K-STATE Research and Extension

2013 Risk and Profit Conference
General Session Speakers

"Knowledge for Life"

GENERAL SESSION I
Grain Markets and The RFS: All Eyes on the EPA

SCOTT IRWIN
University of Illinois

Dr. Scott Irwin is recognized as a national and international leader in agricultural economics. His research on agricultural marketing and price analysis, commodity market efficiency, and speculation in commodity markets is widely-cited by other academic researchers and in high demand among market participants, policy-makers, and the media. He has produced over 200 scholarly publications in his career, with numerous articles in the leading academic journals of his field, such as the *American Journal of Agricultural Economics* and the *Review of Agricultural Economics.*

Irwin's research and outreach programs have had a significant and positive impact on the agricultural community. Examples include:

- *AgMAS* – Irwin is co-director of this nationally-recognized project that provides performance evaluations of agricultural market advisory services.
- *farmdoc* – Irwin serves as the team leader of this award-winning Extension program that provides comprehensive risk management information and analysis for farmers and agribusinesses in the United States. Irwin recently led the effort to create *farmgate*, a sister-site designed to integrate, synthesize, and summarize the information available to Midwest farmers and agribusinesses across the spectrum of agricultural disciplines.

Dr. Irwin and his collaborators have received more than $4 million in competitive grants to support these research and outreach programs.

In recent years, Irwin has made important contributions to the international debate on the role of speculators in commodity futures markets. He has been widely quoted as a leading authority on futures speculation in the financial press (e.g., *Barron's*, *The Economist*, *Institutional Investor* and *The Wall Street Journal*). He has written an op-ed piece for *The New York Times* and his research has been featured in an article published in the business section of the *Times.* Irwin has offered testimony before the U.S. House of Representatives Committee on Agriculture, and he has presented invited papers to various professional organizations and universities. He has also written two guest postings for *Econbrowser*, one of the world's most popular general economics blogsites.

Irwin's lifelong fascination with agricultural economics began at an early age on the family farm in west central Iowa. Trips to the local grain elevator sparked his interest in ag marketing and price analysis, and he pursued that interest at Iowa State University, where he earned a bachelor's degree in agricultural business. Irwin went on to earn both an M.S. and a Ph.D. in agricultural economics at Purdue University.

Irwin joined the faculty of the Department of Agricultural Economics and Rural Sociology at The Ohio State University in 1985. He was named the Francis B. McCormick Professor of Agricultural Marketing and Policy at Ohio State in 1996.

During 1993-1994, Irwin served as a Visiting Scholar in the Office for Futures and Options Research at the University of Illinois. In 1997, he joined the faculty of the Department of Agricultural and Consumer Economics at the University of Illinois; he was named the Laurence J. Norton Chair of Agricultural Marketing in 2004. Irwin currently teaches courses on commodity price analysis and futures market research.

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The RFS and Grain and Oilseed Markets: All Eyes on the EPA

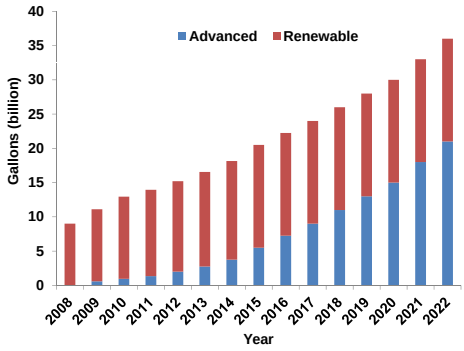
Scott H. Irwin

Full Disclosure

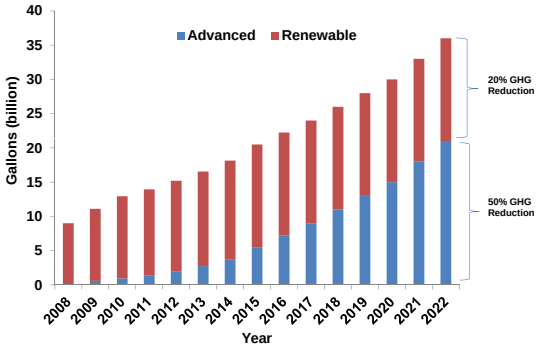
- Funding
  - Recent grants from USDA/ERS, USDA/OCE, and OECD
  - No grants related to biofuels policy
  - Regular support from a university endowment
  - Occasional consulting projects
- Sometimes trade in commodity futures markets
- Principal in a private company that provides U.S. corn and yield forecasts
- Co-manage family grain farm in Iowa

What is the RFS?

