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Testimony Before the U.S. House Committee onEnergy and Commerce Subcommittee on Environment

Gabriel E. Lade

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Abstract

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TESTIMONY BEFORE THE U.S. HOUSE COMMITTEE ON ENERGY AND COMMERCE SUBCOMMITTEE ON ENVIRONMENT

Background on Renewable Identification Numbers under the Renewable Fuel Standard
Wednesday, July 25, 2018

Gabriel E. Lade
Center for Agricultural and Rural Development
Iowa State University

Chairman Shimkus, Ranking Member Tonko, and members of the Committee: Thank you for the opportunity to participate in today's hearing.

My testimony focuses on the purpose and operation of Renewable Identification Numbers, better known as RINs, as the compliance mechanism for meeting the Renewable Fuel Standard (RFS) mandates. In particular, my remarks emphasize RINs' accounting and economic role under the RFS, as well as summarize the empirical evidence on RIN price determinants and their impact on downstream fuel prices. I also address the potential effects of certain proposed changes to the RFS on RIN prices, and their implications for future biofuel use in the United States.

My testimony can be summarized as follows:

- First, RINs serve a vital accounting role in RFS compliance. However, their economic role is even more critical. RIN prices adjust to ensure that Congressional biofuel blending mandates are met. High RIN prices effectively tax gasoline and diesel, discouraging their use, and subsidize biofuels, stimulating their demand.
- Second, several features of RIN markets suggest that they are efficient. Prices adjust quickly to changing compliance cost expectations, and most RIN price volatility since 2013 can be attributed to ever-changing blending targets and uncertainty regarding future mandate volumes. However, publicly available data is insufficient to determine whether the market is fully efficient or free of manipulation. Greater transparency would allow researchers and regulators to study these issues. Further, transparency would make attempts to manipulate the market more difficult and costly.
- Third, the empirical economics literature continues to show that, on average, downstream prices fully reflect upstream RIN costs. This means that so long as refiners offset their RFS compliance obligations as they accrue them, on average, they are fully compensated for their RIN costs through higher wholesale gasoline and diesel prices.
- Fourth, recent actions by the Environmental Protection Agency likely undermine RIN markets and may drive away market participants. This would be detrimental to market liquidity and inhibit price-discovery. RIN markets are designed to provide a signal about the value of

biofuel production and distribution. That signal becomes unreliable when EPA decisions are unpredictable and lack transparency.

- Finally, details matter in any proposed changes to the Renewable Fuel Standard. A leading administrative reform proposal involves capping RIN prices and waiving RVP requirements for E15 so that the fuel can be sold year-round. Absent significant small refiner exemptions, and assuming other aspects of the RFS regulation remain the same, a D6 RIN price cap below $0.40/ RIN is likely to bind. A binding price cap necessarily means that domestic ethanol blending will be below mandated volumes. Nonetheless, RIN price caps could serve an important, stabilizing role in RIN markets, particularly if EPA continues to adjust mandate levels in response to high RIN prices. However, the impacts of any reform depend critically on the details. RIN price caps could make sense as part of a broader reform, but whether they have the intended effects on RIN markets or national biofuel use depends on whether and how other aspects of the program also change.

I. The Accounting and Economic Role of RINs

The Renewable Fuel Standard (RFS) was established in its current form in 2007 by the Energy Independence and Security Act of 2007 (EISA). The program set ambitious long-run minimum volumetric domestic renewable fuel use targets for the United States transportation fuel industry. The purpose of the program is to (i) enhance energy security by promoting domestic fuel production and reducing U.S. reliance on oil imports; (ii) support rural economies; and (iii) lower greenhouse gas emissions from transportation fuels. To satisfy objective (iii), the EISA mandates set separate volumetric targets for four biofuel categories (i) conventional renewable fuel; (ii) advanced biofuel; (iii) biodiesel; and (iv) cellulosic biofuel. Each category has different lifecycle greenhouse gas (GHG) reduction requirements.[1]

The EPA could enforce the RFS mandates in many ways. Rather than more prescriptive means, the Agency uses tradeable credits to implement the mandates. This "market-based" enforcement mechanism is similar to those used by other policies such as the U.S. lead phasedown program and the U.S. sulfur dioxide allowance trading program. These types of policies leverage the insight that well-functioning markets can allocate compliance in a 'least-cost' way. Under the Renewable Identification Number (RIN) system, inefficient biofuel producers are unlikely to be able to sustain a substantive market share. It is because of this that economists have touted these enforcement mechanisms for well over 30 years as an efficient way to implement policies like the RFS (Schmalensee and Stavins, 2017).

