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PRESENTATION TO:

Biomass Research and Development Technical Advisory Committee

August 27, 2015

HOW DO RINs WORK?

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Assurance · Tax · Advisory

Overview

- Brief history of the RFS program
- RIN Basics
- Feedstocks
- Status of the RFS program

Weaver at a Glance

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EPA REGULATIONS:

- Part 79 – **Fuel and Fuel Additives registrations**
- Part 80 – **Fuel regulations**
  - **Gasoline – sulfur, toxics, benzene, etc.**
  - **Distillate Fuels**
  - **Renewable Fuels**
  - **Attestation Services for Gasoline and Renewable Fuels**
  - **In-line Blending Audits – gasoline**
  - **Quality Assurance Plans – EPA-approved Auditor**
- Part 98 – **Greenhouse Gas Reporting**

OTHER FUELS REGULATIONS:

- California Low Carbon Fuel Standard (LCFS)
- Environment Canada – Renewable Fuels Regulations
- State of Arizona – compliance audits
- Marine Preservation Association – dues procedure attestations
- **Laboratory audits – independent labs and petroleum refinery labs**

Abbreviations used today

- **RF** = Renewable Fuel
- **RIN** = Renewable Identification Number
- **OP** = Obligated Party
- **EMTS** = EPA Moderated Transaction System
- **BBD** = Biomass-based Diesel
- **AB** = Advanced Biofuel
- **CB** = Cellulosic Biofuel
- **NOV** = Notice of Violation

- **EV** = Equivalence Value
- **RVO** = Renewable Volume Obligation
- **ERVO** = Export RVO
- **GHG** = Greenhouse Gas
- **LCA** = Lifecycle Analysis
- **QAP** = Quality Assurance Plan
- **Q-RIN** = QAP-verified RIN
- **DFE** = Denatured Fuel Ethanol

