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Sarah Dunham
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RE: Proposed Denial of Petitions for Rulemaking to Change the RFS Point of Obligation: Docket ID No. EPA-OAR–2016–0544

Dear Acting Assistant Administrator Dunham:

This letter is an addendum to my comments of February 22, 2017 on the matter of the RFS point of obligation (document ID EPA-HQ-OAR-2016-0544-0069).

My Feb. 22 comment reviewed research on the extent to which RIN prices are passed through along the fuel supply chain. Subsequent work with those data has confirmed the main findings summarized in that letter. To summarize, those findings were:

(1) There is complete pass-through in bulk prices for obligated fuels (such as New York Harbor RBOB), that is bulk prices of obligated fuels on average move one-for-one with their RIN obligation. Thus, for example, a merchant refiner that sells into the bulk wholesale market on average recoups its RIN obligation in the sales price of the BOB.

(2) The degree to which RIN subsidies resulting from the detachment of RINs upon blending ethanol are passed through to rack prices varies across racks and regions. At some terminals, particularly in the Midwest, RIN prices are fully passed through to rack prices of E10 and higher blends, but at other terminals, particularly in the East, the RIN price subsidy from detaching the D6 RIN is not fully passed through to rack prices of E10. In addition, at many terminals in the East, higher blends (or E100 with RIN attached) are not regularly available.

(3) At retail, the rack price discount of E85, relative to E10, is only partially passed through to the retail customer. There is greater pass-through where there is greater competition, notably in the few urban markets with dense E85 stations such as

Minneapolis-St. Paul, and substantially less pass-through to E85 prices at stations that face little local E85 competition.

This addendum addresses an implication of findings (1) and (2) above for the incentives of "RIN-long" sellers of fuel at the rack to keep RIN prices high. This alleged incentive is one argument that moving the point of obligation to the "rack seller" would incentivize sales of higher blends by all rack sellers, whether RIN-long or RIN-short. If so, the change could increase market penetration of higher blends and increase the use of more renewable fuel.

In my original comment, I affirmed the view that RIN-long parties have an incentive to keep RIN prices high, and thus to restrict RIN generation by restricting sales of higher blends at the rack. Here, I place an important caveat on that statement, which is that this argument applies only to RIN long parties that are RIN-long because of an existing legacy stock of RINs inherited from previous operations. That legacy stock of RINs is an asset, and when a RIN-long party sells it on the RIN market, it is in their interest to have that price high.

In contrast, a party that is RIN-long because of ongoing operations does not have this same incentive. To explain, consider a vertically integrated refiner that purchases BOB from a merchant refiner, then blends that BOB, as well its own BOB, for sale at a terminal it owns. The vertically integrated refiner generates RINs in excess of its own obligation, which it can sell into the RIN market – that is, it is RIN-long as a result of its ongoing operations.

Unlike legacy RINs, for these RINS generated as part of ongoing operations, the vertically integrated refiner has no economic incentive to increase the RIN price. The reason is that the purchase price for the merchant refiner's BOB fully incorporated the RIN price, so that the RIN revenues generated by selling the excess RINs simply offset what was already paid for, in the form of a higher BOB price. The vertically integrated refiner will see RIN sales, at high RIN prices, as a source of revenue on their balance sheet, but it will not make profits from that sale because its upstream BOB cost increased one-for-one with the RIN price.

Although there is, by this reasoning, no economic incentive for RIN-long parties who are RIN-long through normal operations to increase RIN prices, high RIN prices nevertheless benefit some parties along the supply chain. In particular, recall that result (2) found that at some terminals, the value of the separated ethanol RIN is only partially passed through to the purchaser of fuel at the rack. If so, part of the RIN value is passed through to the purchaser, while part is retained by the rack seller.

In principle, this mechanism provides all sellers of fuel at the rack – whether RIN-long or RIN-short – with an incentive to limit sales of higher blends and thus to increase RIN prices. In practice, some rack sellers could be better situated to act on that incentive than others. Owners of terminals that also sell fuel at their racks could potentially restrict the availability of higher blends at the terminals they own. In contrast, owners of terminals that do not sell fuel at the rack, but simply provide rack services, would not have this disincentive to provide higher blends at their terminals.

One might be skeptical that any one rack owner could influence the price of RINs by providing facilities at its racks for selling higher blends or for selling E100-with RIN for splash-blending. However, the E85 market is extremely small, and as followers of the RFS and RINs know, small changes – on the order of hundreds of millions of D6 RINs in a 140+ billion gallon gasoline supply – in actual or expected RIN obligations can result in large fluctuations in RIN prices. The reason is that the market for E85 is small and regional, and substantially increasing RIN generation from higher blends would entail opening new markets. But opening of new markets depends on fuel availability at the rack, and a vertically integrated refiner that retains part of the RIN value has an incentive not to make higher blends available at racks at which it has local market power.

