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# The Grand Bargain? Trading an E15 RVP Waiver for a RINs Price Cap

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Discussions about the future of the RFS reached a fever pitch this week. A high-level meeting at the White House was held, with President Trump presiding and Senators from Iowa and Texas also in attendance. The meeting was prompted by the perceived need to bring down the high cost of ethanol RINs borne by independent merchant refiners. In late January, Philadelphia Refining Solutions declared bankruptcy, citing high RIN costs as a major contributing factor. A variety of proposals to modify obligations under the RFS have surfaced in recent months, including application of the various waiver authorities under the RFS, expanding the number of small refinery exemptions, and a 10 cent per gallon cap on the price of the RIN credits used to comply with the RFS (*farmdoc daily*, August 9, 2017; August 18, 2017; October 5, 2017; October 12, 2017; October 19, 2017; December 6, 2017; December 21, 2017). There has also been widespread discussion of granting an RVP waiver for E15 gasoline blends at the same time in order to make the changes to the RFS more attractive to ag and biofuel interests. While not formalized yet, what seems to be emerging is a "grand bargain" that involves trading off an E15 RVP waiver for a $0.10 cap on RINs prices. The purpose of this article is to examine the tradeoffs presented by this combination of biofuel policy changes.

## Background on E15

E15 is a gasoline blend that consists of 15 percent ethanol and 85 percent gasoline blendstock. In 2011, the EPA approved sales of E15 in the U.S. for all 2001 and newer model year vehicles. In its most typical formulation, E15 has an octane rating of 88. This is one point higher than E10, which is all but a very small fraction of the regular gasoline sold in the U.S. So, E15 can be considered a lower "mid-grade" in terms of octane content. Another characteristic of E15 is that the chemical volatility of the gasoline blend is higher because ethanol at low blend percentage formulations has a relatively high level of volatility. In other words, ethanol in low blend percentages like E10 and E15 tends to evaporate more easily, which can be problematic from an emissions perspective. Volatility of gasoline is measured by something known as "Reid vapor pressure," or RVP for short. Volatility is highest during the summer because temperatures in the U.S. are the highest. Heat leads to higher pressure and larger evaporative emissions.

Moriarity and Yanowitz (2015) provide a nice summary of the history of ethanol and RVP regulations in the U.S.,

*"Blending of ethanol in to gasoline in the 10 to 15 vol% range typically causes the vapor pressure to increase by 1 pound per square inch (psi). The EPA regulates gasoline vapor pressure from June 1 to September 15 to reduce evaporative fuel emissions. In 1992, E10 received a 1-psi waiver, commonly known as the 1-pound waiver, from these requirements for non-reformulated gasoline areas. For purposes of the 1-pound waiver, E10 blends are defined as containing 9 to 10 vol% ethanol. The E10 1-pound waiver code is included in the Code of Federal Regulations which states that the waiver is for E10 only and not any other ethanol blend." (pp. 1-2)*

What this means is that E15 cannot be sold year around throughout the U.S. In "non-reformulated areas" it has to be removed from the blends offered at retail stations for the three-and-a-half months between June 1 and September 15. Non-reformulated areas represent about two-thirds of the U.S. area (but not population). This is an obvious deterrent to potential growth in the use of E15. Also note that the relationship between ethanol content in gasoline blends and RVP is highly non-linear. RVP tends to rise for ethanol blends up to E25 and then fall, with 50 percent blends having about the same RVP as E10. This is the reason that E85, defined as 51 to 83 percent ethanol, has an RVP equal to or lower than E10, and therefore falls under the 1-pound RVP waiver while E15 does not.

**The Tradeoffs**

With this background we can delve into the tradeoffs involved in the "grand bargain" discussed in the introduction. The question with respect to E15 is the market impact of the RVP waiver. As always the place to begin is the recent history of E15 use in the U.S. Unfortunately, the available data is quite sketchy on the actual usage of higher ethanol blends and this is a point of considerable contention. Instead of building up estimates for E15 from primary sources, we infer the usage of higher ethanol blends from aggregate gasoline and ethanol usage. While this will not disentangle E15 from E85 usage it does provide crucial perspective on the actual magnitudes.

