Renewable Fuel Standard

- Policy
- Domestic Biofuel Consumption
- Domestic Biofuel Production
  - Impact on agriculture
- EPA’s efforts to meet RFS
- RFS market – RINs
- Industry, politics, money
Goals of RFS

- Reduce “foreign oil” dependency
- Promote domestic biofuel industry
- Reduce greenhouse gas (GHG) emissions
Lifecycle GHG Thresholds in EISA2007 (% reduction from 2005 baseline)

- Renewable Fuel: 20%
- Advanced Biofuel: 50%
- Biomass-based diesel: 50%
- Cellulosic biofuel: 60%
Renewable fuel categories

- Renewable biofuel
  - Corn ethanol, sugarcane ethanol (from Brazil), biodiesel, etc

- Advanced biofuel
  - Sugarcane ethanol (from Brazil), biodiesel, cellulosic biofuel

- Biomass-based Diesel

- Cellulosic biofuel
  - Doesn’t exist commercially
Renewable Fuel Standard (RFS) Biofuel Volumes

- **cellulosic biofuel**
- **biomass-based diesel**
- **Other advanced biofuel**
- **Conventional biofuel (corn ethanol)**

Biofuel Volume (billion gallons)

<table>
<thead>
<tr>
<th>Year</th>
<th>cellulosic biofuel</th>
<th>biomass-based diesel</th>
<th>Other advanced biofuel</th>
<th>Conventional biofuel (corn ethanol)</th>
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</thead>
<tbody>
<tr>
<td>2008</td>
<td></td>
<td></td>
<td></td>
<td>8 billion</td>
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<tr>
<td>2010</td>
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<td>8 billion</td>
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<tr>
<td>2012</td>
<td>0.1</td>
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<td>2014</td>
<td>0.5</td>
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<td>2016</td>
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<td>0.2</td>
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<td>2018</td>
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<td>2020</td>
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<td>0.4</td>
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</tr>
<tr>
<td>2022</td>
<td>2.5</td>
<td>0.5</td>
<td>2.5</td>
<td>8 billion</td>
</tr>
</tbody>
</table>
Other relevant policies

- Federal excise tax credits for non-cellulosic and ethanol import tariff expired (2011)
- Biodiesel income tax credit expired (2013)
- $1/gallon biodiesel tax credit (expired 2013...renew?)
Domestic Biofuel Consumption

HOW IS IT GOING?
Renewable Fuel Standard (RFS) and Environmental Protection Agency (EPA) Biofuel Volumes

- **Cellulosic biofuel**
- **Biomass-based diesel**
- **Other advanced biofuel**
- **Conventional biofuel (corn ethanol)**

From EPA RFS Final Rule Documents for each year.
EPA has the authority to adjust RFS targets if...

- Severely harms economy or environment
- Inadequate supply of renewable fuels
Renewable Fuel Standard (RFS) and Environmental Protection Agency (EPA) Biofuel Volumes

- **cellulosic biofuel** - *Inadequate supply*
- **biomass-based diesel**
- **Other advanced biofuel**
- **Conventional biofuel (corn ethanol)**

Overall - Ethanol Blend wall

From EPA RFS Final Rule Documents for each year
Transportation Fuel Consumption

Liquid Fuel Consumption - Transportation
(million barrels per day)

AEO 2007

(EIA Annual Energy Outlook, historical and prediction)
Transportation Fuel Consumption

Liquid Fuel Consumption - Transportation (million barrels per day)

Recession, CAFE

(EIA Annual Energy Outlook, historical and prediction)
“Blend Wall” at E10

Source: US EIA, Short-Term Energy Outlook November 2013
Annual Ethanol Consumption in the U.S. – Blend Wall!

*ethanol is listed as gasoline-equivalent gallons

Gasoline: 122 billion gallons (93%)
Ethanol: 7 billion gallons (7%)
E85: 117 million gallons (<1%)

9.6% Ethanol (by volume)

(2011 data, from EIA 2013)
Renewable Fuel Standard (RFS) and Environmental Protection Agency (EPA) Biofuel Volumes

- **cellulosic biofuel** - Inadequate supply
- **biomass-based diesel**
- **Other advanced biofuel**
- **Conventional biofuel (corn ethanol)**

Overall - Ethanol Blend wall

Wasn’t physically met

Made it

From EPA RFS Final Rule Documents for each year
The U.S. exported corn ethanol to Brazil to supplement tight supplies of sugarcane ethanol while importing sugarcane ethanol to help meet the RFS2 and the LCFS.

Help meet advanced biofuel requirements – still limited by E10

Source: EIA Monthly Import Survey and U.S. Bureau of the Census
WHAT IS THE IMPACT ON AGRICULTURE?

Domestic Biofuel Production
U.S. Corn Uses

- Feed and residual use
- Alcohol for fuel use
- Food, seed, and industrial uses
- Exports, market year

USDA Economic Research Service, Dec 2013
Food vs. Fuel

- 40% of the nation’s corn is used for ethanol
- Drought - low corn crop yield from 2012
  - lowest per acre yield since 1995
  - lowest haul since 2006
  - high corn prices, lower exports, lower feed levels for livestock
- 2013 – higher yield, lowered prices and increased exports of corn

(Biofuel Issues and Trends, EIA 2012)
Source: U.S. EIA, based on data from Bloomberg
Note: Ethanol margins are a measure of the profitability of producing ethanol. Margins below zero indicate producers would be taking a loss on the production of ethanol, but the individual cost structures of a producer vary widely.
Corn ethanol concerns

- **Lower corn exports**
  - other countries clear land to grow corn
  - Increase in corn price

- **Conversion of land to corn fields**
  - conservation land losses
    - flood risks
  - increase in water pollution - fertilizer in rivers/gulf dead zone/Chesapeake bay pollution

