

# How hard will EPA push the accelerator on biofuel expansion? What could it mean for RIN prices and compliance costs?

## The RFS proposals and pressure to expand biofuel use

On May 29 2015, the Environmental Protection Agency (EPA) proposed Renewable Fuel Standard (RFS) targets for 2014-2016 (and 2017 in the case of biomass-based diesel). The EPA proposal suggests that future implementation of the biofuel mandates will be based on the idea of continued pressure to expand biofuel use. This is despite the obstacle presented by the blend wall (the limit of ethanol use in E10).

In this bulletin, we use the output from FAPRI-MU's stochastic model to explore the RIN prices, biofuel use, market impacts, and RFS compliance costs.<sup>1</sup> What are the consequences if RFS implementation entails a certain pace of acceleration in biofuel use?

## We measure the pace of acceleration with RIN prices

How hard will EPA push to expand biofuel use? We do not know. In our experiment, we assume a mandate expansion path with linear growth in the percentage standards set forth by EPA. For example, the overall percent standard grows steadily from 9.6% in 2016 to 11.1% in 2022. This assumed growth rate generates RIN prices in the \$0.40-\$0.80 range, generally, through the projection period.<sup>2</sup> The exception is cellulosic biofuel: we assume that production remains small and the RIN value is set by the waiver credit established in the legislation.

The two graphs below show the general implications. The graph at the left shows the ranges (i.e. 10<sup>th</sup> and 90<sup>th</sup> percentiles with average and inter-quartile ranges) of projected conventional RIN prices from 2016 to 2022. The ranges we simulate are strong at the start to induce expansion of ethanol use in high-blend fuels and also more biodiesel. The ranges fall in later years partly because we assume the EPA will not push for more conventional ethanol beyond the 15 billion gallon limit implied by the legislation. Generally, in these simulations, the motor fuel market absorbs 15 billion gallons of conventional ethanol by 2018, and further mandate expansion is taken to mean more advanced biofuels, which includes biodiesel as well as sugarcane ethanol.

### Summary:

*This bulletin explores the RIN price and compliance cost implications of a steady 'push' in RFS requirements beyond EPA's 2014-2016 proposals.*

### For more on this topic, see these FAPRI-MU publications:

Bulletin #04-15  
RIN price (mis)behavior?

Bulletin #01-15  
Are RIN prices high enough for E85 expansion?

Report #01-14  
Biomass-based diesel policy options: Larger RFS requirements and tax credit extension

Report #07-13  
Renewable fuel standard waiver options for 2014 and beyond

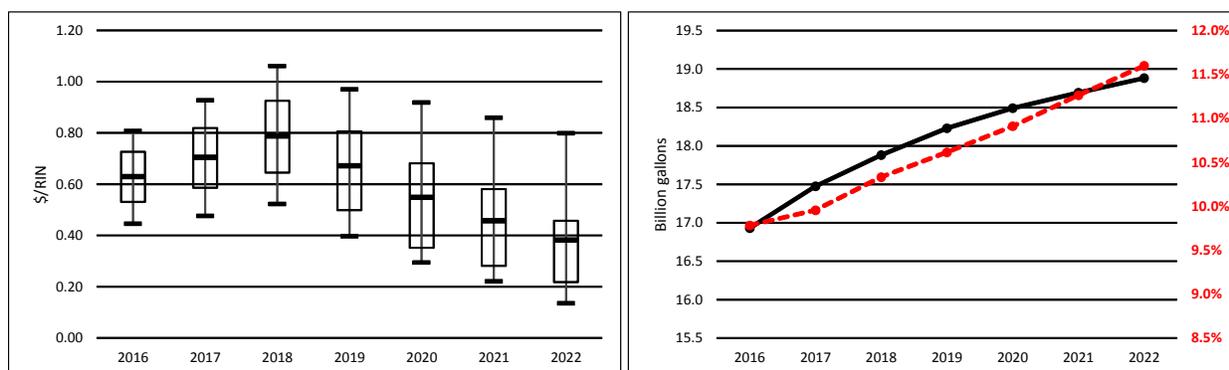
Report #03-13  
Implied RIN prices for E85 expansion and the effects of a steeper blend wall

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**Figure 1. Left: Conventional (D6) RIN price ranges** (with the upper and lower horizontal bars spanning 10<sup>th</sup>-90<sup>th</sup> percentiles, the box covering the 25<sup>th</sup>-75<sup>th</sup> percentiles, and the middle horizontal bar the average); **Right: Average overall RFS requirement (volumetric, in black) and average ethanol share of motor gasoline use (dashed red).**



The graph on the right shows that this approach causes the projected ethanol use to rise as a share of total motor gasoline use. Given that motor gasoline use is flat or falling over this period, however, rising ethanol share does not mean much more ethanol use. There is pressure for more biodiesel, too.