Table 1 provides the estimates of combined E15 and E85 usage in the U.S. for 2013 through projections for 2019. Line (1) of each panel shows gasoline use for the U.S. in 2013-2017 and projected use for 2018-2019. The original data are drawn from the February 2018 EIA STEO and reduced slightly to reflect Alaska's opting out of the RFS. Line (2) shows the E10 blend wall based on gasoline use in Line (1). Panel A assumes the ethanol inclusion rate is 10 percent to reflect the theoretical maximum rate of ethanol inclusion. Panel B assumes the ethanol inclusion rate is 9.9 percent to reflect a small amount of E0 usage and other logistical impediments to reaching the theoretical maximum of 10 percent inclusion. Line (3) in both panels contains actual total domestic ethanol use in the U.S. for 2013-2017 and projected use for 2018-2019, again from the February 2018 EIA STEO with a reduction to reflect Alaska's opting out of the RFS. Total use is the sum of E10, E15, and E85. Line (4) then subtracts Line (2) from Line (3) in order to estimate combined E15 and E85 use.

**Table 1. Estimates of U.S. E15 and E85 Use for 2013-2019**

| Item | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|---|
| **Panel A: 10 Percent Inclusion Rate** | | | | | | | |
| (1) Gasoline Use | 135.290 | 136.487 | 140.426 | 142.926 | 142.203 | 142.827 | 143.816 |
| (2) E10 Blend Wall [(1) x 0.10] | 13.529 | 13.649 | 14.043 | 14.293 | 14.220 | 14.283 | 14.382 |
| (3) Total Ethanol Use | 13.193 | 13.431 | 13.928 | 14.323 | 14.513 | 14.709 | 14.833 |
| (4) E15 and E85 Use [(3)-(2)] | 0.000 | 0.000 | 0.000 | 0.031 | 0.293 | 0.427 | 0.452 |
| **Panel B: 9.9 Percent Inclusion Rate** | | | | | | | |
| (1) Gasoline Use | 135.290 | 136.487 | 140.426 | 142.926 | 142.203 | 142.827 | 143.816 |
| (2) E10 Blend Wall [(1) x 0.099] | 13.394 | 13.512 | 13.902 | 14.150 | 14.078 | 14.140 | 14.238 |
| (3) Total Ethanol Use | 13.193 | 13.431 | 13.928 | 14.323 | 14.513 | 14.709 | 14.833 |
| (4) E15 and E85 Use [(3)-(2)] | 0.000 | 0.000 | 0.026 | 0.173 | 0.435 | 0.570 | 0.595 |

Note: All values stated in terms of billion gallons.

The estimates in Table 1 suggest very little or no use of higher ethanol blends from 2013-2015. Growth appeared to pick up in earnest in 2016 and 2017, with the volume between roughly 300 and 400 million gallons in 2017. The growth is projected to continue in 2018 and 2019, possibly as high as 600 million gallons. Despite the implied growth trajectory for combined E15 and E85 usage in recent years, it is important to keep in mind the small size of the volumes. For example, the highest projected usage, 595 million gallons in 2019, represents just four percent of total ethanol use and four-tenths of one percent of total gasoline use.