RINs accounting role: RIN serve first-and-foremost as an accounting system, tracking biofuel use throughout the United States. Every gallon of qualifying biofuel produced in or imported into the United States generates a unique RIN in EPA's Moderated Transaction System (EMTS). RINs are 'attached' to biofuels until they are blended at wholesale terminals for final consumption, after which they are 'separated' from the physical fuel and can be transferred to any party registered under the EMTS (Figure 1). Different types of biofuels generate different RINs that correspond to the mandate categories described above.

[1] Bracmort (2018) provides a more detailed description of these requirements.

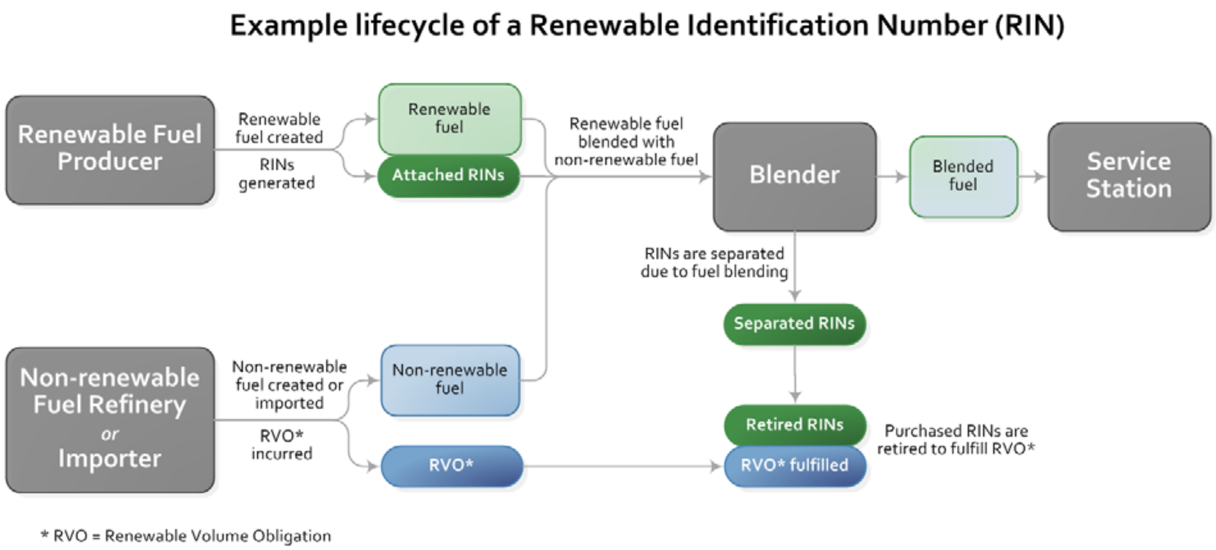

Figure 1- Lifecycle of a RIN. (Source: Environmental Protection Agency)

Every year, the EPA sets obligated parties' renewable volume obligations (RVOs). Obligated parties are defined as under the law as U.S. oil refiners and fuel importers. RVOs come in the form of percentage standards. At the end of every compliance period, obligated parties must turn in a number of RINs equal to their RVO. Only separated RINs can be turned in, or ‘retired' per Figure 1, for compliance. This system ensures that only domestically blended biofuels count towards obligated parties' RVOs.

EPA sets separate RVOs for each biofuel category, and these requirements are nested. Cellulosic (D3) RINs can be used by obligated parties to comply with their cellulosic biofuel, advanced biofuel, and conventional biofuel RVOs. Biomass-based diesel RINs (D4) count towards parties' biomass-based diesel, advanced biofuel, and conventional biofuel RVOs. Advanced RINs (D5) count towards parties' advanced and conventional biofuel RVOs. Conventional renewable fuel RINs (D6) count only towards conventional biofuel RVOs.

Figure 2 illustrates the nesting structure. Most corn-starch ethanol generates “D6” RINs that count towards the conventional renewable fuel mandate. Fuels whose lifecycle greenhouse gas (GHG) emissions are at least 50% lower than gasoline or diesel generate “D5” RINs that can count towards the advanced biofuel mandate. Biomass-based diesel that achieves at least a 50% GHG reduction generates "D4" RINs. Last, cellulosic biofuels that achieve a 60% or greater GHG reduction generates "D3" RINs.

