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Impacts of Possible Changes in the RFS

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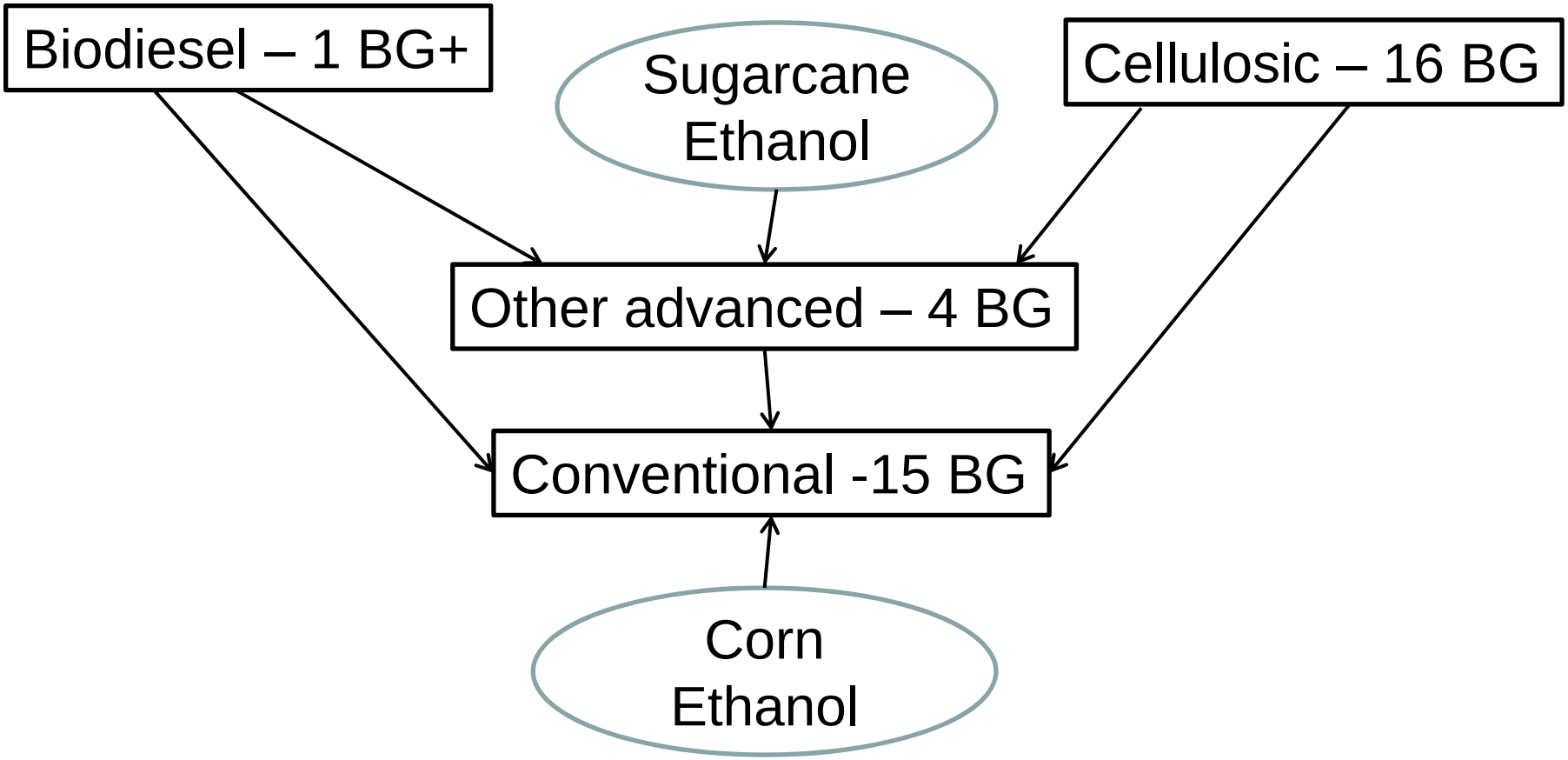
January 9, 2014

RFS Definition

- The Renewable Fuel Standard (RFS) provides for 36 billion gallons (ethanol equivalent) by 2022.
- There are four categories – biodiesel, cellulosic advanced, other advanced, and conventional.
- It is a nested structure, so only corn ethanol counts for conventional, but biodiesel, other advanced, or cellulosic can fill the conventional as well.