The data used by Pouliot, Smith, and Stock (2016) (submitted to the Docket Feb. 22, 2016) are consistent with this prediction. Those data consist of daily prices for gasoline and ethanol (neat and blends) at 252 distinct terminals. These terminals are not a nationally representative sample: the sample intentionally over-samples Midwest state with high E85 penetration. With this caveat, higher blends and/or E100 are available at 59% of the "open" terminals (owned by entities that do not sell fuel at the rack), but only 21% of the remaining terminals offer higher blends and/or E100.[1] These data suggest that availability of higher blends at the rack varies with whether the terminal owner sells fuel or only provides terminal services.

Obligated parties involved in RIN transactions explicitly see on their balance sheets RIN costs, for net purchasers, or RIN revenues, for net sellers. Although they see costs or revenues from BOB sales, they do not see on their balance sheet a separate line item reflecting the RIN price component of BOB. Therefore from an accounting perspective, firms would recognize RIN purchases or sales as impacting their bottom line, while from this accounting perspective they would not explicitly recognize the compensatory movement of their BOB expenditures or revenues.

[1] For this calculation, I classified terminals as open if they are owned by Buckeye, Kinder Morgan, Magellan, Nucor, or Transmont.

These points here are made more precise in the appendix to this amendment, which lays out a model of a profit-maximizing vertically integrated refiner which purchases fuel from a merchant refiner, and which has market power at its racks which thus permits it to retain part of the RIN value rated by separating D6 RINs.

This analysis suggests that the insufficient availability of higher blends in regions dominated by closed racks is not the consequence of some parties being RIN-long, but rather the consequence of the combination of local market power at the rack (because of the large fixed cost of building a rack) and an ownership structure that enables some rack sellers to restrict rack availability of higher blends or E100-with RIN. Changing the point of obligation would change neither the ownership structure nor local market power. Thus, changing the point of obligation would not address these reasons that higher blends are not available at such racks.[2]

Sincerely,

James H. Stock

[2] Local market power at the rack and rack ownership comprise only two of the reasons for the lack of market penetration of higher blends in most heavily populated markets. Another reason is the lack of downstream demand. This is a classic chicken and egg problem, and the states that have solved this problem did so largely through state incentive and promotion programs. In principle, the problem of limited penetration of higher blends could be addressed through programs like the USDA Biofuels Infrastructure Partnership, but (unlike the BIP program) structured to achieve a high retail station density with higher blend price competition in target markets.

Appendix

A Model of Higher Blend Availability at the Rack[3]

This appendix provides a model of a profit-maximizing vertically integrated refiner's decision whether to provide higher blends at the rack, when that refiner has market power at the rack and thus is able to retain some of the RIN value.[4]

I model a vertically integrated refiner that refines BOB, purchases BOB from a merchant refiner, and sells at the rack blended fuel from both its own BOB and the purchased BOB. It incurs a RIN obligation on the fuel it refines and blends, and generates D6 RINs by blending ethanol into E10 and, possibly, higher blends. The vertically integrated refiner controls the terminal, in the sense that the vertically integrated refiner can decide whether or not higher blends are offered at the rack. In general many fuels could be offered including E100. Here, I simplify so that the only fuels sold at the rack are E10 and, possibly, E85. I also simplify the RFS so that the only renewable fuel is conventional ethanol.

***Definitions*.** Let:

Q_R = quantity of BOB refined by the vertically integrated refiner
Q_M = quantity of BOB purchased from the merchant refiner
Q_{E100} = quantity of E100 blended by the integrated refiner
= number of D6 RINs generated by the integrated refiner
Q_{E10}, Q_{E85} = quantity of E10 (E85) sold at the rack by the vertically integrated refiner
P^* = international price of BOB (BOB sold into the international market)
P_{BOB} = bulk wholesale price of BOB (e.g. NYH RBOB spot)
P_{E100} = wholesale price of E100 (terminal gate price, with RIN attached).
P_{E10}, P_{E85} = rack price of E10 (E85)
P_{D6} = D6 RIN price

I assume that E85 consists of 26% BOB and 74% E100.

Market pricing equations. Consistent with the empirical results (1) and (2) in the second paragraph of this letter, I assume complete RIN pass-through in the bulk wholesale market, complete pass-through at the rack of wet fuel marginal costs, but potentially

[3] I thank Jing Li for her help with this model, although all responsibility for errors is my own.
[4] This model focuses on the source of profits by the vertically integrated refiner and the decision of whether to offer higher blends at the rack. The model takes partial RIN pass-through as a given. A more complex model would be needed, with market structure and interactions between market participants, to derive pass-through coefficients endogenously.

incomplete pass-through of the RIN value produced by blending ethanol into E10 or E85. Let

β = fraction of the value of the D6 RIN separated by blending ethanol that is passed through to rack prices of E10 and E85

α = RIN obligation on 1 gallon of BOB incurred under the RFS

Throughout I ignore additive markups, which are inessential to this argument. I also treat P^* as determined exogenously by global supply and demand for BOB. The market pricing equations thus are:

$$P_{BOB} = P^* + \alpha P_{D6}$$
$$P_{E10} = .9P_{BOB} + .1P_{E100} - .1\beta P_{D6}$$
$$P_{E85} = .26P_{BOB} + .74P_{E100} - .74\beta P_{D6}$$