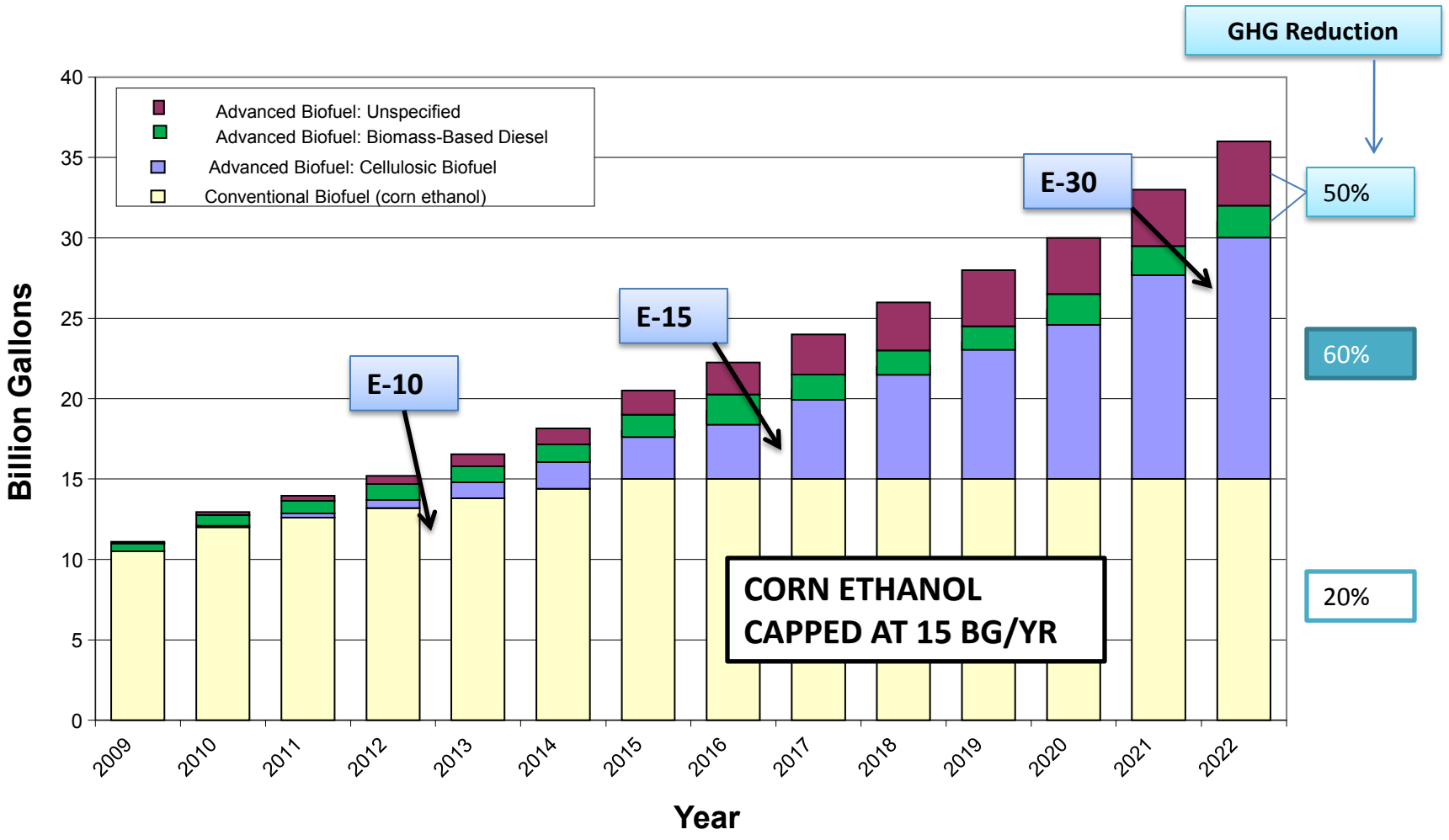
Origins of the RFS Program

- The Energy Policy Act (2005) required EPA to implement a renewable fuels standard program
- First program was called “RFS1” - effective date Sept. 1, 2007
  - Renewable Fuels volumetric goals:
    - 9 Billion gallons by 2008; 22 billion gallons by 2022
  - Imposed obligations on gasoline refiners and importers (RVOs)
  - Created “Renewable Identification Numbers” or “RINs”:
    - The “currency of compliance”
    - Generated by producers of renewable fuels
    - Used by gasoline refiners and importers to prove compliance
    - Represented by a 38-digit code
      - Prone to transfer errors, duplication

Evolution to "RFS2"

- RFS1 was barely underway when Congress enacted a major overhaul under the Energy Independence and Security Act (Dec 2007)
- Objectives:
  1. Reduce dependence on foreign oil
  2. Reduce greenhouse gas (GHG) emissions
  3. Promote job growth in U.S. "green" sector
- Vast expansion of the overall volumes and scope of the RFS program
- Four interrelated annual renewable fuel mandates
- Obligations imposed on diesel as well as gasoline refiners and importers
- RINs are still the currency of compliance, but there are more strings attached to qualifying renewable fuel:
  - "Renewable Biomass" feedstock
  - Life-cycle emissions reductions
  - RIN creation/management centralized in EPA Moderated Transaction System (EMTS)