Nested RFS Structure



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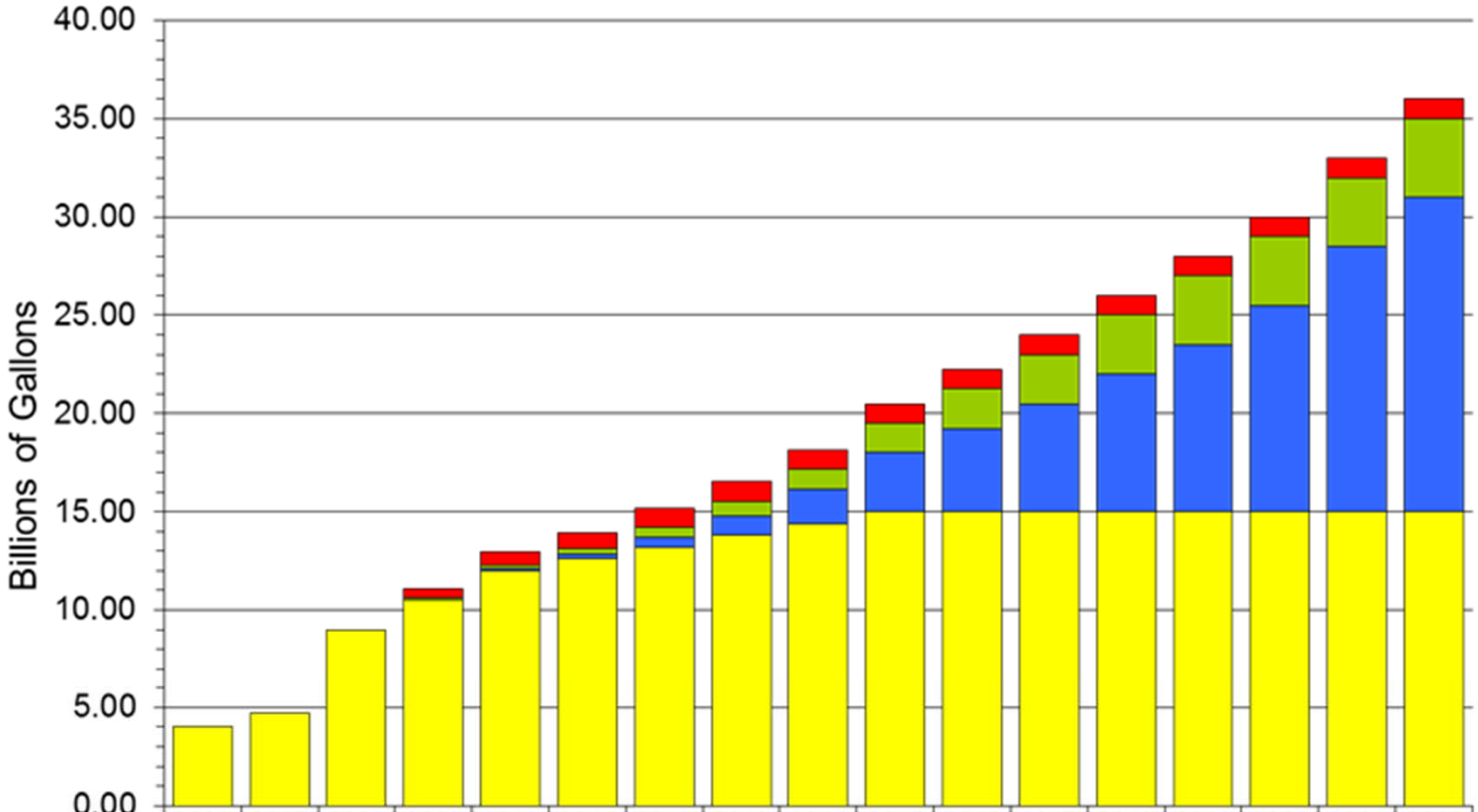
Renewable Fuel Standard (2007-2022)



