Understanding the RFS and RINs

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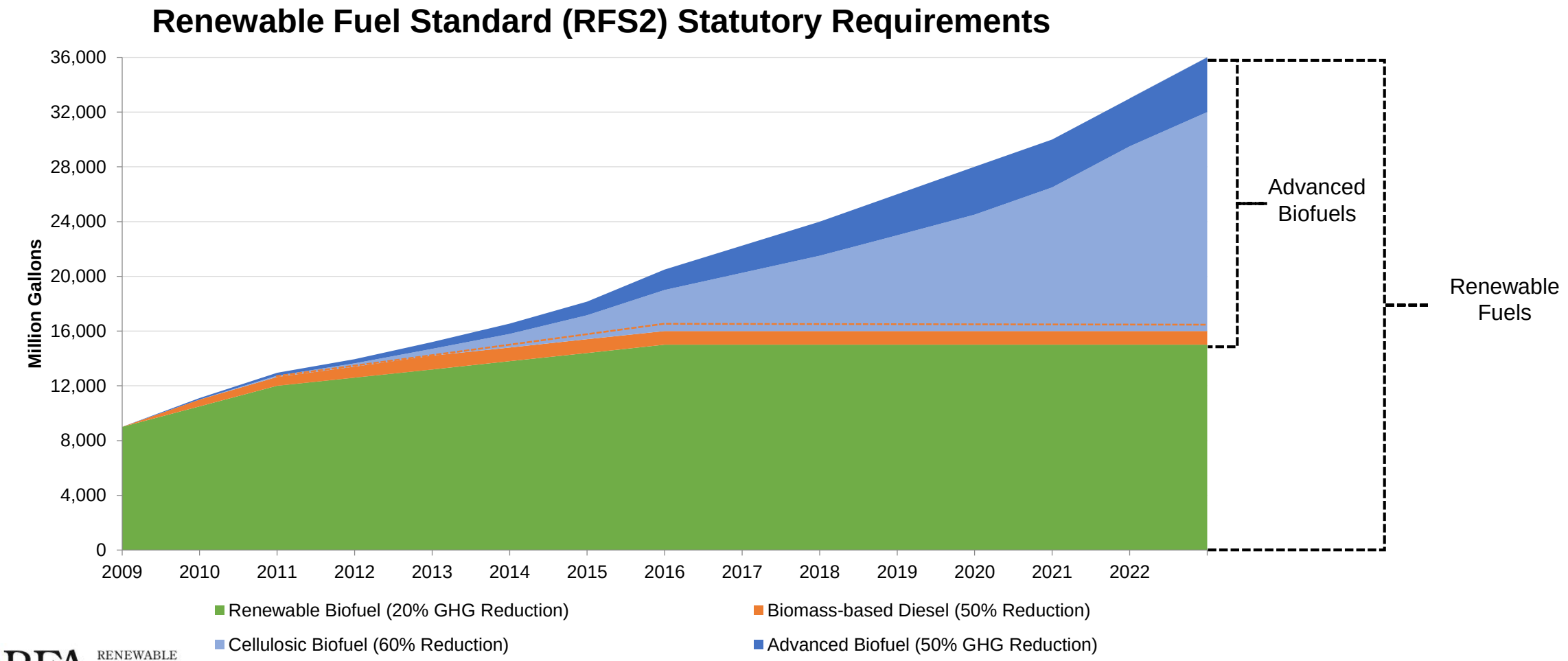
To understand RINs, you must first understand the RFS