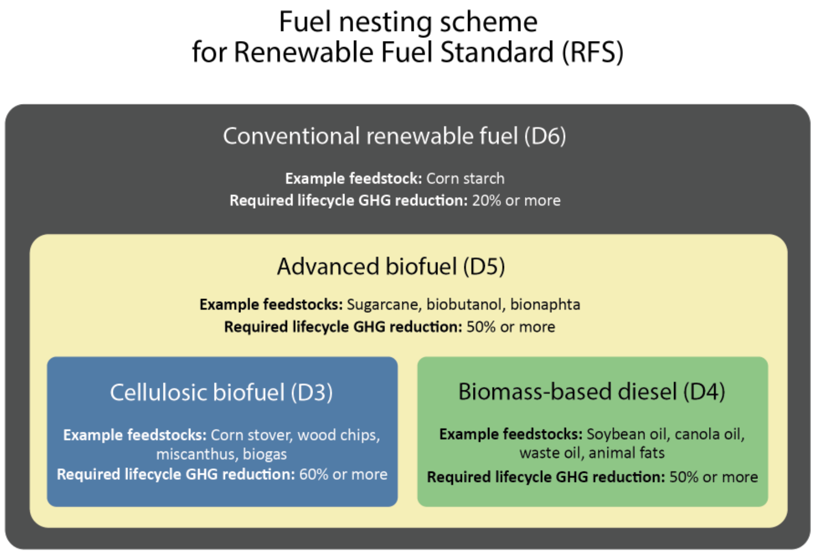

Figure 2- Nesting structure of RINs (Source: Environmental Protection Agency)

An example may help clarify how the RVOs work. Suppose the EPA sets a 10% total biofuel percentage standard; a 4% advanced biofuel standard; and a 1% cellulosic biofuel and biomass-based diesel standard. For every one hundred gallons of gasoline or diesel sales, obligated parties must purchase ten RINs. Of those, at least four RINs must be D5, D4, or D3. Further, at least one of the four advanced RINs must a D3 RIN and one a D4 RIN. The 'undifferentiated' six RINs can be D6 RINs.

RINs economic importance: More important than its accounting purpose is the economic incentive that RINs provide for biofuel use. Every gallon of gasoline or diesel sales creates a proportional RIN obligation for obligated parties, ten RINs for every one hundred gallons in the example above. At the same time, every gallon of biofuel generates a RIN that can be sold. So long as RIN prices are positive, this mechanism acts as an implicit tax on gasoline and diesel sales and a subsidy for biofuels. As RIN prices rise, the tax and subsidy values increase. In turn, the value of blending biofuels increases and fuels with higher biofuel blends become more attractively priced to consumers.

Table 1 provides an example of the fuel price impacts of RINs. The table presents prices for E0 (100% gasoline), E10 (90% gasoline, 10% ethanol), E15 (85% gasoline, 15% ethanol), and E85 (25% gasoline, 75% ethanol) using wholesale gasoline and ethanol prices reported by the Nebraska Energy Office, but artificially varying RIN prices. Ignore the values in parentheses for now.

Table 1 – RIN price impacts on retail fuel prices

RIN Price	E0 Price	E10 Price	E15 Price	E85 Price
$0.00	**$2.70**	**$2.62**	**$2.58**	**$2.10**
	($2.70)	*($2.69)*	*($2.69)*	*($2.62)*
$0.25	**$2.73**	**$2.62**	**$2.57**	**$1.92**
	($2.73)	*($2.69)*	*($2.67)*	*($2.44)*
$0.50	**$2.75**	**$2.62**	**$2.55**	**$1.73**
	($2.75)	*($2.69)*	*($2.66)*	*($2.26)*
$0.75	**$2.78**	**$2.62**	**$2.53**	**$1.55**
	($2.78)	*($2.69)*	*($2.64)*	*($2.08)*

Notes: All examples use a $2.21/gal unleaded gasoline (87 octane) price and $1.40/gal wholesale fuel ethanol price based on average rack prices reported by the Nebraska Energy Office for June 2018. All prices include a $0.184/gal federal and $0.30/gal state fuel tax. All examples assume a 10% biofuel mandate and that all RIN prices are equal. Italic values in parentheses inflate ethanol costs to $2.10 to reflect the fuel's lower energy content relative to gasoline. Prices do not include any retail station markup. E10 prices remain the same regardless of RIN price because the implicit RIN tax is nearly exactly offset by the implicit RIN subsidy across the prices considered. (Source: Nebraska Energy Office; Author's calculations.)