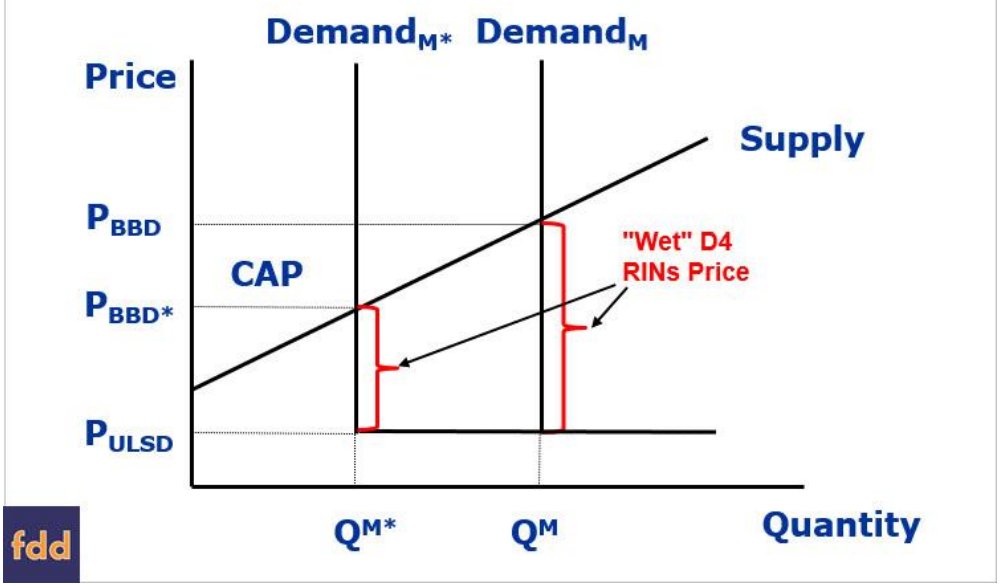
The estimates in Table 1 raise the obvious question as to why the usage of higher ethanol blends has remained so small. There appears to be a variety of factors at work blocking expansion. First, the lack of an RVP waiver for E15 and the inability to offer it year round throughout the U.S. clearly has some negative impact on E15 use. Second, there are liability concerns with respect to misuse of E15 for vehicles older than the 2001 model year. Vehicles this old are a shrinking part of the fleet but the liability issues for misfueling have never been fully resolved. Third, there are severe limitations on the number of stations that offer E15 and E85. The EPA estimated that 1,640 retail stations offered E15 and 4,300 retail stations offered E85 in 2017. Since the total number of retail gasoline stations in the U.S. exceeds 150,000, this is a very small fraction of total retail capacity. Fourth, there is some evidence that RINs values associated with E85 are not fully passed through to the consumer level (Knittel, Meiselman, and Stock, 2015), which makes E85 more expensive than theory would predict. Fifth, biodiesel and renewable diesel have been plentiful. Combined with the price impact of the biodiesel tax credit and the previous restrictions, this has resulted in these biofuels being the cheaper and preferred alternatives to higher ethanol blends for filling the "gaps" in the RFS (*farmdoc daily*, February 15, 2018).

The bottom-line from this analysis is that the RVP waiver is just one of several factors that have held back the growth of E15 in the U.S. Removing the impediment of the current RVP waiver would certainly give a boost to E15 use but it would not address the other factors restricting growth. From the perspective of the grand bargain on the RFS, the gains with respect to ethanol use would likely be small in the short-run. Longer-run gains are uncertain and would depend on addressing the other factors listed above.

We now turn to the other half of the proposed grand bargain—the 10 cent cap on RINs prices. This proposal was thoroughly analyzed in an earlier *farmdoc daily* article on December 21, 2017. We focused in that article on biodiesel because it has been the "marginal" gallon for filling both the advanced and conventional RFS mandates, which means that D4 biodiesel RINs have been crucial in setting the price level of the vast majority of RINs traded. The key results are presented in Figure 1, which shows the biodiesel market when the RINs price cap is lower than the market determined RINs price. This sets off a series of important responses in the market. Given that the biodiesel (BBD) price is the diesel price plus the D4 price, the cap on the RINs price also caps the producer biodiesel price at $P_{BBD^*}$. At the new lower price of biodiesel the equilibrium production drops from $Q^M$ to $Q^{M^*}$, which, of course, reduces the volume mandate by the same amount. This leads to the essential insight from the analysis that, all else constant, the RINs price and the mandate level are directly related—one cannot be changed without changing the other. Stated differently, reductions in the volume mandates will reduce the RINs price, or reductions in the RINs price will reduce the volume produced, effectively reducing the mandate. Of course, this analysis is strictly economic and does not consider whether this "backdoor" method of reducing mandate levels is even legally feasible. For example, if $Q^M$ is the legal statutory mandate and the RINs price cap is binding as in Figure 1, then the statutory volume mandate is infeasible because not enough biodiesel will be produced.

