Lecture XXIX: Ethanol Policy – Renewable Identification Numbers

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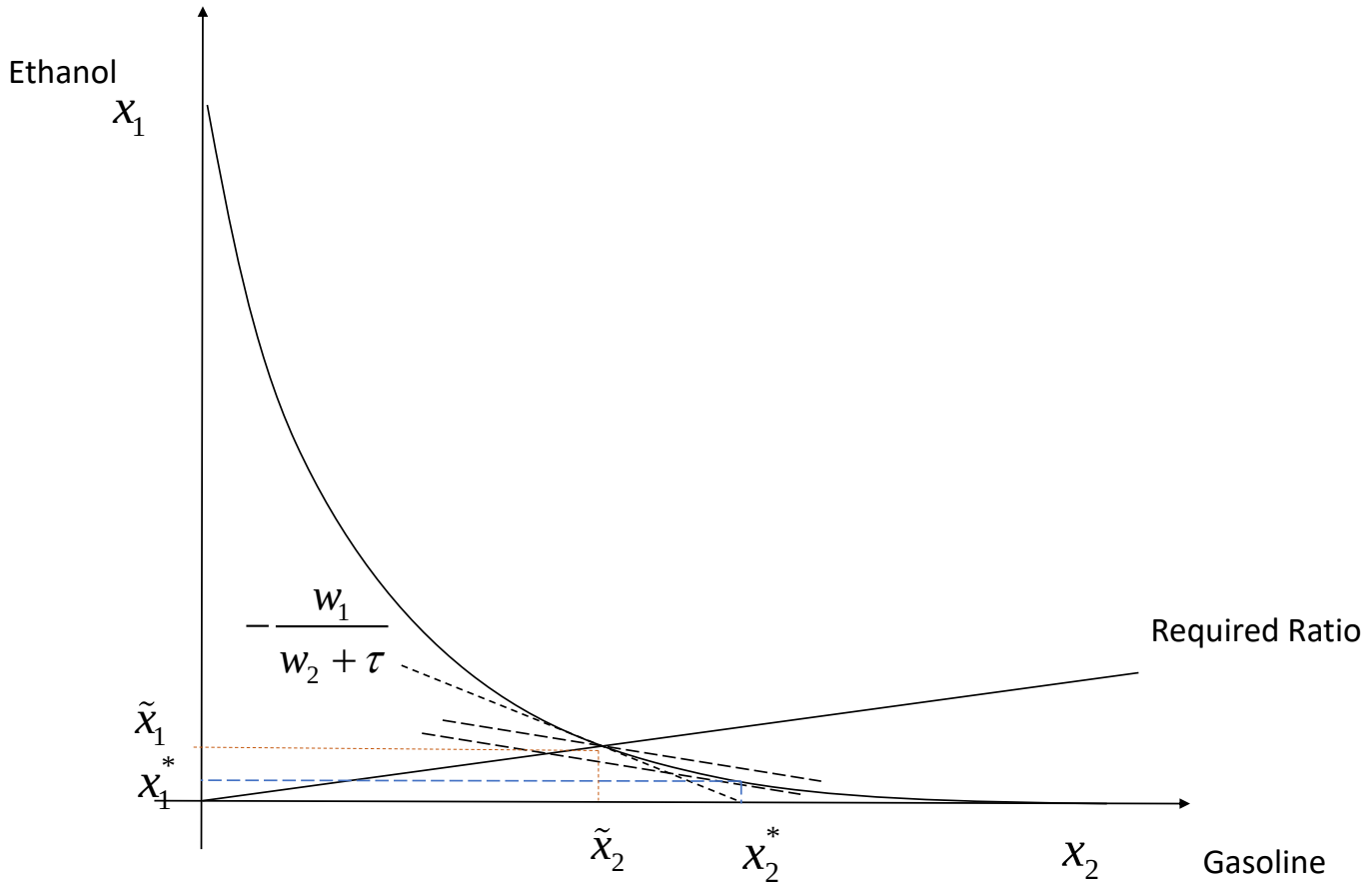
VEETC Versus Required Blend



Production Economics – VEETC

- VEETC

$$\max_{x_1,x_2,x_3} pf\left(x_1,x_2,x_3\right) - \left(w_1-\tau\right)x_1 - w_2x_2 - w_3x_3$$

$$\frac{\partial \pi}{\partial x_1} \Rightarrow \frac{\partial f}{\partial x_1} = \frac{w_1-\tau}{p} \tag{1}$$

$$\frac{\partial \pi}{\partial x_2} \Rightarrow \frac{\partial f}{\partial x_2} = \frac{w_2}{p}$$