E0 is the most expensive fuel in all cases due to gasoline's higher wholesale cost. Suppose that total U.S. ethanol demand is not sufficiently high at a $0 RIN price to meet the RFS mandates. As described in Section II, RIN prices will increase in response to this RVO deficit. As RIN prices increase, fuels with higher-ethanol blends become more attractively priced. This adjustment will lead to consumers who own non-flex fuel vehicles to switch from E0 to E10 and incentivize consumers with FFVs to switch from E10 to E15 or E85.[2]

[2] Flex fuel vehicles are vehicles with engines that are capable of fueling with any ethanol-gasoline blend up to 85%. In 2016, it was estimated that there were as many as 20 million FFVs in the U.S., around a 7% market share. See https://www.afdc.energy.gov/vehicles/flexible_fuel.html.

The table demonstrates another important impact of the RFS. Most fuel sold today in the United States is E10, a 10% ethanol-gasoline blend. As RIN prices rise, E10 prices are virtually unaffected because the implicit subsidy for ethanol in E10 almost entirely offsets the implicit tax on gasoline in E10. For fuel with ethanol blends exceeding a 10% volume, higher RIN prices decrease retail prices. Thus, most U.S. consumers are unaffected by high RIN prices at the pump, and those who use high-ethanol blend fuels likely benefit from high RIN prices. The cost of the RFS mostly lies upstream of consumers - the mandates shift market shares from petroleum to biofuel producers.

II. RIN Market Efficiency

An efficient RIN market is critical to a successful, least-cost implementation of the RFS. Before discussing the market's performance, a digression on RIN price determinants may be useful.

RIN price determinants: In a competitive market, RIN prices are only positive if RFS mandates require more ethanol or biomass-based diesel use than the market would deliver in the absence of the mandates. In most cases, RINs increase ethanol blending in gasoline and biomass-based diesel blending in diesel. The determinants of RIN prices in these two markets are distinct, though the markets for RINs generated by ethanol and biomass-based diesel are linked due to the nesting structure of the mandates.

There are many reasons for the fuel industry to blend ethanol in gasoline even in the absence of the RFS mandates, particularly given the large, industry-wide investments in blending infrastructure across the U.S. in the last decade. First, ethanol is an EPA-approved fuel oxygenate. Oxygenate blending is required in many U.S. regions under the Clean Air Act because they reduce tailpipe emissions.[3] Second, ethanol has a higher octane rating than gasoline. Octane is a measure of a fuel's combustion resistance, and higher performance vehicles typically require higher-octane fuel to operate efficiently. Ethanol's higher octane allows refiners to decrease octane production at the refinery, reducing costs.

Figure 3 illustrates how RINs impact ethanol markets. Ignore the red curve for now. Given the benefits of ethanol blending, and so long as ethanol costs are competitive with gasoline, ethanol

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[3] See https://www.eia.gov/outlooks/steo/special/pdf/mtbe.pdf.

blending is positive even with no mandate. Ethanol price and quantity with no mandate will be determined at the intersection of the fuel's supply and demand curve. RIN prices equal zero if the mandate is set at or below this level because the market needs no extra incentive to meet the mandate.