U.S. Renewable Fuels Standards, 2008-2022



U.S. Renewable Fuels Standards, 2008-2022



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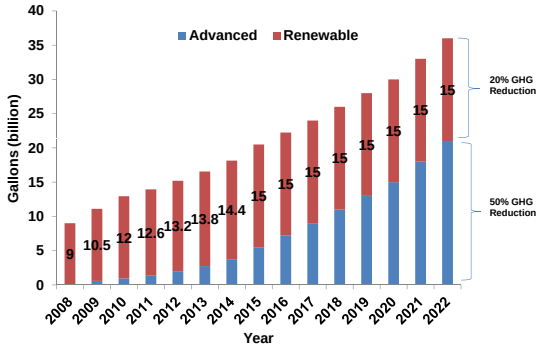
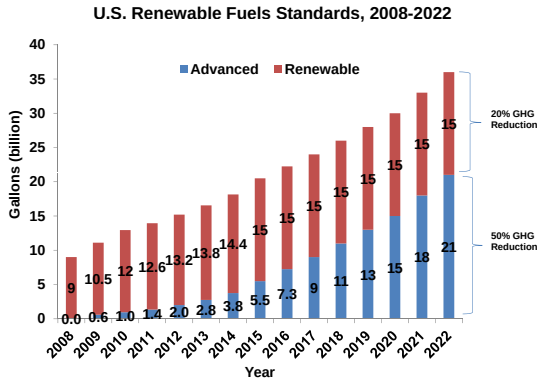
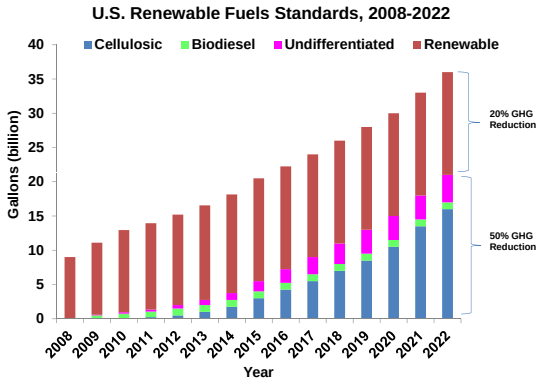
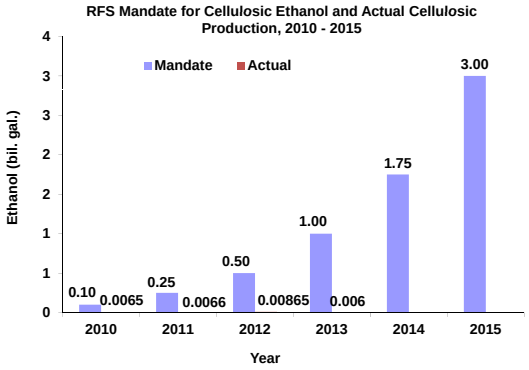
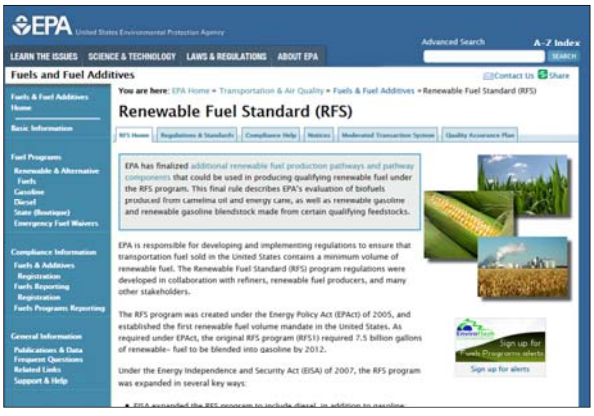








How is the RFS Enforced?



http://www.epa.gov/otaq/fuels/renewablefuels/index.htm

2013 Renewable Volume Obligations (RVOs)

RFS Category	Percentage Ratio (%)	Volume of Renewable Fuel (billion gallons)
Cellulosic biofuels	0.004%	0.006
Biomass-based diesel	1.13%	1.28
Advanced biofuels	1.62%	2.75
Total renewable fuel	9.74%	16.55