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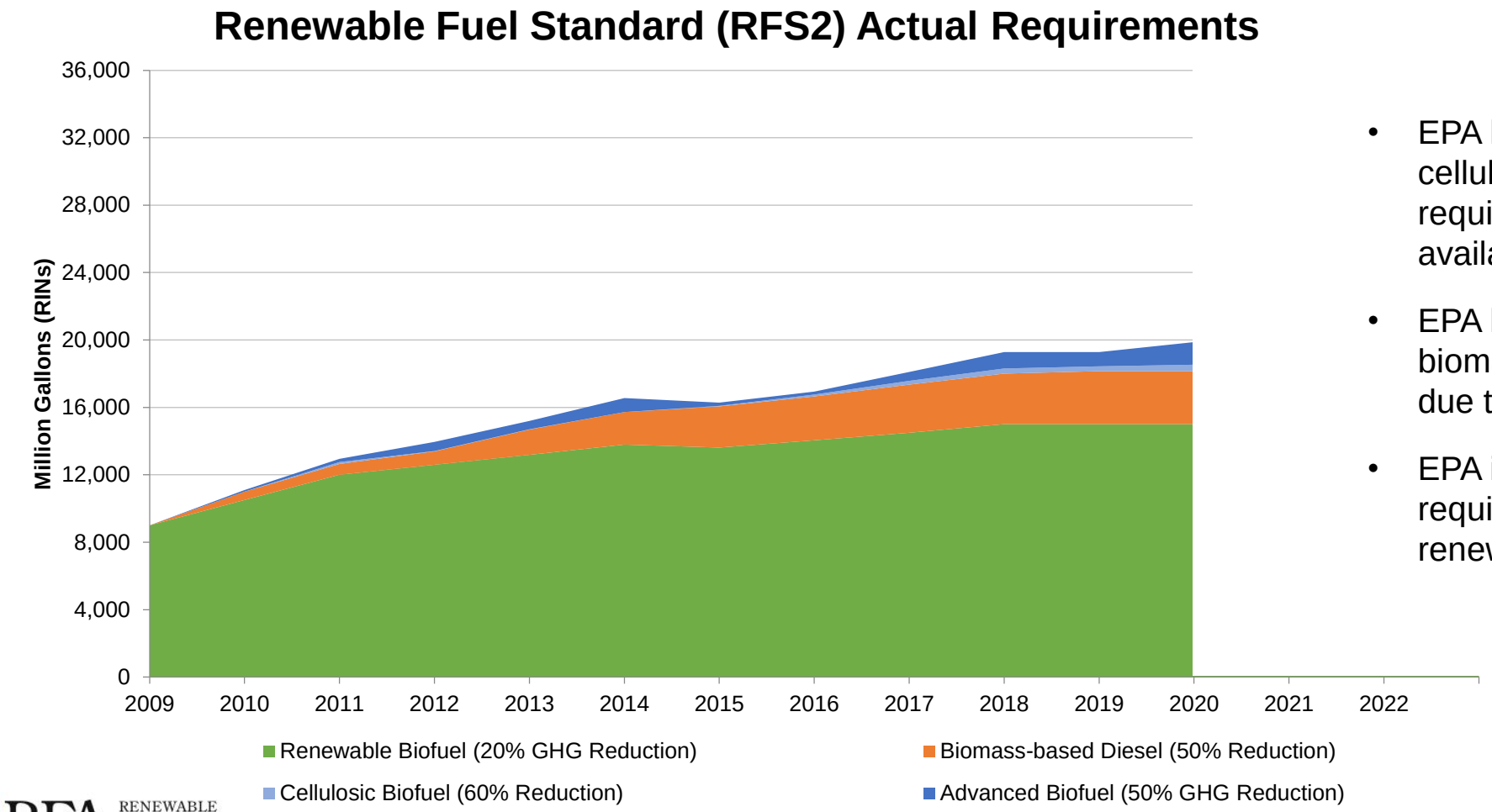
EPA may adjust annual RFS requirements under certain circumstances



- EPA has consistently reduced cellulosic and advanced biofuel requirements due to lack of available supply
- EPA has consistently raised biomass-based diesel requirements due to growing available supply
- EPA illegally reduced 2014-2016 requirements for conventional renewable fuels (*ACEI v. EPA*)

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Renewable Identification Numbers (RINs) and Renewable Volume Obligations (RVOs)

- **RVOs** are the percentage shares of gasoline and diesel that must be comprised of renewable fuels
  - Derived by dividing volumetric requirement for each type of renewable fuel by projected U.S. gasoline and diesel consumption
  - Ensures all obligated parties (refiners/importers) blend their proportional share
- **RINs** represent gallons of renewable fuel that are produced and blended into U.S. gasoline and diesel fuel
  - RIN is a numbered credit generated by renewable fuel producer
  - Obligated parties acquire RINs when they purchase and blend renewable fuel
  - Obligated parties turn in RINs to EPA to demonstrate compliance with their RVO
    - RINs are tradeable: obligated parties who blend less than their required share of renewable fuels may purchase RINs from other parties who blended more
    - RINs have a 2-year life: 20% of an obligated party's RVO may be met with RINs generated in previous year