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Biomass-based Diesel				0.50	0.65	0.80	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Other Advanced				0.10	0.20	0.30	0.50	0.75	1.00	1.50	2.00	2.50	3.00	3.50	3.50	3.50	4.00
Celulosic Advanced					0.10	0.25	0.50	1.00	1.75	3.00	4.25	5.50	7.00	8.50	10.50	13.50	16.00
Conventional Biofuels	4.00	4.70	9.00	10.50	12.00	12.60	13.20	13.80	14.40	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00

Biodiesel

- The original maximum mandate for biodiesel was 1 BG, but EPA has now increased that level to 1.28 BG.
- Must reduce greenhouse gas (GHG) emissions by at least 50%
- It can be transportation fuel, transportation fuel additive, heating oil, or jet fuel. It can be ester based diesel (e.g., from soybean oil), or non-ester renewable diesel (e.g., from cellulosic feedstocks).
- Biodiesel (as defined here) is required for the biodiesel part of the RFS.

Cellulosic Advanced

- Only biofuels produced from cellulosic feedstocks such as corn stover, miscanthus, switchgrass, forest residues, or short rotation woody crops can count in this category.
- Cellulosic biofuels must be shown to reduce GHG emissions by 60%.
- EPA has waived most of the RFS for this category and will continue to do so. It has not, however, lowered the overall RFS total.

Other Advanced

- This category can be a wide range of biofuels that reduce GHG emissions at least 50%.
- Sugarcane ethanol that meets the GHG reduction standards qualifies.
- Biodiesel qualifies. Cellulosic biofuels can be used.
- Recently, EPA approved sorghum ethanol produced under certain conditions.