We also estimated in the December 21st article the expected quantity impact of a 10 cent per gallon RINs price cap. Without the biodiesel tax credit, the impact of such a low RINs price cap on biodiesel would be catastrophic. The total biodiesel requirement for the RFS would be reduced from an expected three billion gallons in 2018 to zero gallons. If the biodiesel tax credit was reinstated, the impact is not quite as catastrophic, with the total requirement for 2018 being reduced from three billion gallons to 876 million gallons. The expected impact of the price cap on ethanol is not nearly as severe. Because we assume the equilibrium ethanol price is below the price of CBOB gasoline, ethanol use for E10 would not be affected. This also means that E10 is assumed to ultimately lower the cost of gasoline at the pump to consumers (assuming the lower cost of ethanol is fully passed on to consumers). However, the RINs price cap would remove all incentives for blending E15 and E85, and hence, the small amount of higher ethanol blends estimated in Table 1 would disappear.

**Figure 1. The Biodiesel (BBD) Market with a Binding Volume Mandate and Binding RINs Price Cap**




In sum, the $0.10 RINs cap would have large impacts on biofuels in the U.S. It would be equivalent to waiving: i) the BBD mandate down to zero, ii) the total advanced mandate down to zero (assuming cellulosic is eliminated by the cap as well), and iii) the conventional ethanol mandate down to the level of the E10 blend wall.

**Implications**

The political battle over the RFS has centered on the high price of ethanol RIN credits that are used to comply with the RFS conventional ethanol mandate. Independent merchant refiners claim that large RINs costs have materially harmed their profitability. A number of proposals have surfaced in recent months to address these concerns, but what seems to be getting the most traction is a "grand bargain" that involves trading off an E15 RVP waiver for a 10 cent per gallon cap on RINs prices. Our analysis indicates that removing the impediment of the current RVP waiver would give a boost to E15 use but the gains in ethanol use would likely be small in the short-run. Longer-run gains are uncertain and would depend on addressing several other factors that contribute to holding back the growth in usage of higher ethanol blends. By comparison, a 10 cent RINs cap would have large impacts on biofuels production and use in the U.S. In particular, the impact of such a low RINs price cap on biodiesel would be catastrophic. Assuming the biodiesel tax credit is not in place (which it is not at present), the total biodiesel requirement for the RFS would be reduced from an expected three billion gallons in 2018 to zero gallons. The expected impact of the price cap on ethanol is not nearly as severe. E10 use would not be affected, but the cap would remove all incentives for blending higher ethanol blends.

The picture that emerges from this analysis of a "grand bargain" over the RFS is one where the impact of an RVP waiver for E15 would be vastly smaller than the impact of a 10 cent per gallon RINs price cap. Whether this is a positive tradeoff obviously depends on the interests at stake. Agricultural and biofuels interests will find this tradeoff distinctly unappealing, while refining interests will tend to have just the opposite reaction. Given that this is not likely to be the foundation for a political compromise, other alternatives will likely need to be considered if the goal is to bring down D6 ethanol RINs prices. One possibility is to take advantage of the opportunity afforded by the recent shrinkage of the conventional ethanol gap (*farmdoc daily*, February 15, 2018). If ethanol usage could be pushed up just a few hundred million gallons, the conventional gap could be closed and D6 prices would naturally fall to just a few cents. An RVP waiver for E15 might just do the trick.

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