Four categories of renewable fuels and RIN "D Codes"

- **Cellulosic Biofuel** – 60% GHG reduction
  - Cellulosic ethanol, biogas
- **Biomass-based Diesel** – 50% GHG reduction
  - FAME biodiesel, NE Renewable Diesel
- **Advanced Biofuel** – 50% GHG reduction
  - Sugarcane ethanol, F/B waste ethanol, Co-processed NE-RD
- **Renewable Fuel** – 20% GHG reduction
  - Corn starch ethanol, grandfathered FAME biodiesel and NE-RD…and everything else

RIN is 38-digit code:
KYYYYCCCCFFFFFBBBBBRRDSSSSSSSSEEEEEEEE

- D3 – Cellulosic Biofuel
- D7 – Cellulosic Diesel
- D4 – Biomass-based Diesel
- D5 – Advanced Biofuel
- D6 – Renewable Fuel

Energy Equivalency

- 1.0 RIN = 1.0 gallon of ethanol.
- Renewable fuels with more energy content per volumetric unit than ethanol can generate **more than 1.0 RIN per gallon**.
- Examples:
  - FAME biodiesel = 1.5
  - NE RD = 1.7
  - Butanol = 1.3

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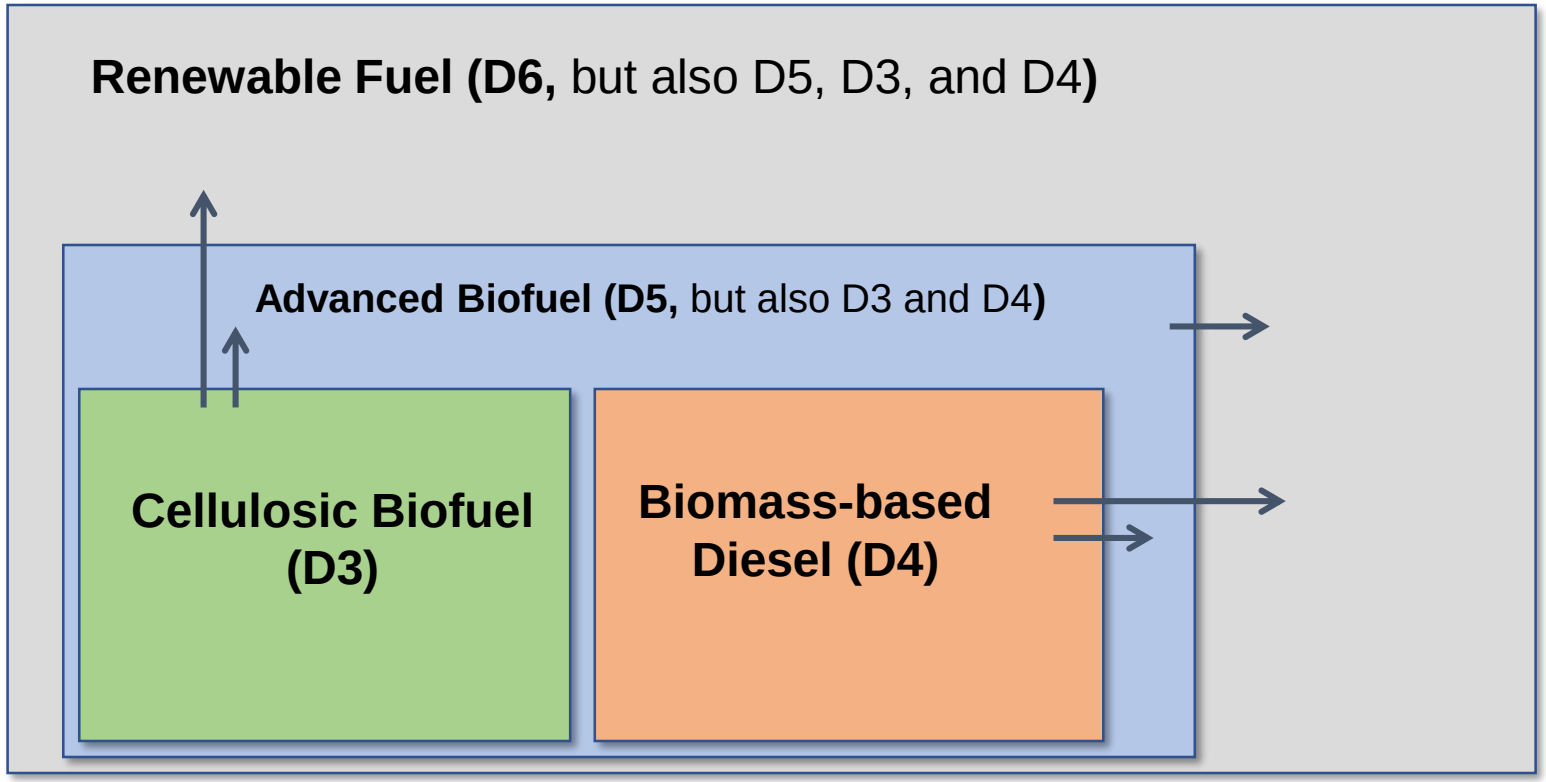
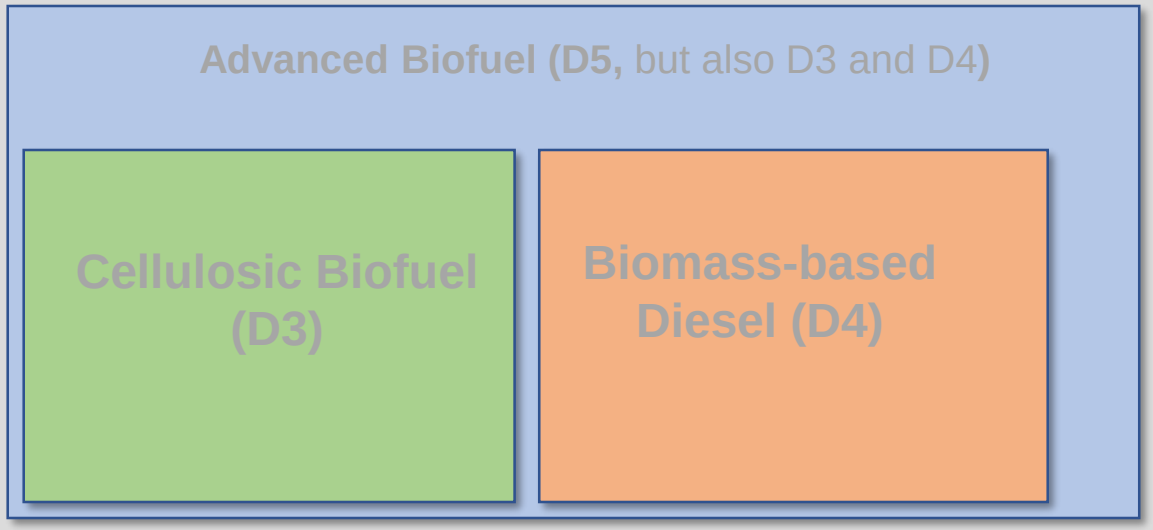
Nesting of the RFS standards