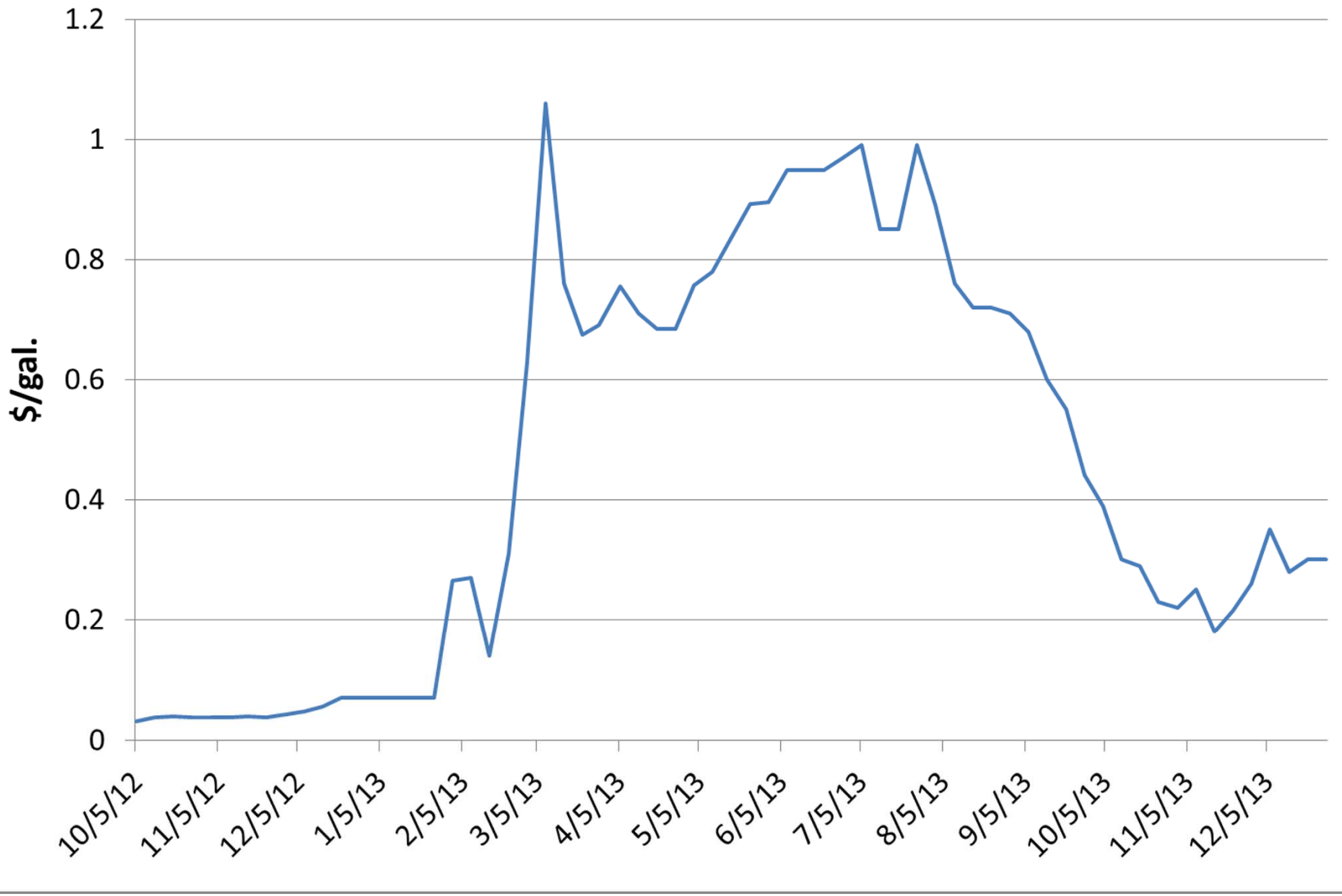
Conventional Biofuels

- This category is the only one that permits corn based ethanol.
- It requires a reduction in GHG emissions of at least 20%. However, ethanol plants that were in operation or under construction as of December 2007 are grandfathered.
- The RFS level is 13.8 BG in 2013 and reaches 15 BG in 2015.

RFS Enforcement - RINs

- The RFS is enforced by creating obligations for each type of biofuel.
  - Obligated parties generally are refiners (only the product for the domestic market) and importers.
  - For example, if you are a refiner, and you have 10% of the total domestic market (domestic plus imported) for gasoline, for 2013 with a 13.8 BG total obligation for corn ethanol, you would incur obligations for 1.38 BG.
  - The traded fraction is 15-25% of total RINs.

Corn Ethanol RIN Price



The Blend Wall

- The blend wall refers to a physical limit on blending of ethanol.
  - It is derived from the U.S. practice of blending gasoline at 10%. Current U.S. consumption of gasoline type fuel is about 133 BG per year.
  - With ethanol being blended at 10%, the maximum ethanol that can be blended is 13.3 BG.
  - There are small amounts of ethanol blended as E85 and as E15, but they are really too small to matter for this purpose.

Possible RFS Changes

- Elimination of the RFS
- Elimination of the cellulosic biofuel off ramp
- Reduction in the overall RFS any time the cellulosic mandate is partially waived
- Eliminating the other advanced category and expanding biodiesel
- Reduction of the overall RFS to accommodate the blend wall
- Irwin/Good proposal to freeze RFS at 2013 levels
- EPA approval of E15 for all vehicles
- Greater market penetration for E85

Elimination of the RFS

- Cellulosic biofuels development likely would cease. While cellulosics are closer than ever, they are not economically viable at present.
- Biodiesel likely would disappear.
- Sugarcane ethanol imports would fall or cease.
- Corn ethanol likely would continue at near present levels in the short run, but longer term outlook is uncertain.