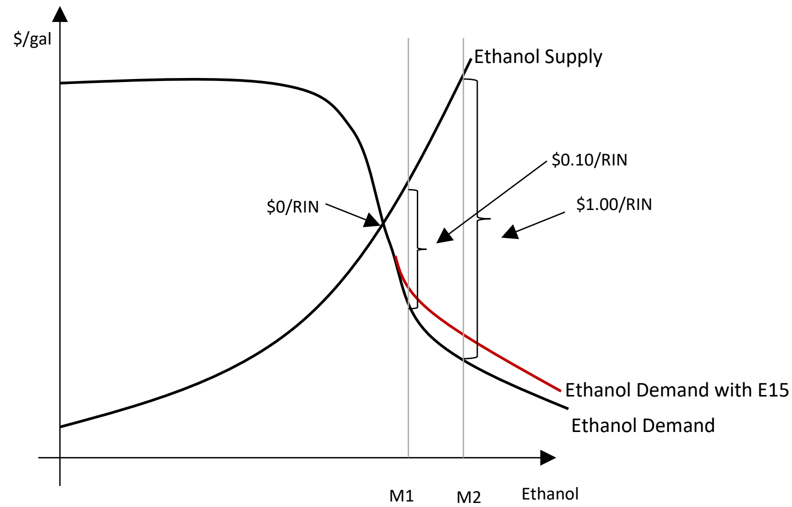

Figure 3 – Ethanol demand and RIN pricing

RIN prices are positive when the RFS requires greater ethanol consumption than the market would provide in the absence of the program. In Figure 3, RIN prices are $0.10/RIN to meet the mandate M1 and rise sharply to $1.00/RIN if the mandate is set at M2. The sharp decline in the ethanol demand curve reflects a fundamental constraint on ethanol-gasoline blending in the U.S. – most vehicles are only approved to use up to 10% ethanol blends. After E10 saturate the conventional gasoline vehicle market, the only way to increase ethanol use is by increasing E15 or E85 demand. For several reasons, including limited FFV and E15/E85 fueling station capacity as well as FFVs consumers' hesitancy to switch to E85, increasing E15/E85 demand requires low ethanol prices. As shown in Table 1, this is achieved through higher RIN prices.

Biomass-based diesel does not face the same blending constraints as ethanol. It does, however, have higher production costs. This is illustrated in Figure 4. In this example, the fuel industry demands any amount of biodiesel so long as it is price-competitive with diesel. Because it has high production costs, the market demands little biodiesel in the absence of the RFS. As biodiesel blending requirements increase, RIN prices rise sharply, reflecting the additional cost of supplying each extra gallon of biodiesel to the market.

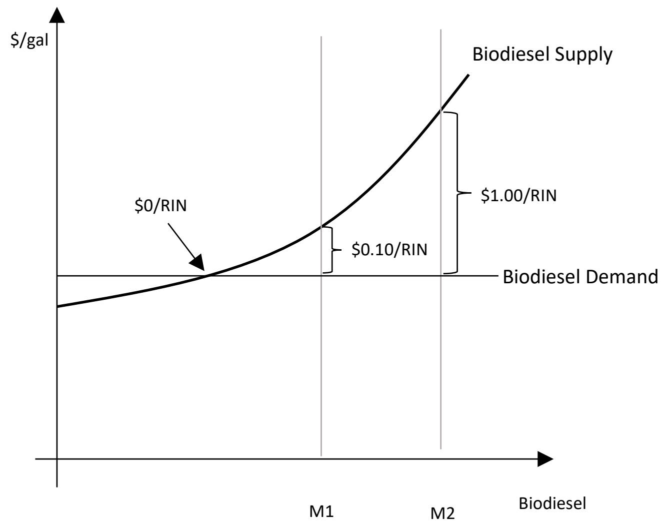

Figure 4 – Ethanol demand and RIN pricing

RIN market efficiency. Fama (1970) famously defined an efficient market as one in which "prices always fully reflect available information." For RINs, this requires that prices reflect all costs of meeting the RFS. These costs are affected by (i) current and future mandate levels; (ii) the required discount that consumers need to fuel with E15 and E85; (iii) current and future gasoline, diesel, and biofuel prices; and (iv) current and future biofuel production costs. All of these are subject to substantial uncertainty. Just a few academic studies estimate E85 demand (Pouliot and Babcock, 2017; Pouliot, Liao, and Babcock, 2018), and there are no such studies of E15 demand. This means that little is known about the shape of the demand curve in Figure 5, especially as ethanol use rises above the blend wall. Future agricultural feedstock and oil prices are also notoriously difficult to predict. Last, since at least 2013, EPA rulemaking has continued to shift industry expectations of current and future mandates. Figures 3 and 4 illustrate why shifting mandates cause volatility. Small mandate increases, from M1 to M2 in both Figures, sharply increase RIN prices due to the large discounts that FFV owners require to consume fuel and sharply rising biodiesel production costs.

Determining whether RIN markets are efficient is challenging. One metric is to study how quickly RIN prices adjust to new information. My colleagues and I studied this in a recent peer-reviewed publication (Lade, Lin-Lawell, and Smith, 2018). We found that RIN prices quickly responded to

EPA announcements shifting industry expectations of future mandates. Figure 5 shows D6 RIN prices from 2012 to mid-2016 overlaid with EPA announcements. Prices promptly increased or decreased depending on whether the announcement increased or reduced expected mandate levels. The finding is encouraging as it suggests that the market is liquid.