- Excess **cellulosic biofuel** can be used to meet **advanced biofuel** and total **renewable fuel** requirements
- Excess **biomass-based diesel** can be used to meet **advanced biofuel** and total **renewable fuel** requirements
- Excess **advanced biofuel** can be used to meet total **renewable fuel** requirements

Nesting of the RFS standards

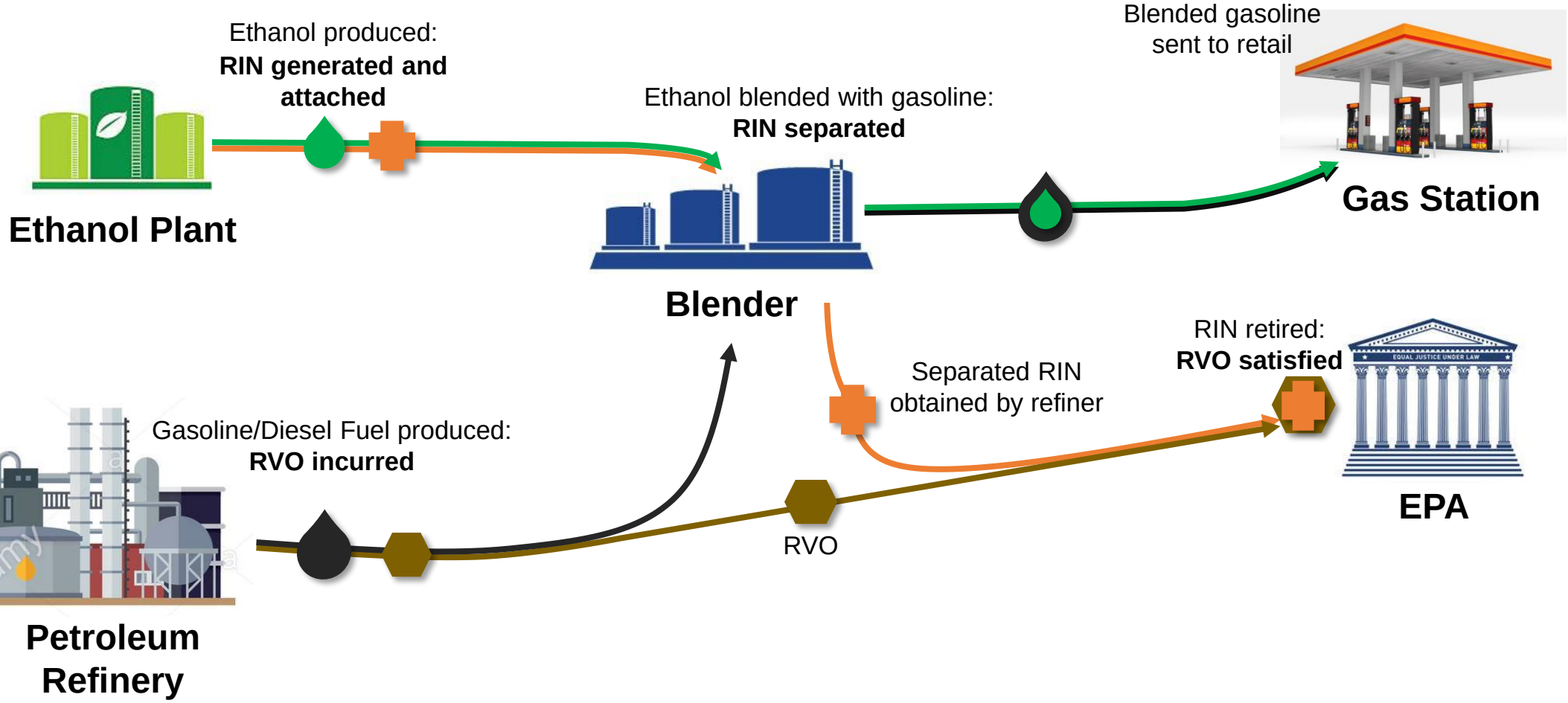
Renewable Fuel (D6, but also D5, D3, and D4**)**
This portion of Total Renewable Fuel is often called "conventional renewable fuel" and is the only category for which corn starch ethanol qualifies



- Example of annual nested RVOs:

2017 Final RVOs	Million RINs	RVO %
Cellulosic biofuel (D3/D7)	311	0.173%
Biomass-based diesel	3,500	1.67%
Total Advanced	**4,280**	**2.38%**
Advanced-residual	*469*	-
Total renewable fuel	**19,280**	**10.70%**
Renewable fuel-residual	*15,000*	-

RIN lifecycle for ethanol



RINs also serve as an economic incentive to expand renewable fuel consumption

- RIN prices represent the marginal cost of producing and consuming required volumes of each renewable fuel
- High RIN prices indicate a market perception that annual RVOs will be difficult to meet
  - *At some point, the RIN price is high enough that obligated parties choose to invest in expanded renewable fuel distribution and/or production infrastructure rather than purchase RINs from competitors*
  - Stimulates increased renewable fuel production
  - Stimulates investment in renewable fuel distribution infrastructure
  - Facilitates retail discounting of fuel blends with high renewable content
- Low RIN prices indicate a market perception that annual RVOs will be easy to meet without expanding biofuel production and distribution capabilities