Production Economics – Required Blend

- Required Blend

$$\max_{x_1,x_2,x_3} pf(x_1,x_2,x_3) - w_1x_1 - w_2x_2 - w_3x_3 + \lambda\left(R - \frac{x_1}{x_2}\right)$$

$$\frac{\partial \pi^*}{\partial x_1} \Rightarrow \frac{\partial f}{\partial x_1} - \lambda\frac{1}{x_2} = \frac{w_1}{p} \tag{2}$$

$$\frac{\partial \pi^*}{\partial x_2} \Rightarrow \frac{\partial f}{\partial x_2} + \lambda\frac{x_1}{x_2^2} = \frac{w_2}{p}$$

Basic Program

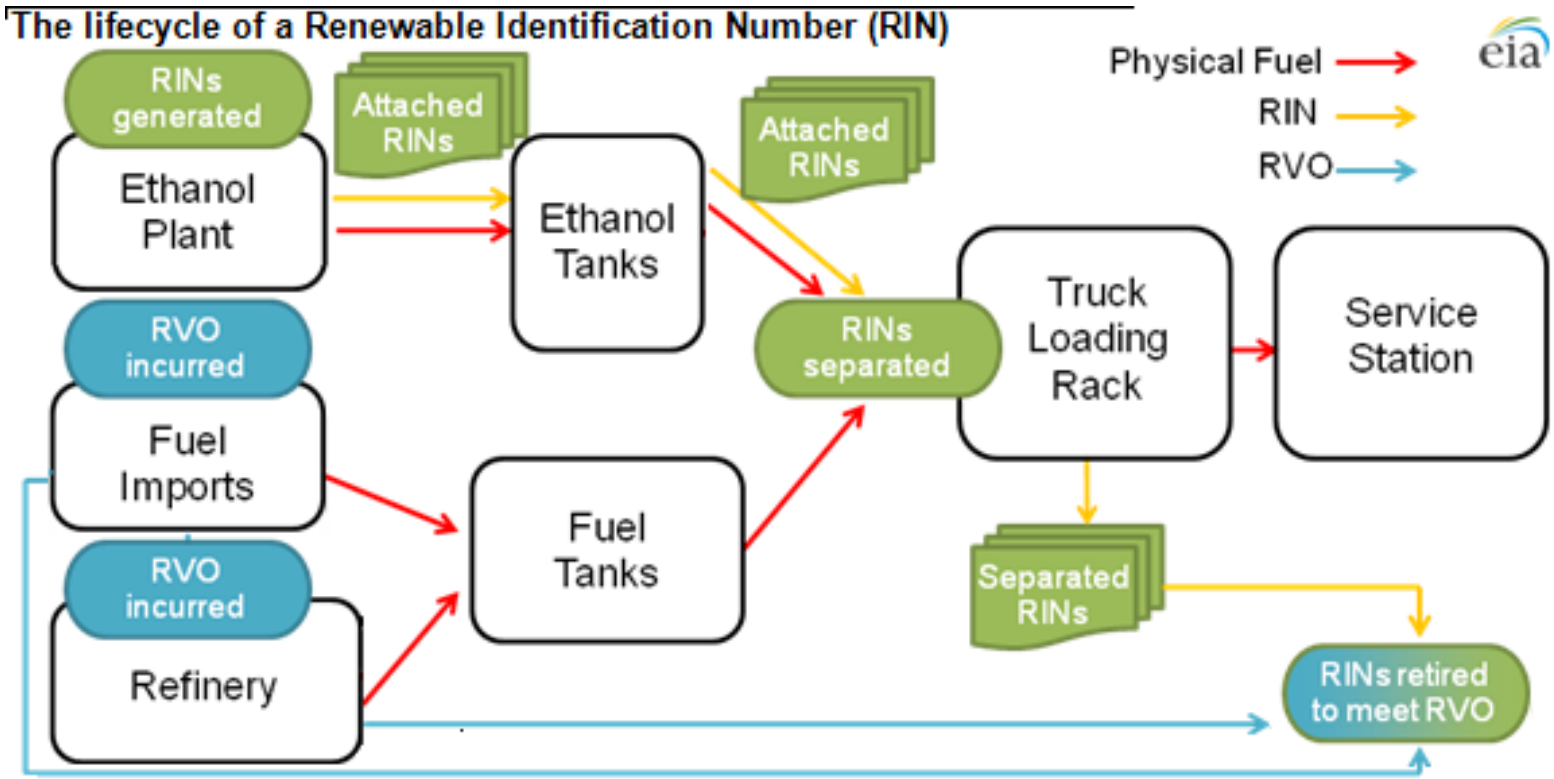
- To increase the amount of biofuels in gasoline, the Renewable Fuel Standard (RFS) administered by the Environmental Protection Agency (EPA) was enacted through laws passed in 2005 and 2007.
- Today, about 10% of fuel sold as motor gasoline is corn-based ethanol.
- Renewable Identification Numbers (RIN) and Renewable Volume Obligations (RVO) are the mechanisms the EPA uses to implement the RFS program.
- RVOs are the targets for each refiner or importer of petroleum-based gasoline or diesel fuel, while RINs allow for flexibility in how each of them may choose to comply.
- `https://www.eia.gov/todayinenergy/detail.php?id=11511`