Figure 5 - D6 RIN prices after the release of EPA's (1) 2013 Final Rule, (2) 2014 Proposed Rule, (3) 2014-2016 Proposed Rule; (4) 2014-2016 Final Rule; (5) 2017 Proposed Rule; and (6) 2017 Final Rule. (Source: Oil Price Information Service)

Manipulation of RIN markets. A related concern to market efficiency is whether there is an opportunity for parties to manipulate RIN prices. The issue has been raised by several journalists, particularly after RIN prices increased so suddenly in 2013.[4] Publicly available RIN transaction data are insufficient to determine whether the market has been manipulated.[5] As a result, no academic study speaks directly to this question. Commodity and Futures Trading Commission (CFTC) Chairman Giancarlo testified earlier this year that, using detailed RIN transaction data from EPA, CFTC staff were unable to find obvious manipulation in RIN markets. However, the Chairman cautioned that available data was insufficient to draw definitive conclusions.[6]

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[4] See https://www.nytimes.com/2013/09/15/business/wall-st-exploits-ethanol-credits-and-prices-spike.html.
[5] Daily RIN prices are available through several subscription services like Oil Price Information Service, Bloomberg, and EcoEngineers. EPA posts aggregate RIN generation, separation, and retirement data at https://www.epa.gov/fuels-registration-reporting-and-compliance-help/public-data-renewable-fuel-standard.
[6] See https://www.dtnpf.com/agriculture/web/ag/news/business-inputs/article/2018/02/15/cftc-draw-conclusion-rin-market-epa-2.

Similar concerns have been raised in other tradeable credit markets. In 2013, researchers at the University of California, Berkeley, University of California, Davis, and Stanford University considered the potential for manipulation in California's Cap and Trade allowance program.[7] The authors recommended that the California Air Resources Board (ARB) release timely and accurate data on state emissions levels as well as data on firms' allowance holdings. They argued that greater transparency makes it more difficult for firms to acquire large enough positions to manipulate prices. The authors recommend that the ARB could, for example, disclose firms' holdings when their net long positions exceed certain thresholds or publish the distribution of net-holdings of market participants.

Similar concerns also arose in California's market for Low Carbon Fuel Standard credits. To address this, the California ARB posts quarterly histograms of parties' net positions.[8] For example, April 2018 data show that three firms currently hold upwards of 40% of banked LCFS credits.

A few issues are worth considering when debating the speculators' role in RIN markets. First, as shown in Figure 5, much of the observed RIN market volatility can be explained by shifting signals from EPA. Second, correlation does not imply causation. The entrance of speculators into RIN markets when volatility increases does not mean that speculators cause price volatility. In fact, volatility makes markets more attractive to speculators. Third, speculators can serve a crucial role in increasing market liquidity. Last, even if a market actor were to acquire a large position in RIN markets, their ability to manipulate prices is limited by a key feature of RINs - biofuel producers can always generate more RINs by increasing production. This would undercut efforts to manipulate RIN prices through withholding.

III. Impacts of RINs on Downstream Market Prices

RIN price impacts on bulk, wholesale, and retail fuel prices have been a key point of contention. The debate can be segmented into two questions. First, are RIN costs reflected in wholesale

[7] See https://www.arb.ca.gov/cc/capandtrade/emissionsmarketassessment/informationrelease.pdf.

[8] See https://www.arb.ca.gov/fuels/lcfs/dashboard/dashboard.htm.

gasoline and diesel prices? Second, do high-ethanol blend fuels (E15 and E85) reflect RIN subsidies?

An important distinction is necessary on the statutory versus economic incidence of taxes. Statutory tax incidence lies with the party that has to pay a tax bill. Economic incidence refers to the burden of the tax after market prices adjust. For example, depending on the state, either fuel stations, wholesale distributors, or refiners pay state fuel taxes (Kopczuk et al., 2016). However, we all know that gas prices rise when fuel taxes increase. A naïve analysis would suggest that consumers do not pay the tax since they do not receive a bill from the state government, i.e., their statutory incidence is zero. However, the economic incidence lies almost entirely with consumers – upstream parties are typically fully compensated for their tax bill through higher prices at the pump.

