallon for compliance with the conventional mandate.



Implications

The EPA released the preliminary rulemaking for 2017 RFS standards on May 18. This rulemaking also established biomass-based diesel (BBD) volume requirements for 2018. A key question is whether the 2017 standard continues the recent EPA policy of providing a measurable push for conventional biofuel consumption beyond the E10 blend wall. After updating projections for gasoline and diesel consumption, we estimate the conventional ethanol mandate gap to be 275 million gallons in 2014, 371 million gallons in 2015, 453 million gallons in 2016, and 510 million gallons in 2017. Since the estimates of the conventional mandate gap are relatively large, particularly for 2016 and 2017, this suggests the EPA is continuing to provide a substantial push above the E10 blend wall for conventional biofuels. A key question going forward is how long this push can last in the face of rising gasoline consumption.

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