Source: "Regulation of Fuels and Fuel Additives: 2013 Renewable Fuel Standards." *Federal Register*, Vol. 78, No. 158, August 15, 2013, pp.49794-49830

Renewable Identification Numbers (RINs)

- The U.S. EPA enforces RVOs using RINs, a tradable credit system
- A RIN is a 38-digit number assigned to each gallon or batch of renewable fuel produced or imported into the U.S.
- Each RIN travels with the biofuel as it moves through the supply chain
- RINs are actively traded in a secondary market
- RINs allow obligated parties to meet their individual mandates by applying RINs representing biofuels which they have physically purchased and blended, or those which were purchased from another party through RIN trading

RIN = KYYYYCCCCFFFFFBBBBBRRDSSSSSSSSEEEEEEEE

Where

K	= code distinguishing RINs still assigned to a gallon from RINs already detached
YYYY	= the calendar year of production or import
CCCC	= the company ID
FFFFF	= the company plant or facility ID
BBBBB	= the batch number
RR	= the biofuel equivalence value (described below)
D	= the renewable fuel category
SSSSSSSS	= the start number for this batch of biofuel
EEEEEEEE	= the end number for this batch of biofuel

Source: Schnepf, R., and B.D. Yacobucci. "Renewable Fuel Standard (RFS): Overview and Issues." Congressional Research Service, March 2013.

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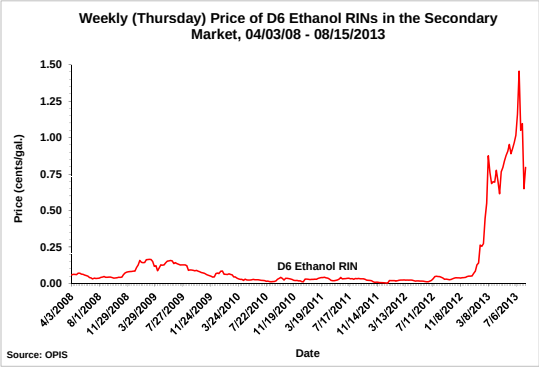
Table 5. RFS D Code Definitions

D value	RFS1	RFS2
1	Cellulosic biomass ethanol	na
2	Any other renewable fuel	na
3	na	Cellulosic biofuel
4	na	Biomass-based diesel
5	na	Advanced biofuel
6	na	Renewable fuel
7	na	Cellulosic diesel

Source: EPA, 40 C.F.R. Part 80, "Regulation of Fuels and Fuel Additives: Changes to Renewable Fuel Standard Program, Final Rule," Feb. 3, 2010.

Notes: na = not applicable.

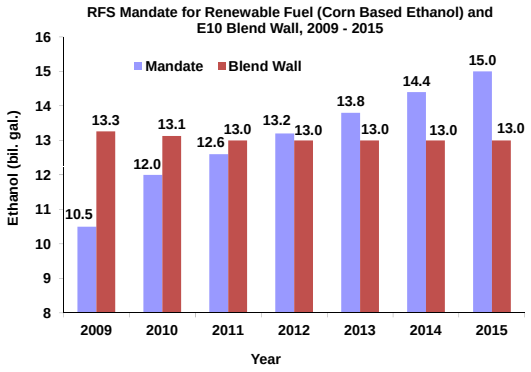
Source: Schnepf, R., and B.D. Yacobucci. "Renewable Fuel Standard (RFS): Overview and Issues." Congressional Research Service, March 2013.

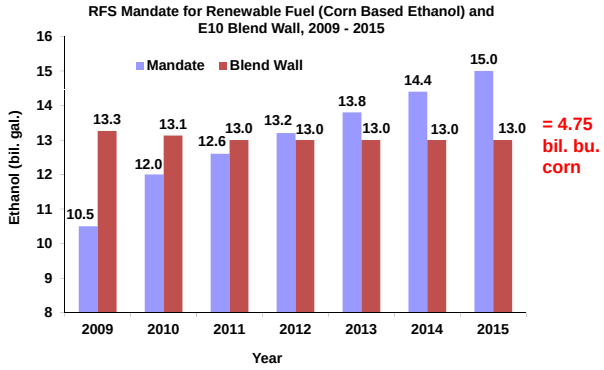


What is the Ethanol Blend Wall?