The table summarizes some key implications: the RIN prices tend to stay separated in many simulations, suggesting that, though the mandate pushes past 10%, biodiesel and conventional ethanol are not competing sources of RINs in many instances. This is due, in part, to fairly strong demand for conventional RIN stocks going forward. The larger stocks provide more cushion even as ethanol use expands.

Compliance costs average about \$11 billion over this period, with an early peak as the conventional gap expands. The low and high values (10<sup>th</sup> and 90<sup>th</sup> percentiles) suggest a wide range.

**Table 1. Key RIN price and compliance cost implications of sustained RFS pressure**

	Conventional RIN price (dollars per RIN-gallon)			Biodiesel RIN price (dollars per RIN-gallon)			Compliance costs <sup>a</sup> (billion dollars)		
	10 <sup>th</sup> percentile	Avg.	90 <sup>th</sup> percentile	10 <sup>th</sup> percentile	Avg.	90 <sup>th</sup> percentile	10 <sup>th</sup> percentile	Avg.	90 <sup>th</sup> percentile
<b>2016</b>	0.45	0.63	0.81	0.67	0.83	1.00	8	11	14
<b>2017</b>	0.48	0.70	0.93	0.69	0.89	1.12	9	13	16
<b>2018</b>	0.52	0.79	1.06	0.66	0.87	1.09	10	14	19
<b>2019</b>	0.40	0.67	0.97	0.57	0.80	1.06	8	13	18
<b>2020</b>	0.30	0.55	0.92	0.46	0.71	1.02	7	11	17
<b>2021</b>	0.22	0.46	0.86	0.41	0.66	0.96	5	9	16
<b>2022</b>	0.14	0.38	0.80	0.38	0.63	0.94	4	8	15

<sup>a</sup> : We calculate compliance costs by summing the following: (a) conventional RINs used for compliance multiplied by the conventional RIN price; (b) advanced RINs used for compliance multiplied by the advanced RIN price; (c) biomass-based diesel RINs used for compliance multiplied by the biomass-based diesel RIN price; (d) cellulosic RINs used for compliance multiplied by the cellulosic RIN price.

### Stop signs, detours, and fast lanes

Many uncertainties surround these estimates. For example, the EPA made it clear that their approach to setting the proposed volume requirements was “stock-neutral” with respect to RIN carryover. However, RIN stocks could vary dramatically as obligated parties adjust their expectations of future years, causing changes in biofuel use and differences in RIN prices, too.

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The blend wall remains a matter of speculation. What is required for E85 expansion, and what are the consequences for RIN prices?<sup>3</sup>

The crude oil prices in our baseline are based on January IHS-Global Insight projections, which rose sharply from 2016 onward. That path implies a lower motor fuel consumption path and increased cost competitiveness of higher ethanol blends, leading to the falling RIN price paths shown here. A lower crude oil price path might imply higher RIN prices and compliance costs than those in this study.

At the time of publication, conventional RIN prices for the 2015 vintage are around \$0.45/RIN. Our projections for 2016 are indicative of a more binding RFS requirement. This is, in part, due to a projected draw down of RIN stocks in 2015, which combined with the steady growth in the RFS requirement leads to an increase in RIN prices. In reality, obligated parties might be inclined to build stocks and carry over more RINs than we assume here while RIN prices are relatively cheap – depending on what they expect future RIN prices to be.

Finally, in implementing the mandates, how hard will the push on the accelerator be? Would these RIN prices and associated compliance costs cause the pace to slow, or to speed up? These and other uncertainties suggest even wider ranges of results are possible than shown above.

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1. The FAPRI-MU system of structural supply and demand equations represents major agricultural commodities and commodity products, including biofuels, with a focus on the U.S. The results of any given projection, however, depend on given various conditions, such as variations in crop yields or petroleum prices. If conditions change, then FAPRI-MU projections follow a different path. The stochastic model draws randomly those conditioning factors to generate 500 different projection paths.
  2. In other work, we've identified the prices of RINs (Renewable Identification Numbers that are a sort of certificate of RFS compliance) as key indicators of how difficult it is to meet the mandate. See FAPRI-MU Bulletin #01-15; FAPRI-MU Report #03-14; FAPRI-MU Report #01-14; Thompson, Meyer, & Westhoff (2010), *The New Markets for Renewable Identification Numbers in Applied Economic Perspectives and Policy*; or Thompson, Meyer, & Westhoff (2011), *What to Conclude about Biofuel Mandates from Evolving Prices for Renewable Identification Numbers in American Journal of Agricultural Economics*.
  3. See FAPRI-MU Bulletin #01-15.

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