How RINs drive retail discounting

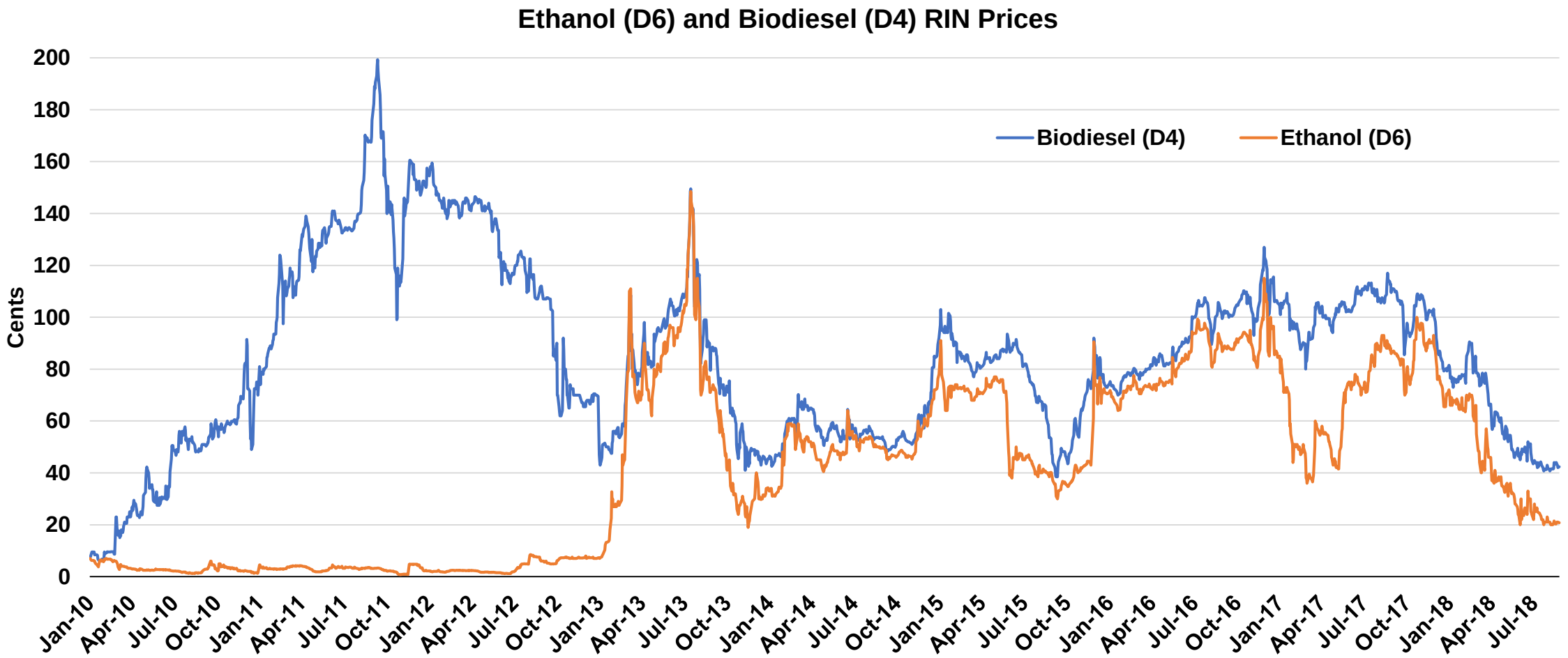
Table 1 – RIN price impacts on retail fuel prices

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.)

Source: G. Lade (CARD/Iowa State University), 2018

Historical RIN prices



Source: OPIS

RINs do not cause "hardship" for refiners
Merchant (& integrated) refiners recoup their RIN costs!

- **EPA (under Pruitt):** "…obligated parties, including small entities, are generally ***recovering the cost of acquiring the credits necessary for compliance with the RFS standards*** through higher sales prices of the petroleum products they sell. This is true whether they acquire RINs by purchasing renewable fuels with attached RINs or purchase separated RINs."
- **Wells Fargo:** "Most independent refiners now ***enjoy a net benefit from RINs***, based on our analysis. ***RINs costs are being passed along***."
- **Economists from Harvard, MIT, University of Michigan**: "RIN prices were passed through one-for-one in the prices of bulk petroleum fuels."
- **Economists from Iowa State University**: "We show that high RIN prices…***have no impact on profits of refiners, blenders, or integrated oil companies***."
- **Andeavor**: "RIN costs are passed through at the bulk finished product sales points and provide refiners with coverage of their exposure to them."
- **American Petroleum Institute**: "RIN costs are ***largely recovered by refineries, both large and small,*** through the increased value of gasoline and diesel fuel they supply to the market."

Questions?

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