Elimination of the cellulosic biofuel off ramp

- At present, any time EPA waives any part of the cellulosic mandate, blenders have the option of buying a credit and advanced RIN to fulfill their blending requirement (instead of actual blending).
- The current cost of the off ramp is about $0.73/gal., which makes it less expensive to buy out than to blend.
  - RIN + gasoline < cost of cellulosic biofuel
- Not clear what eliminating this option would do, as banks and venture capitalists do not view the RFS as an iron-clad guarantee.
- Off-take agreement is key to securing financing.

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Reduction in the overall RFS any time the cellulosic mandate is partially waived

Impacts When Both Total and Advanced RFS Levels Are Reduced

Year	2013	2014	2015
RFS total	16.55	18.15	20.5
Corn total	13.8	14.4	15
Blend wall	13.3	13.3	13.3
Cellulosic mandate	1	1.75	3
Revised overall total	15.55	16.4	17.5
RIN carry forward balance	2.1	1.77	1.07
RIN CF Used	0.33	0.7	1.07
Sugarcane	0.25	0.25	0.25
Corn ethanol prod (gal.)	13.05	13.05	13.05
Biodiesel RINs	1.92	2.4	3.13
Biodiesel production (gal.)	1.28	1.60	2.09
Reduced advanced RFS	1.75	2.00	2.50
Advanced supplied	2.17	2.65	3.38
Total RINs	15.55	16.4	17.5

Policy goes a long way towards solving the blend wall problem.

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Eliminating the other advanced category and expanding biodiesel

Impacts of Eliminating the Other Advanced Category and Expanding Biodiesel

Year	2013	2014	2015
RFS total	16.55	18.15	20.5
Corn total	13.8	14.4	15
Blend wall	13.3	13.3	13.3
Cellulosic mandate	1	1.75	3
Revised overall total	15.72	16.77	17.97
RIN carry forward balance	2.1	1.6	0.5
RIN CF Used	0.5	1.1	0.5
Sugarcane	0	0	0
Corn ethanol prod (gal.)	13.3	13.3	13.3
Biodiesel RINs	1.92	2.37	4.17
Biodiesel production (gal.)	1.28	1.58	2.78
Biodiesel RFS (gal.)	1.28	1.58	1.98
Biodiesel supplied (RINs)	1.92	2.37	4.17
Total RINs	15.72	16.77	17.97

Eliminates sugarcane ethanol and solves blend wall problem.

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Reduction of the overall RFS to accommodate the blend wall

Impact of Reducing Overall RFS to Accommodate the Blend Wall

Year	**2013**	**2014**	**2015**
RFS total	16.55	18.15	20.5
Corn total	13.8	14.4	15
Blend wall	13.3	13.3	13.3
Cellulosic mandate	1	1.75	3
Revised overall total	16.05	17.05	18.8
RIN carry forward balance	2.1	1.6	1.1
RIN CF Used	0.5	0.5	0.75
Sugarcane	0.5	0.5	0.75
Corn ethanol prod (gal.)	12.8	12.8	12.55
Biodiesel RINs	2.25	3.25	4.75
Biodiesel production (gal.)	1.50	2.17	3.17
Advanced RFS	2.75	3.75	5.50
Advanced supplied	2.75	3.75	5.50
Total RINs	16.05	17.05	18.8

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Reduction to accommodate blend wall and cellulosic

Big total RFS reduction, but corn ethanol and biodiesel are OK.

RFS Reduction to Accommodate Blend Wall and Cellulosic

Year	**2013**	**2014**	**2015**
RFS total	16.55	18.15	20.5
Corn total	13.8	14.4	15
Blend wall	13.3	13.3	13.3
Cellulosic mandate	1	1.75	3
Revised overall total	15.05	15.3	15.8
RIN carry forward balance	2.1	2.1	2.1
RIN CF Used	0	0	0
Sugarcane	0	0	0
Corn ethanol prod (gal.)	13.3	13.3	13.3
Biodiesel RINs	1.92	2.01	2.51
Biodiesel production (gal.)	1.28	1.34	1.67
Advanced RFS	1.75	2.00	2.50
Advanced supplied	1.92	2.01	2.51
Total RINs	15.22	15.31	15.81

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Irwin/Good proposal to freeze RFS at 2013 levels

Solves most problems through 2015.