- **Climate change**
  - increase irrigation requirements (9%)
  - lower corn yields (7%) in the next 40 years (*Rice/UC Davis study*)

- **Distribution**
  - can’t go in gasoline pipelines, has to be trucks/rail cars/barges

*(Biofuel Issues and Trends, EIA 2012)*
Move from Corn to Cellulosic

- EPA issued waivers to RFS for 2010-2013 to lower cellulosic targets
  - Failed to meet lower targets
  - No commercial production in 2010 or 2011
  - 20k gallons in 2012, 5 million in 2013? (*EIA projection*)

*Todays in Energy, EIA Feb 26, 2013*
Attempting to meet the RFS

WHAT IS THE EPA DOING?
Trying to meet RFS for ethanol

- Lower RFS requirements
- Approve E15 for MY 2001 and newer
- Encouraging more E85 use with CAFE and GHG credits for automakers
- Incentivizing high-octane (E30) vehicles through Tier 3 air pollution regulations
EPA’s draft targets for 2014

- Significantly lower than RFS targets
  - 15.2 vs 18.15 billion gallons overall
  - corn-based ethanol – 13 vs 14.4 billion gallons
Trying to meet RFS for ethanol

- U.S. EPA approved E15 for MY 2001 and newer vehicles to overcome “blend wall”
  - Concerns include
    - Automobile warranties
    - Liability for misfueling
    - Infrastructure costs
      - American Fuel and Petrochemical Manufacturers (AFPM) oppose
  - Small number of E15 stations
  - Controversial – House bill to stop sale of E15

(Picture from Wisconsin Ethanol Coalition)
Renewable Identification Number (RIN)

How does the EPA track biofuel usage for RFS?
Renewable Identification Number (RIN)
Renewable Volume Obligation (RVO)

Source: U.S. Energy Information Administration, U.S. Environmental Protection Agency
Note: Fuel represents biofuels, motor gasoline, and diesel fuel
Source: Oil Price Information Service / EIA Today in Energy 6/13/2013
Note: January 2, 2013 = American Taxpayer Relief Act of 2012 and $1 per gallon biodiesel tax credit becomes law
Note: February 28, 2013 = Deadline for obligated refiners and importers to submit 2012 compliance demonstration reports
Source: US EIA, US EPA
Note: RFS line represents the implied annual conventional biofuels portion of the RFS target, which primarily includes corn ethanol.
The Price of an Ethanol Credit

The Environmental Protection Agency requires gasoline refiners to use a certain amount of ethanol and other bio-fuels. Refiners can meet the requirement by buying biofuel and blending it into gasoline or by accumulating credits known as RINs. The price of the credits has skyrocketed this year.

Related Article »

The E.I.A. forecasts that the “blend wall” is approaching, with ethanol mandates surpassing the amount that can be blended into gasoline by 2014.

FEB. 12

The E.I.A. forecasts that oil companies will need to use credits from last year to meet the 2013 mandate.

MARCH 19

Prices bounce on rumors that the E.P.A. might lower 2013 mandates.

MARCH 12

At an annual meeting, refinery executives term the market a “casino” and accuse financial traders of “hoarding.”

APRIL 16

Platts Oilgram News reports that “the big trading houses, hedge funds and banks” are the most active players in the market, according to traders and brokers.

MAY 27

An industry newsletter reports a rumor that a large refiner will have to purchase millions of RINs later this year.

JULY 23

A Morgan Stanley research report sees an “upside” to RIN prices, and alludes to scenarios where RINs could trade for $2 to $5.

The E.P.A. announces that it will not change the ethanol requirement for 2013 but would consider changes for 2014.

Blend wall concern

- RFS “renewable fuel” mandate levels 13 billion gallons or less
  - Can all be blended into the gasoline mix to make E10
  - Ethanol RIN prices should be near zero
- > 13 billion gallons
  - Ethanol RIN prices approach biodiesel RIN prices
  - May need to use biodiesel to meet total RFS mandates

More: [http://farmdocdaily.illinois.edu/2013/10/more-on-ethanol-rins-pricing.html](http://farmdocdaily.illinois.edu/2013/10/more-on-ethanol-rins-pricing.html)
Scott Irwin, Department of Agricultural and Consumer Economics, U of Illinios
CME Group D6 Ethanol RINS
Industry, politics, and money

WHO IS PUSHING BACK?
Who is for and against RFS?

**For**
- Biofuel Industry
- Agriculture Industry (corn)
- Wall Street?
- Corn-state politicians

**Against**
- Oil Industry
- Agriculture Industry (animals)
- Restaurants
- Countries that import corn
- Oil-state politicians
  - Environmentalists
  - Auto Industry
RFS/Biofuel Industry vs. Oil Industry

- American Petroleum Institute (API) actively lobbying/suing to repeal RFS
  - > E10 could damage automobiles (void warranties)
    - OEMs against, AAA against
  - advanced biofuels not ready – refiners have to buy credits
  - EPA late with mandates

- Oil companies pulling out of ethanol production, looking more at drop-in fuels

- Biofuel industry supporting RFS
  - Ad campaign to fight against “Big Oil’s unfair influence” on congress/legislation
RFS in Congress

- House Energy & Commerce Committee
  - white paper series
    - Blend wall/E15
    - Agriculture impacts
    - GHG and other environmental impacts

- House and Senate committee meetings/letters

- Several bills in House and Senate to repeal/modify RFS
Where is it going in the future?

RENEWABLE FUEL STANDARD (RFS)
Renewable Fuel Standard (RFS) Requirements and Projected Volumes

- Corn ethanol
- Advanced domestic ethanol
- Imported ethanol
- Biomass-based diesel
- Cellulosic drop-in fuels

EIA data from AEO 2013