A similar distinction arises in the RIN context. The statutory RIN tax lies with refiners and fuel importers – they pay the RVO 'tax bill' to the EPA every year. However, whether refiners bear the economic burden of the tax depends on whether wholesale gasoline and diesel prices rise with RIN prices. Knittel, Meiselman, and Stock (2016, 2017) find that, on average, bulk petroleum fuel prices rise and fall one-to-one with RIN costs.[9] This means that when RIN prices increase, wholesale gasoline and diesel prices typically increase to exactly offset refiners' RIN costs. So while the statutory incidence lies with refiners, they bear none of the economic incidence.[10] Several parties have questioned these results. Nonetheless, EPA's analysis agreed with Knittel, Meiselman, and Stock and the agency strongly argued that RIN costs are reflected in downstream fuel prices in its denial of petitions to change the RFS point of obligation (EPA, 2016).

Several caveats are in order. First, while pass-through is complete on average, it may not always be the case that refiners are always fully compensated for their RIN costs. Second, the result holds for bulk petroleum prices. While wholesale terminal prices closely follow bulk prices, some wholesale terminal prices may not fully reflect RIN costs. Pouliot, Smith, and Stock (2017) study RIN pass-through at gasoline distribution terminals at 57 U.S. cities and find that pass-through

[9] Bulk petroleum fuels considered by the authors include Gulf diesel, New York Harbor diesel, New York Harbor RBOB and CBOB, and Los Angeles RBOB. Wholesale terminal prices in the U.S. are typically set in relation to these market prices.

[10] See Babcock, Lade, and Pouliot (2016) for more discussion on the impacts of the RFS on merchant refiners.

varies across regions and depends on whether they study branded or unbranded prices. Last, while bulk fuel prices compensate refiners for their RIN costs, RIN price volatility creates risk for refiners that do not purchase RINs as they accrue their RVO. Overall, while the academic literature to date suggests that the economic incidence of RINs lies with downstream parties, more work is needed to understand how RINs affect fuel prices better.

Table 1 illustrates the importance of the second question, whether the RIN subsidy for high-ethanol blend fuels is reflected in consumer prices. I assumed that this was true in Table 1 and my discussion in Section I. Pass-through of the RIN subsidy is critical to increase ethanol demand, particularly for E15 and E85. Market participants and the EPA questioned whether retail E85 prices reflected the upstream RIN subsidy. For example, the EPA included the following language in its proposed rule for the 2017 biofuel standards:

> *"RIN prices can continue to provide additional subsidies that help to reduce the price of E85 relative to E10 at retail, but the propensity for retail station owners and wholesalers to retain a substantial portion of the RIN value substantially reduces the effectiveness of this aspect of the RIN mechanism."*

I studied this issue in a recently published, peer-reviewed paper (Lade and Bushnell, Forthcoming). Using data from over 450 retail fuel stations in Iowa, Illinois, and Minnesota, we found that half to three-quarters of the RIN subsidy for E85 was passed-through to consumers, with even higher pass-through rates since 2015. Complementary work supports these findings (Li and Stock, 2017). This suggests that the economic mechanisms described in Section I are working – when RIN price increases, E15 and E85 prices decrease.

IV. Small Refiner Exemptions and RIN Prices

EISA allows the EPA to provide RVO exemptions to small refiners that would experience disproportionate hardships from complying with the RFS. However, in the past exempted volumes were reallocated to other refiners, leaving mandate volumes unaffected. Recent reports suggest that EPA granted substantially more 'small refiner exemptions' (SREs) in 2017 than in previous years, increasing SREs from 790 million RINs in 2016 to 1.46 billion RINs in 2017.[11] Further, reports suggest that at least some portion of these exemptions were not reallocated to larger refiners, breaking with past precedent, and that EPA issued RINs that were not generated by biofuel productions to some refiners to retroactively offset previous RVOs.[12]

These actions have two impacts on RIN markets. First, SREs act as a mandate cut to the RFS if EPA does not reallocate the exempted RVOs to larger refiners. Second, the secrecy surrounding SREs undermines the integrity of RIN markets, especially if only the firms receiving the exemptions know of their existence. Lack of transparency increases market participants' uncertainty of mandate levels. In the long-run, uncertainty delays investments in the very biofuel infrastructure that the RFS is designed to incentivize.

V. RFS Reform Proposals: RIN Price Caps and RVP Waivers

Several RFS reforms have been proposed, particularly over the last year. I will highlight the potential impacts of one prominent administrative reform proposal on RIN markets - a D6 RIN price cap with an E15 Reid Vapor Pressure (RVP) waiver. Lade, Pouliot, and Babcock (2018) provide a more in-depth discussion on this topic.