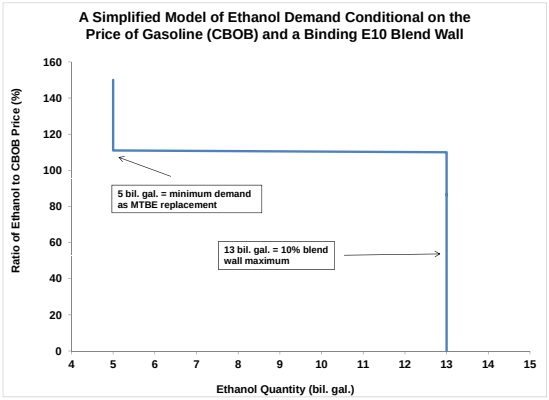
Ethanol-Gasoline Blending

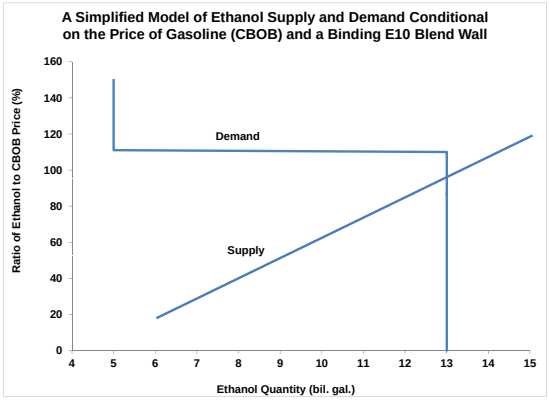
- The most common blend of ethanol and gasoline is known as E10
  - A mixture of 10% anhydrous ethanol and 90% gasoline
  - Can be used in the engines of most cars and light duty trucks without modification of the engine or fuel system
- Considerable controversy whether higher blends of ethanol will damage engines without modification
- The term "blend wall" is used to denote the maximum quantity of ethanol that can be used in the motor gasoline supply given a blending limit
  - If E10 is the maximum blend, then the blend wall equals 10% of total motor gasoline supply
  - Puts an upper limit on the size of ethanol production and use of corn for fuel ethanol

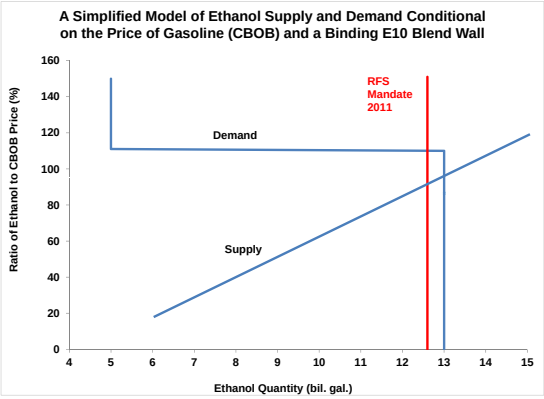


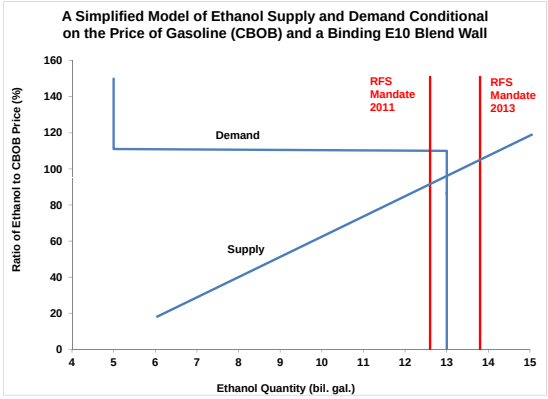


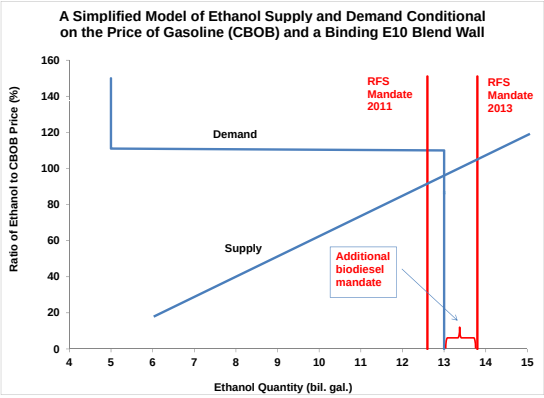
What are the Implications of the Ethanol Blend Wall for the RFS?