Vertically integrated refiner's short term profit maximization problem. The vertically integrated refiner could sell its BOB into the competitive international market for P^*, so I treat this as the cost of its BOB. (I do not model the crack spread and treat the cost of the BOB to the downstream affiliate to be the opportunity cost of not selling it into the international market.) The vertically integrated refiner purchases BOB from the merchant refiner at P_{BOB}, and it purchases E100 at P_{E100}. Thus its costs are,

$$Cost = P^*Q_R + P_{BOB}Q_M + P_{E100}Q_{E100}$$

It sells the blended fuels at rack prices P_{E10} and P_{E85}, and generates revenues on the RINs it generates from blending in excess of its own RIN obligation.[5] Thus its revenues are,

$$Revenue = P_{E10}Q_{E10} + P_{E85}Q_{E85} + P_{D6}(Q_{E100} - \alpha Q_R).$$

Profits are revenues minus costs. After algebraic simplification using the market pricing equalities and the blending identities $.9Q_{E10} + .26Q_{E85} = Q_R + Q_M$ and $.1Q_{E10} + .74Q_{E85} = Q_{E100}$, profits are,

$$Profit = \Pi = (1-\beta)P_{D6}Q_{E100}. \qquad \text{(A.1)}$$

[5] Equivalently, we could have treated the upstream operations as selling Q_R to the downstream operation at P_{BOB}, then purchasing the RINs needed to meet its obligation from the downstream operation at the market price P_{D6}. This alternative treatment yields the same profit function (A.1).

Discussion

1. The total amount of RIN generation is Q_{E100}, and the value of those RINs is $P_{D6}Q_{E100}$. Under perfect competition at the rack, the vertically integrated refiner would pass all that RIN value on to the consumer ($\beta = 1$) and would make no economic profits. If the vertically integrated refiner is able to retain some of the RIN value, so $\beta < 1$, then profits at the rack depend solely on the number of RINs generated, their price, and the pass-through rate. Note that the concept of profits used here is that of economic profits, or rents, which are profits above and beyond normal profits or margins.

2. Profits do not depend separately on the amount of excess RINs generated by blending Q_M; that is, there are no additional economic profits stemming from being RIN-long. The reason is that the merchant refiner fully passes on the cost of its RIN obligation into the BOB price, so that the vertically integrated refiner's revenues from selling excess RINs simply offset this higher cost.

3. Profits increase with high RIN prices, so the vertically integrated refiner has an incentive to keep RIN prices high – not because it is RIN-long, but because it retains a fraction (1-β) of the RIN value of all the ethanol it blends.

4. The decision about whether to sell E85 at the rack and, if so, how much, is modeled by maximizing profits with respect to Q_{E85}. The integrated refiner will introduce E85 at the rack if its profits increase by doing so. After some algebra this condition becomes,

$$\left.\frac{\partial \Pi}{\partial Q_{E85}}\right|_{Q_{E85}=0} = .74(1-\beta)P_{D6} + 0.1(1-\beta)Q_{E10}\frac{\partial P_{D6}}{\partial Q_{E85}} \geq 0$$

   The first term in the center expression is the retained value of the RIN generated by blending an additional gallon of E85, holding E10 blending constant; this term is positive. The second term is the change in the value of the retained fraction of the RINs generated by blending E10, which is negative because generating an additional RIN by blending E85 reduces the price of the D6 RIN. If the second term outweighs the first, the vertically integrated refiner will not offer E85 at the rack if it is profit maximizing. The tradeoff between these two terms depends on two factors:

(a) How much the D6 RIN price declines when additional RINs are by E85 sales, given the RVO (this is the term $\partial P_{D6}/\partial Q_{E85}$ [6]). Experience in the RIN market suggests that this term is large for RVOs above the ethanol capacity of E10, with expansion on the order of hundreds of millions of RINs having a significant effect on RIN prices.

(b) How much E10 the vertically integrated refiner blends. If the vertically integrated refiner blends only a small amount of E10, then the loss on the retained value of RINs generated by E10 blending could be outweighed by the retained value from blending E85. On the other hand, a vertically integrated refiner with a large E10 presence could lose a small amount of profits per gallon, on many gallons of E10, so would have an incentive not to provide E10.[7]

[6] Specifically, this partial derivative is the change in P_{D6} from producing an additional fraction of a RIN by increasing E85 consumption by 1 gallon, holding constant the RVO, the total energy value of fuel (E10 + E85) consumed, and other factors that affect RIN prices.

[7] This calculation ignores costs of investing in rack equipment to dispense E85; including those costs would increase the disincentive for the vertically integrated refiner to offer E85 at the rack. It also supposes that the vertically integrated refiner's E85 sales can be increased without changing its E10 sales; modifying this assumption to introduce an offset does not change the qualitative conclusions outlined here.