Possible Impacts of Irwin/Good RFS Freeze Proposal

Year	2013	2014	2015
RFS total	16.55	16.55	16.55
Corn total	13.8	13.8	13.8
Blend wall	13.3	13.3	13.3
RIN carry forward balance	2.1	1.1	0.1
RIN CF Used	1	1	0.1
Sugarcane	0.5	0.5	0.5
Corn ethanol prod (gal.)	12.8	12.8	12.8
Biodiesel RINs	2.25	2.25	3.15
Biodiesel production (gal.)	1.50	1.50	2.10
Advanced RFS	2.75	2.75	2.75
Advanced supplied	2.75	2.75	3.65
Total RINs	16.55	16.55	16.55

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EPA Approval of E15 for All Vehicles

If implemented, would solve problems.

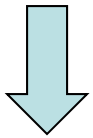
Impact of E15 Approval for All Vehicles

Year	2013	2014	2015
RFS total	16.55	18.15	20.5
Corn total	13.8	14.4	15
Blend wall	19	19	19
RIN carry forward balance	2.1	2.1	2.1
RIN CF Used	0	0	0
Sugarcane	0.5	0.75	0.75
Corn ethanol prod (gal.)	13.8	14.4	15
Biodiesel RINs	2.25	3	4.75
Biodiesel production (gal.)	1.50	2.00	3.17
Advanced RFS	2.75	3.75	5.50
Advanced supplied	2.75	3.75	5.50
Total RINs	16.55	18.15	20.5

Greater Market Penetration for E85

- Bruce Babcock has argued that there is significant potential for expanding E85 consumption.
- We have 12 million flex fuel vehicles. Current E85 sales represent about 3% of the capacity of those vehicles.
- Ethanol has been about $0.75/gal. less expensive than gasoline. Price difference plus RIN value could provide incentive for more E85 sales.

Possible RFS Changes

- Elimination of the RFS 
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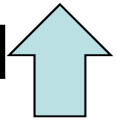
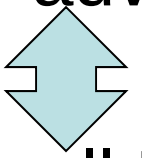
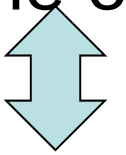
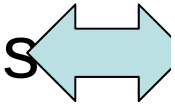
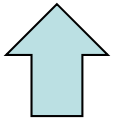
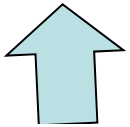
- Reduction in the overall RFS any time the cellulosic mandate is partially waived 
- Eliminating the other advanced category and expanding biodiesel 
- Reduction of the overall RFS to accommodate the blend wall 
- Irwin/Good proposal to freeze RFS at 2013 levels 
- EPA approval of E15 for all vehicles 
- Greater market penetration for E85 

EPA Now Has a New 2014 Proposal

Category	2014 RFS	EPA Proposal	New Option
Cellulosic	1.75	0.017	0.03
Biodiesel	1	1.28	1.5
Advanced	3.75	2.2	2.5
Other advanced	0.5	0.263	0.22
Corn ethanol	14.4	13.01	13.9
Total	18.15	15.21	16.4

- The EPA proposal reduces the overall mandate by more than the cellulosic component
- It accounts for both the cellulosic shortfall and the blend wall.
- The 13 BG level for corn ethanol provides no incentive for expanding E85.

Conclusions

- The RFS is important to the biofuels sector.
- Because of the blend wall and other issues, the RFS has now come under increased attack.
- Eliminating the RFS would kill renewable fuel growth, but ethanol could hold its ground in the short run.
- The EPA 2014 proposal deals with most of the problems of the RFS.
  - Biofuel advocates say it goes too far in accommodating the blend wall.
  - Interest groups wanting to kill the RFS say it does not go far enough.

Thanks

Questions and comments