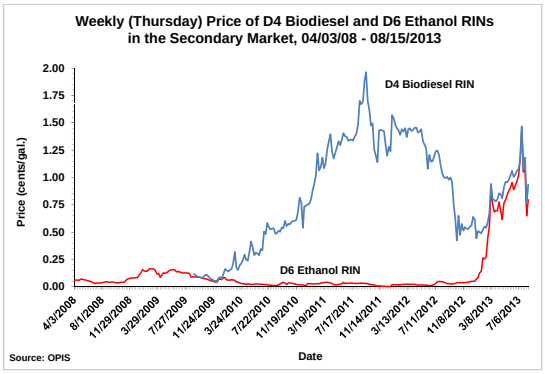












Are There Ways Around the Ethanol Blend Wall?

E15

- US EPA approved 15% ethanol blends for 2001 and newer vehicle models in January 2011
- Less than 20 gas stations in the U.S. out of 120,000 currently offer E15
- Implementation, has been delayed by a number of factors
  - Some state laws limit ethanol blends to 10%
  - Liability issues associated with dispensing E15
  - Cost of installing blender pumps at retail stations
  - Lack of consumer awareness and understanding
  - Some car manufacturers will not warranty engines if E15 used

http://www.chooseethanol.com/what-is-ethanol/entry/e15

E85

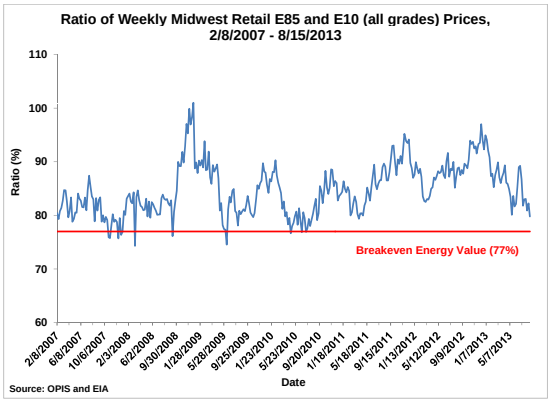
- Up to 85% ethanol blends have been approved for "flex fuel" vehicles for some time
- Over 11 million flex fuel vehicles on the road
- Represents a large potential consumption base for ethanol, perhaps large as 5-6 billion gallons annually
- Only about 40 million gallons of E85 used in 2012, or less than one tank per vehicle

http://www.greencar.com/articles/flexing-ford-mustang-muscle-e85-performance-car.php

http://www.afdc.energy.gov/fuels/ethanol_e85.html

E85 Pricing

- A gallon of ethanol has only about 2/3 of the energy content of a gallon of E10 gasoline
- Implies that a gallon of E85 will reduce gas mileage about 23% compared to E10 gasoline
- Suggests E85 should be priced at about 77% of the pump price of E10 gasoline
  - $3.50 pump price of E10 translates into a breakeven E85 price of $2.70
  - A further discount may be required by consumers to compensate for more frequent refueling stops



E85 Use through 2015

- Positive factors
  - High crude oil and gasoline prices
  - Lower corn and ethanol prices
  - High D6 ethanol RINs prices
- Negative factors
  - Less than 3,000 stations out of 120,000 currently offer E85
  - Geographic concentration of stations in Midwest
  - Lack of critical mass of stations in any area
  - Cost of adding E85 pumps ($10k to $250k)
  - Varying ethanol content (51 to 83%)
  - Negative consumer perceptions (Consumer Reports)
  - RFS uncertainty

What are EPA's Options for Implementing the RFS and Implications for Grain Markets through 2015?