- The volumes for the four RFS targets (cellulosic, biodiesel, advanced, and total) are assigned to the obligated parties—refiners and importers of gasoline and diesel fuels—by way of RVO percentages.
- For 2013, the four proposed RVO targets are:
  - cellulosic biofuels, 0.008%
  - ethanol equivalent for biomass-based diesel, 1.12%
  - advanced biofuels, 1.6%
  - Total renewable fuels, 9.63%
- The RVOs are applied to each obligated party's actual supply of gasoline and diesel fuel to determine its specific renewable fuel obligation for that calendar year.
- Obligated parties must cover their RVOs by surrendering RINs within 60 days after the end of each calendar year.

RINs

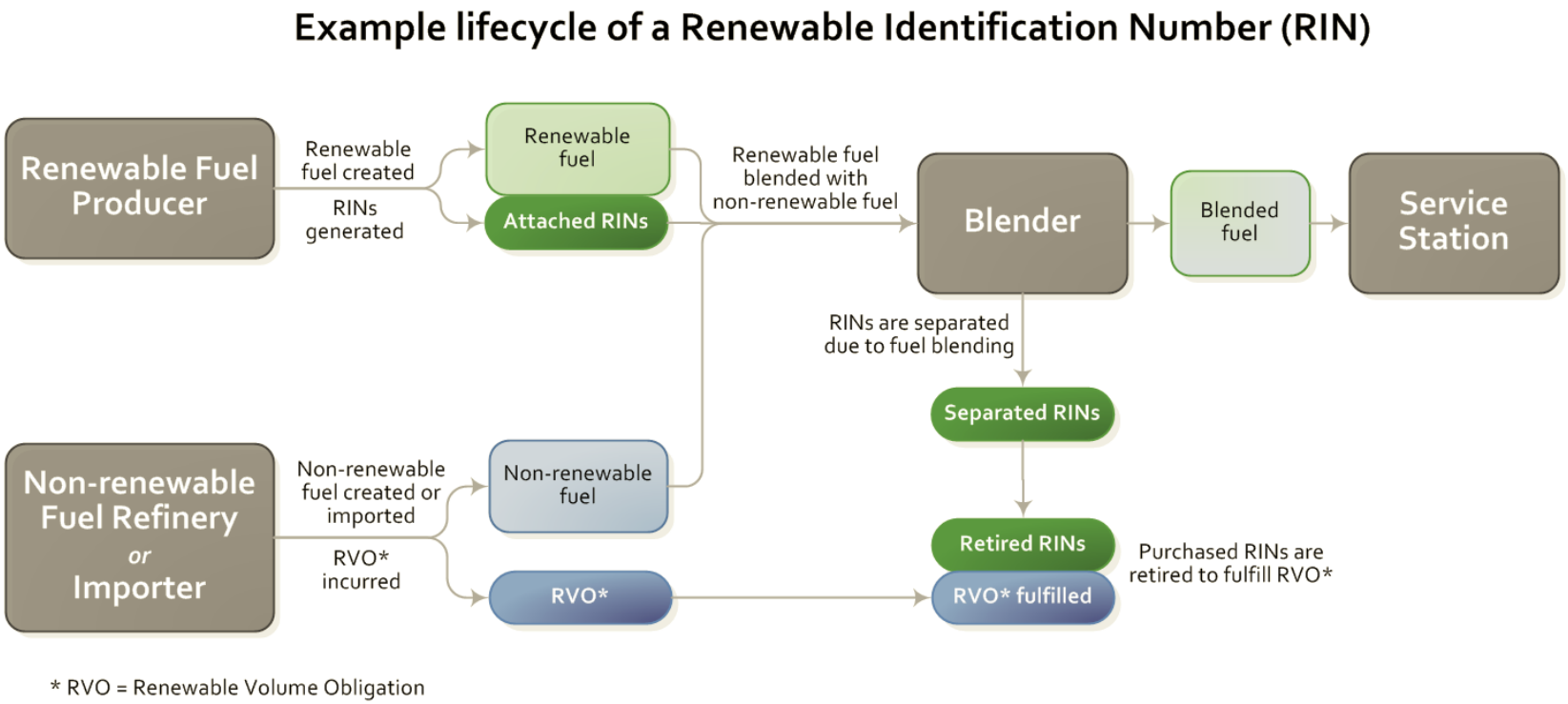
- RINs are used for both recordkeeping and flexibility in meeting the separate RFS targets.
- Each RIN is a 38-character alphanumeric code assigned to each gallon of renewable fuel that is produced in or imported into the United States.
- RINs are valid for the year in which they are generated.