The EPA could implement a D6 RIN price cap by offering "waiver credits" much as they do for the cellulosic biofuel mandate. EPA would allow parties to purchase RINs at a fixed price from the Agency instead of on the market. Biofuel production would not generate these waiver credits. Thus, biofuel use will be lower than the mandated volumes whenever obligated parties use the credit window.

RIN price caps have many merits. High RIN prices since 2013 have led to extensive RFS lobbying by both the biofuels and oil industries. EPA has responded by adjusting the statutory mandates. The ensuing RIN market volatility from this approach is evident in Figure 5. If EPA or Congress intend to meet legislative RFS mandates only if compliance costs are below a certain level, a RIN price cap is the most effective way to signal this intent to fuel markets. With a RIN price cap,

[11] See https://www.reuters.com/article/us-usa-biofuels-epa/biofuel-groups-ask-u-s-government-to-slow-small-refinery-waiver-program-idUSKBN1K82UL and http://biomassmagazine.com/articles/15445/epa-provides-data-on-2016-2017-rfs-waivers-in-letter-to-grassley.

[12] See https://www.reuters.com/article/us-usa-biofuels-waivers-exclusive/exclusive-epa-grants-refiners-biofuel-credits-to-remedy-obama-era-waiver-denials-idUSKCN1IW1DW

investors, producers, and other market participants know that they must produce and sell biofuels at or below the cap, reducing uncertainty caused by policy gyrations. However, the level of a RIN price cap is crucial. A low cap signals to markets that only low-cost compliance options can be used to meet the mandates and that remaining compliance will be met through wavier credits purchases. A low RIN price cap also reduces the incentive to blend biofuels into motor fuel and increase biofuel fueling infrastructure.

RIN prices over the last two years suggest that, absent significant SREs and other changes to the RFS program, a D6 RIN price cap at or below around $0.40/RIN is likely to bind. That is, setting a D6 RIN price cap below $0.40/RIN will effectively reduce biofuel use below current EPA mandates. A price cap below $0.20/RIN would reduce price discounts for E15 and E85, and decrease demand for the fuels.

An E15 RVP waiver would allow year-round sales of the fuel. The current lack of a waiver that retailers in many U.S. regions are not only allowed to sell E15 in the summertime. This necessarily decreases the value of investing in E15 fueling infrastructure. Granting a waiver would likely increase investment in E15 pumps, making the fuel more available across the United States. Figure 3 illustrates the likely effect that an E15 RVP waiver would have on RIN prices. More E15 stations increase demand for ethanol in the U.S., shifting the demand curve for ethanol outward. If this shift is large, RIN prices will decrease.

It is difficult to determine how large of an impact an E15 waiver would have on RIN prices. E15 is a new fuel, and consumer uncertainty about whether E15 is appropriate to use in their vehicles will make them less likely to use the fuel even when it is priced competitively with E10. E15 pumps include warnings that the fuel is only appropriate for use in passenger vehicles manufactured after 2001 or in FFVs. Further, many manufacturers include warnings to consumers not to use E15 in some newer vehicle models.

Also, because ethanol has a lower energy content than gasoline, E15 needs to be priced several cents below E10 to be competitive. E15 contains around 1.75% less energy per gallon than E10, which means consumers' fuel economy decreases when they use the fuel. For illustration purposes, I inflate the ethanol price used to calculate retail fuel prices in Table 1 to account for its lower energy content. Results are in parentheses. Ethanol blends are less attractive from this 'gasoline-gallon equivalent' pricing perspective. When RIN prices are $0.25/RIN, E15 is priced $0.05/gal lower than E10. However, the discount is just $0.02 when the energy content differences are accounted for. In recent work, my co-authors and I found that RIN prices below $0.20/gal are unlikely to provide consumers with a large enough discount to substantially increase demand for E15 for a wide range of gasoline and ethanol wholesale prices, especially if consumers require a larger price discount than the energy content value.

All of the discussion above assumes other features of the RFS program would be unchanged. The discussion is meant to demonstrate the policy trade-offs inherent in reform proposals. Ultimately, details matter a great deal in understanding the potential implications of any reform proposal. Price caps and RVP waivers may have very different impacts on RIN costs and biofuel blending if other aspects of the regulation also change.[13] As with other issues addressed in my testimony, more research is needed to understand the implications of any proposal.

[13] See Stock (2018) for a detailed analysis of other RFS reform proposals.

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