EPA Options in 2014 and 2015

1. Continue the status quo (no waiving of advanced or total RFS mandate as cellulosic mandate is waived)
2. Write down advanced mandate and total RFS mandate near the amount of cellulosic mandate write down
3. Freeze all mandates at 2013 levels going forward


FEDERAL REGISTER

Vol. 78 Thursday,
No. 26 February 7, 2013

Part V

Environmental Protection Agency

Key Assumptions for the Analysis

- Steep ethanol blend wall through 2015
  - ✓ 100 million gallons of E85 in 2013
  - ✓ 300 million gallons of E85 in 2014
  - ✓ 700 million gallons of E85 in 2015
- Ethanol imports from Brazil a maximum of 500 million gallons per year
- Ethanol exports from the U.S. fixed at 500 million gallons per year
- Biodiesel mandate increases to 1.5 billion gallons in 2014 and 1.7 billion gallons in 2015
- No biodiesel imports or exports
- D4, D5, and D6 RINs stocks total 2.5 billion gallons at the start of 2013

Option #1: Status Quo

Implementation of U.S. Renewable Fuels Standard for 2013-2015 under Status Quo--Billion Gallons

Calendar Year	Total	Advanced				Renewable
		Cellulosic	Biodiesel(a)	Undifferentiated	Total	
2013	16.55	0.006	1.28	0.82	2.75	13.80
2014	18.15	0.05	1.50	1.45	3.75	14.40
2015	20.50	0.10	1.70	2.85	5.50	15.00

(a) each gallon of biodiesel receives 1.5 gallons credit towards RFS

Option #1: Status Quo

Implementation of U.S. Renewable Fuels Standard for 2013-2015 under Status Quo--Billion Gallons

Calendar Year	Total	Advanced				Renewable
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2013	16.55	0.006	1.28	0.82	2.75	13.80
2014	18.15	0.05	1.50	1.45	3.75	14.40
2015	20.50	0.10	1.70	2.85	5.50	15.00

(a) each gallon of biodiesel receives 1.5 gallons credit towards RFS

Option #2: Writedown

Implementation of U.S. Renewable Fuels Standard for 2013-2015 under Advanced and Total Writedown--Billion Gallons

Calendar Year	Total	Advanced				Renewable
		Cellulosic	Biodiesel(a)	Undifferentiated	Total	
2013	16.55	0.006	1.28	0.82	2.75	13.80
2014	16.70	0.05	1.50	0.00	2.30	14.40
2015	17.65	0.10	1.70	0.00	2.65	15.00

(a) each gallon of biodiesel receives 1.5 gallons credit towards RFS

Option #1: Status Quo

Implementation of U.S. Renewable Fuels Standard for 2013-2015 under Status Quo--Billion Gallons

Calendar Year	Total	Advanced				Renewable
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2015	20.50	0.10	1.70	2.85	5.50	15.00

(a) each gallon of biodiesel receives 1.5 gallons credit towards RFS

Option #2: Writedown

Implementation of U.S. Renewable Fuels Standard for 2013-2015 under Advanced and Total Writedown--Billion Gallons

Calendar Year	Total	Advanced				Renewable
		Cellulosic	Biodiesel(a)	Undifferentiated	Total	
2013	16.55	0.006	1.28	0.82	2.75	13.80
2014	16.70	0.05	1.50	0.00	2.30	14.40
2015	17.65	0.10	1.70	0.00	2.65	15.00

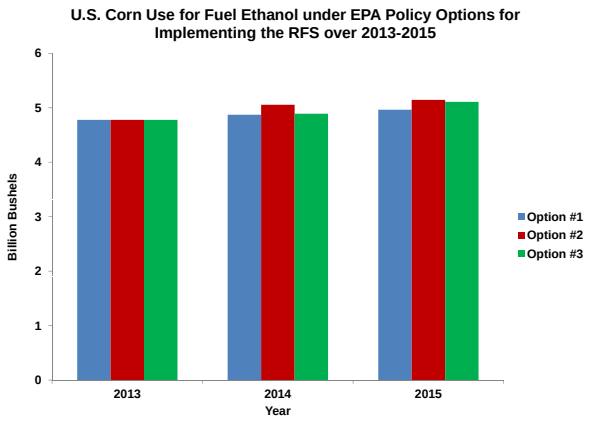
(a) each gallon of biodiesel receives 1.5 gallons credit towards RFS