RFS2 Renewable Fuel Volumes



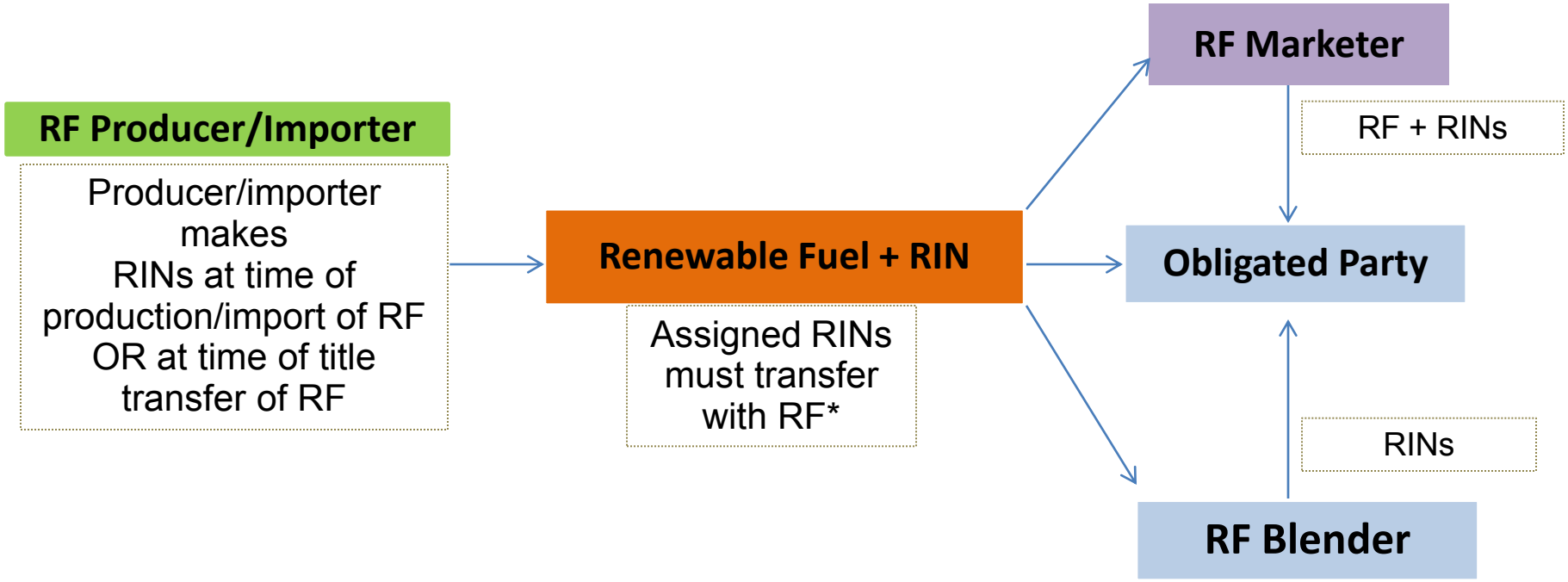
SO – WHAT ARE RINS AND HOW ARE THEY:

1. GENERATED?
2. TRANSFERRED?
3. USED?

Put simply: RINs are saleable regulatory credits that represent a quantity of qualifying renewable fuel

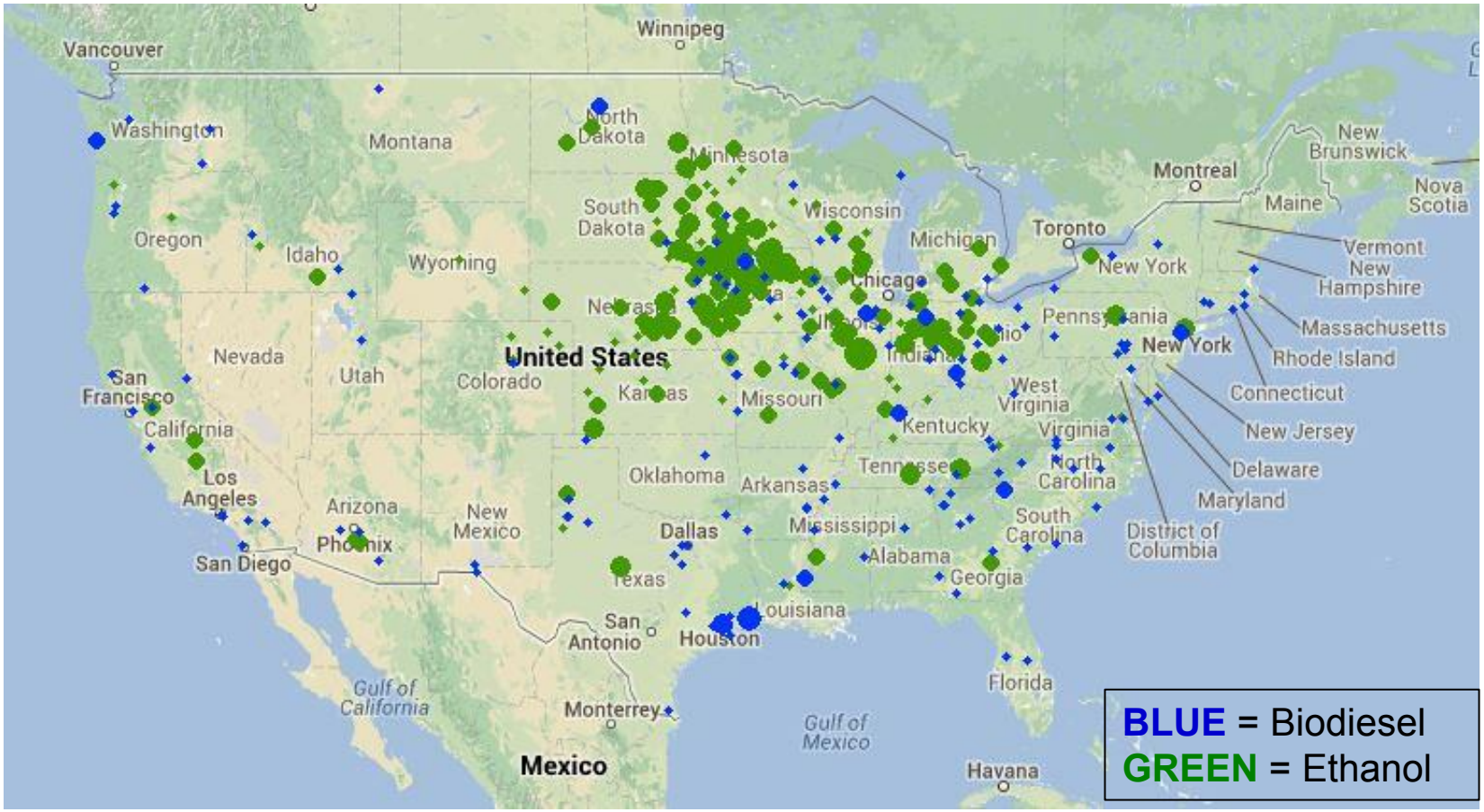
BUT: The devil is in the details!