Overview of RINs



- https://www.epa.gov/fuels-registration-reporting-and-compliance-help/rin-trades-and-price-information

Another View of the RINs Market



- https://www.epa.gov/renewable-fuel-standard-program/renewable-identification-numbers-rins-under-renewable-fuel-standard

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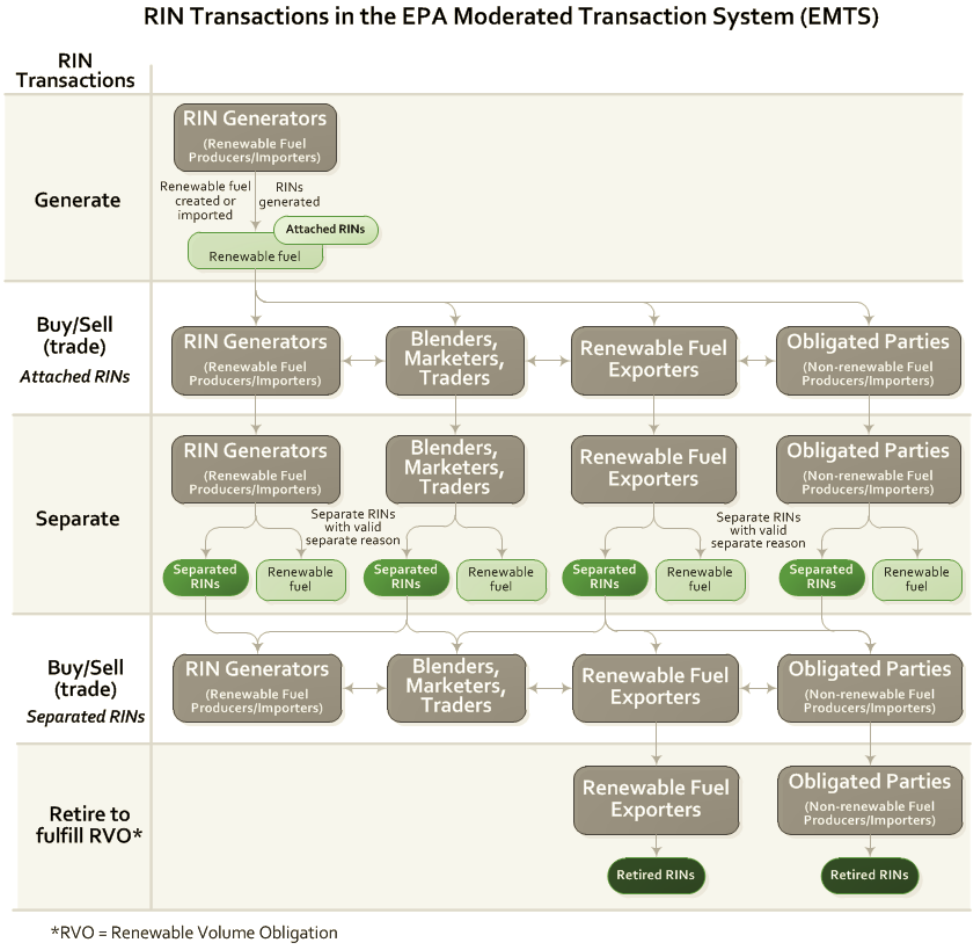
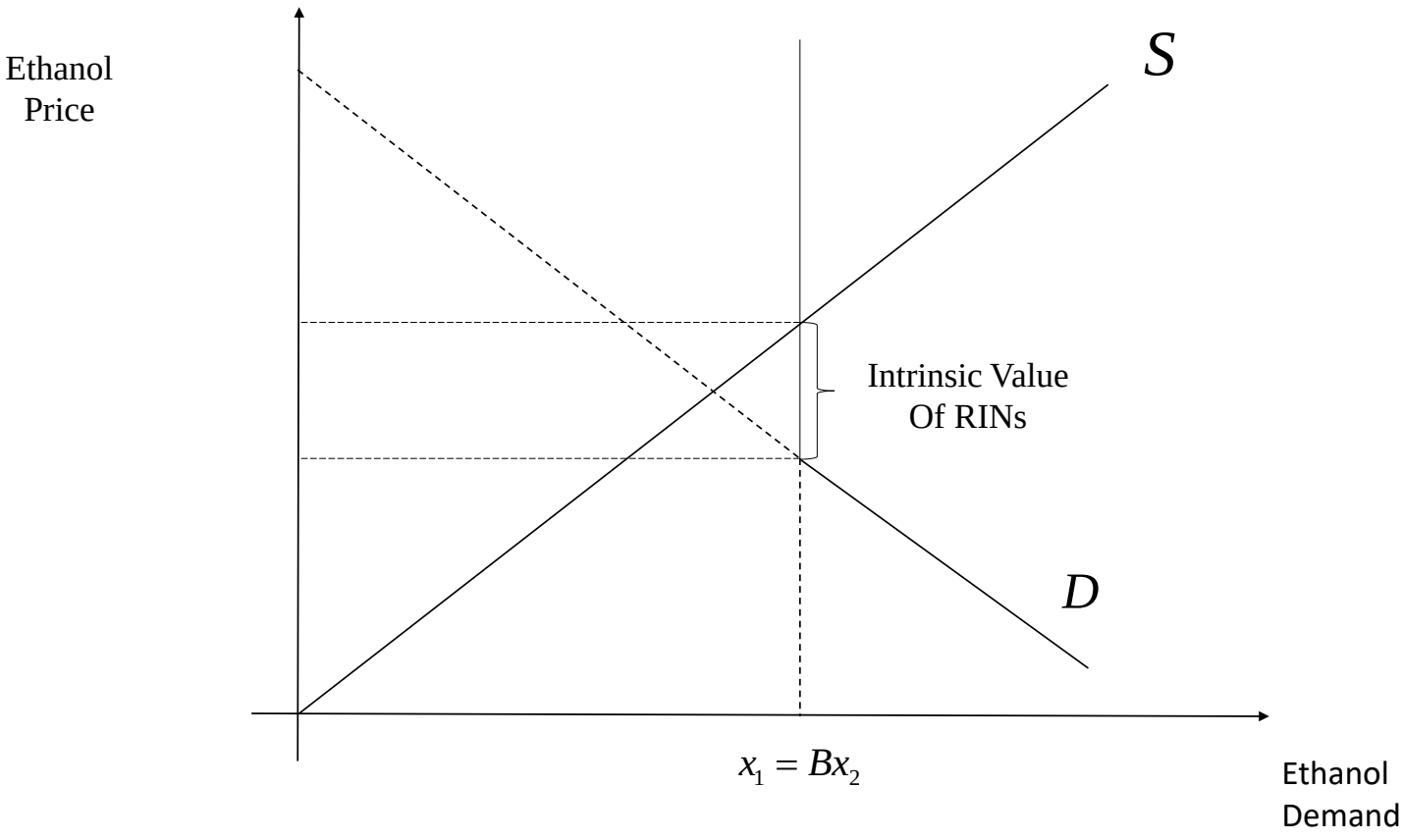


Types of RINs

Mandate Category	Label	2015 Standard Volumetric Mandate	2015 Standard Percentage Mandate	2022 Standard Volumentric Mandate
Cellulosic Biofuel	D3	0.123	0.069 %	16
Biomass-based Diesel	D4	1.73	1.49 %	TBD
Advanced Biofuel	D5	2.88	1.62 %	21
Renewable Fuel	D6	16.93	9.52 %	36

- Source: Korting and Just `https://ageconsearch.umn.edu/record/250034/files/Cornell-Dyson-wp1614.pdf`

Market for RINs



Market for Prices RINs