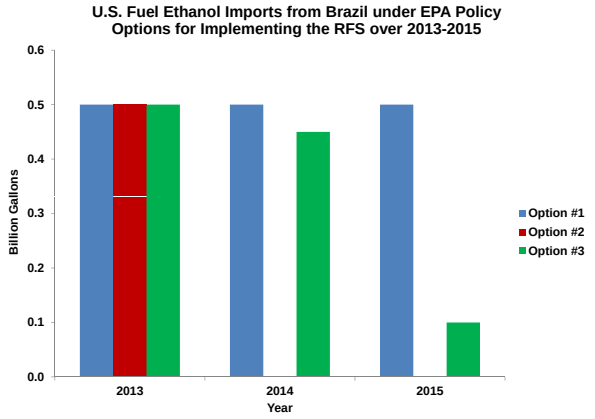
Option #3: Freeze

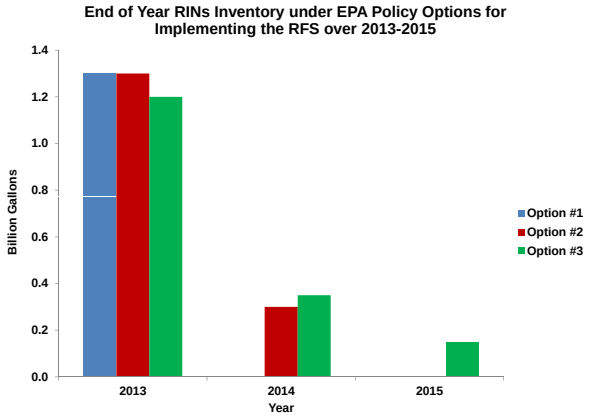
Implementation of U.S. Renewable Fuels Standard for 2013-2015 under Freeze--Billion Gallons

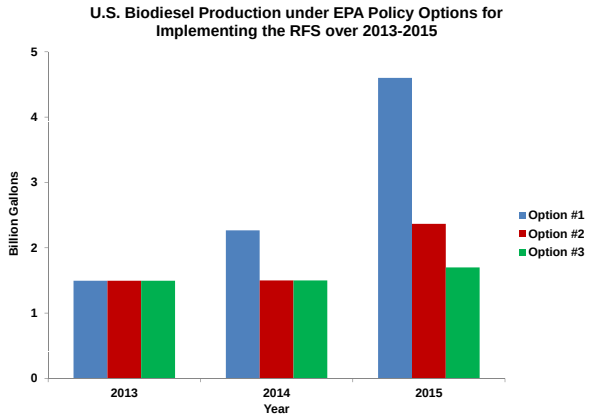
Calendar Year	Total	Advanced				Renewable
		Cellulosic	Biodiesel(a)	Undifferentiated	Total	
2013	16.55	0.006	1.28	0.82	2.75	13.80
2014	16.55	0.05	1.50	0.45	2.75	13.80
2015	16.55	0.10	1.70	0.10	2.75	13.80

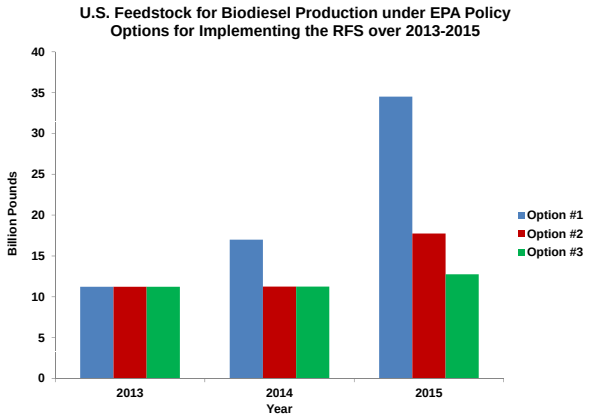
(a) each gallon of biodiesel receives 1.5 gallons credit towards RFS











Which Option will the EPA Pick?

"Given the history of the market and relevant constraints, EPA does not currently foresee a scenario in which the market could consume enough ethanol sold in blends greater than E10, and/or produce sufficient volumes of non-ethanol biofuels (biodiesel, renewable diesel, biogas, etc.), to meet the volumes of total renewable fuel and advanced biofuel stated in the statute. Given these challenges, EPA anticipates that in the 2014 proposed rule, we will propose adjustments to the 2014 volume requirements, including to both the advanced biofuel and total renewable fuel categories."

Source: "Regulation of Fuels and Fuel Additives: 2013 Renewable Fuel Standards." *Federal Register*, Vol. 78, No. 158, August 15, 2013, p.49823.

www.farmdocdaily.illinois.edu