RIN Transfers – Simple Fuel/RIN Transaction Model



*RINs are fungible; can be transferred with any type of renewable fuel
e.g. Today, a 2012 renewable diesel RIN can be transferred with a 2014 ethanol gallon

Where are RINs “born”?



Information from NREL interactive website: http://maps.nrel.gov/biomass

RIN Generation

- RINs are generated by renewable fuel producers and U.S. importers who import from registered foreign producers
  - Producers and Importers generate RINs based on (denatured) production volume (temp-corrected) and the Btu content of the fuel
  - RINs can ONLY be generated if:
    - Fuel is used for transportation fuel, heating oil or jet fuel
    - Feedstock meets the definition of "**Renewable Biomass**"
    - Produced under an EPA-approved pathway (or grandfathered)

RIN Generation – Qualifying Feedstock

- Renewable fuels qualify only if produced from **"Renewable Biomass":**
  - Products from planted crops and crop residue / trees and tree residue
  - Animal waste material and byproducts
  - Algae
  - Biomass cleared from the vicinity of buildings and other areas to reduce wildfire risk
  - Separated yard or food waste
- Products from crops, trees, and their respective residues are subject to an "existing agricultural use" requirement as of 12/19/2007:
  - Feedstock source must have been cleared or cultivated before this date; and,
  - Feedstock source must have been actively managed or fallow on this date.
- **However** –U.S. and Canadian crop- and tree-based feedstocks are covered under an "aggregate compliance option"
  - Does not require individual farm/plantation tracking to show existing agricultural use, unless future USDA data shows an overall growth in farm land use above 2007 baseline

RIN Generation – Lifecycle GHG Reductions

- Each of the four Renewable Fuel Mandates has its own lifecycle GHG reduction criteria (established under EISA)
  - **Cellulosic Biofuel:** ***[Represented by D codes 3, 7]***
    - Must achieve 60% reduction vs. gasoline or diesel baseline
    - Cellulosic RIN production increasing due to new plants and biogas/CNG reclassification
  - **Biomass-Based Diesel:** ***[D codes 4, 7]***
    - Must achieve 50% reduction vs. diesel baseline
    - Includes Biodiesel and Renewable Diesel
  - **Advanced Biofuel:** ***[D code 5]***
    - Must achieve 50% reduction vs. gasoline or diesel baseline
    - Includes cellulosic, BBD, sugarcane ethanol and any other qualifying renewable fuel other than corn starch ethanol
  - **Total Renewable Fuel:** ***[D code 6]***
    - Must achieve 20% reduction vs. gasoline or diesel baseline; except:
      Existing (2007) facilities are "grandfathered", i.e., exempt to its 2007 baseline
    - Includes corn ethanol primarily
- Lifecycle emissions are evaluated by EPA as part of a "well to wheels" analysis, which supports various fuel pathways

Cellulosic Feedstocks

Renewable Fuels produced from these feedstocks using an approved technology can generate "Cellulosic Biofuel" D3 or D7 RINs

- Agricultural Residues
- Switchgrass
- Miscanthus
- Separated Yard Waste
- Separated Food Waste
- Biogenic separated MSW
- Annual Covercrops
- Forest Product Residues
- Forest Thinnings
- Slash
- Arundo Donax
- Pennisetum purpureum
- Biogas from municipal wastewater treatment facility digesters
- Biogas from agricultural digesters
- Biogas from separated MSW digesters
- Biogas from the cellulosic components of biomass processed in other waste digesters
- Arundo Donax
- Energy Cane
- Bagasse
- Bagasse Straw

Cellulosic feedstocks are evaluated based on their cellulosic content

Oils approved by EPA as feedstock for Renewable Fuels

- Pathway Table Feedstock Oils (Can generate D-4 RINs):
  - Soybean
  - Canola/Rapeseed*
  - Algal Oil**
  - Covercrop***
  - Biogenic Waste Oils
    - Tallow, Chicken Fat, Used Cooking Oil, Waste Veg Oil
  - Non-food grade corn oil
  - Camelina sativa
  - Fish

* Only if plant transesterifies using nat. gas or biomass for process energy

** EPA evaluating different production processes

*** Not precisely defined by EPA

- Grandfathered Facilities' Oils (Can generate only D-6 RINs):
  - Palm
  - PFAD
  - PSO/SBE
  - Sunflower
  - Safflower
  - Cottonseed*
  - Brassica carinata*
  - Pennycress*
  - Jatropha
  - Etc.

* Public comment received; expected to be added to left column

- **ALL FACILITIES MUST USE FEEDSTOCKS THAT MEET DEFINITION OF "RENEWABLE BIOMASS"**
- **CROP-BASED FEEDSTOCKS FROM ONLY U.S. AND CANADA QUALIFY UNDER "AGGREGATE COMPLIANCE" APPROACH**

All other feedstocks

The following feedstocks qualify for D4, D5 or D6 RINs, as applicable:

- Corn Starch (D6)
- Sugarcane (D5)
- Non-cellulosic components of annual cover crops (D6)
- Starch - Agricultural Residues (D6)
- Starch - Annual Covercrops (D6)
- Non-Cellulosic Portions of Separated Food Wastes (D4, D5)
- Free Fatty Acids (D4, D6)
- Cyanobacteria (D4)

RIN Generation – Examples of Lifecycle Analysis Pathways

Fuel Type	Feedstock	Production Process Reqmts	D Code
Ethanol	Corn Starch	Drymill process	6
Ethanol	Sugarcane	Fermentation	5
Ethanol	Cellulosic feedstock	Any cellulosic production process	3
Biodiesel	Soybean oil, used cooking oil, tallow, NFG corn oil	Transesterification	4
Renewable Diesel	Soybean oil, used cooking oil, tallow, NFG corn oil	Hydrotreating (no coprocessing/coprocessing)	4 / 5
Cellulosic Diesel, Jet, Heating Oil	Cellulosic biomass	Any cellulosic production process	7
Renew. CNG/LNG	Biogas from Landfills	Any	3
Renewable Jet, Heating Oil, Ethanol	Separated food wastes	Any separated food wastes process	5

RIN Generation – Additional Key Concepts

- RINs generators and foreign producers must register their company and facility(ies) with EPA
  - ➢ Facility registration requires review by 3rd party engineer
- RINs are viable for two years: year of generation + next year
- RIN yields vary by the type of fuel -- dependent on fuel Btu content (in relation to ethanol)
  - Ethanol – 1.0 RINs per gallon
  - Biodiesel – 1.5 RINs per gallon
  - Renewable Diesel – 1.6 to 1.7 RINs per gallon
  - Biogas – 11.727 RINs/MMBtu (LHV basis)
  - Electricity – 1 RIN/22.6 KW-hr
- Renewable fuel producers can participate in the Quality Assurance Plan program – independent, on-going audit of fuel, RINs

SO – WHAT ARE RINS AND HOW ARE THEY:

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RIN Transfers – The Role of RF Blenders

- Blenders generally purchase Renewable Fuel and blend it into gasoline or diesel
  - **Ethanol to E-10, E-15 or E-85 blend levels; Biodiesel to B2, B5, B20**
- Upon blending the blender can sell the two commodities – the blended physical fuel and the separated RIN
- Many blenders are also Obligated Parties
- The largest independent blenders of biodiesel are truckstops

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Who Needs to Use RINs?

- Obligated Parties
  - Companies who produce or import petroleum gasoline or diesel fuel in a given calendar year
  - Do not have to blend physical renewable fuel
  - Must satisfy their renewable volume obligations (RVO) using RINs and/or cellulosic waiver credits
    - Can use prior-year RINs for up to 20% of the applicable RVO
  - Acquire RINs through the purchase of physical fuel with RINs or through RIN-only transactions

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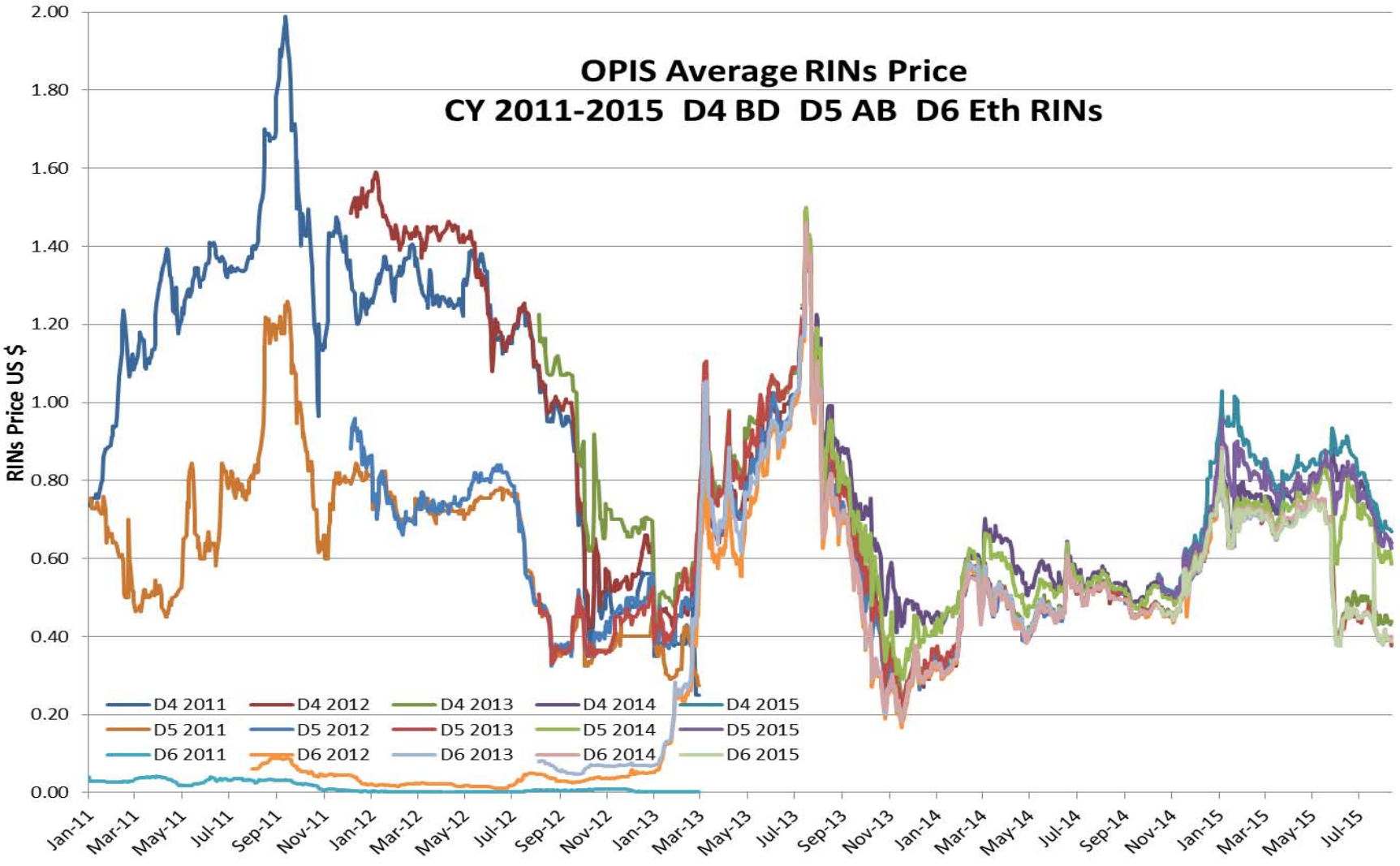
RIN Price History



The RFS is far from boring…

- Very controversial - Proposed Renewable Volume Obligations which are much lower than EISA due to blendwall concerns, lack of cellulosic production
- RIN Fraud Cases – have involved a handful of ‘biodiesel’ producers; investigations continue
- Constantly changing regulations – new fuels, new feedstocks, new processes, new requirements

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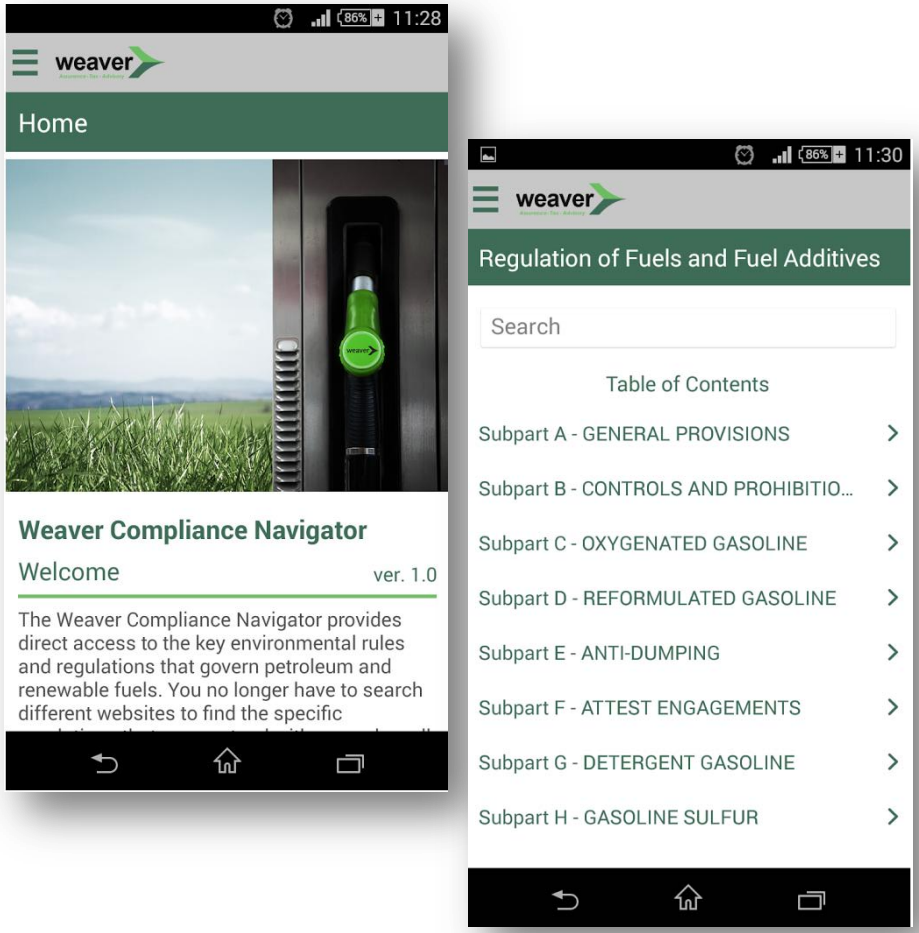

* It's FREE !!

Questions?

Thank you for the opportunity to speak with you today !

If you have any questions, please feel free to contact me:

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