The Impact of Biofuels Mandates on Grain and Oilseed Markets

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The Profitability of Illinois Agriculture: Managing in a Turbulent World
What is the RFS?


Gallons (billion):
- Advanced
- Renewable

20% GHG Reduction
50% GHG Reduction

- Advanced
- Renewable

Gallons (billion)

Year


9 10.5 12 12.6 13.2 13.8 14.4 15 15 15 15 15 15 15 15

20% GHG Reduction

50% GHG Reduction

- Cellulosic
- Biodiesel
- Undifferentiated
- Renewable

20% GHG Reduction

50% GHG Reduction
How is the RFS Enforced?
Renewable Fuel Standard Formulas for 2012

\[
\text{Std}_{CB, i} = 100\% \times \frac{\text{RFV}_{CB, i}}{(G_i - R_G) + (G_S - R_GS) - GE + (D_i - R_D) + (D_S - R_DS) - DE_i}
\]

Cellulosic

\[
\text{Std}_{BBD, i} = 100\% \times \frac{\text{RFV}_{BBD, i} \times 1.5}{(G_i - R_G) + (G_S - R_GS) - GE + (D_i - R_D) + (D_S - R_DS) - DE_i}
\]

Biodiesel

\[
\text{Std}_{AB, i} = 100\% \times \frac{\text{RFV}_{AB, i}}{(G_i - R_G) + (G_S - R_GS) - GE + (D_i - R_D) + (D_S - R_DS) - DE_i}
\]

Advanced

\[
\text{Std}_{RF, i} = 100\% \times \frac{\text{RFV}_{RF, i}}{(G_i - R_G) + (G_S - R_GS) - GE + (D_i - R_D) + (D_S - R_DS) - DE_i}
\]

Total
<table>
<thead>
<tr>
<th>Biofuel Type</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cellulosic biofuel</td>
<td>0.006%</td>
</tr>
<tr>
<td>Biomass-based diesel</td>
<td>0.91%</td>
</tr>
<tr>
<td>Advanced biofuel</td>
<td>1.21%</td>
</tr>
<tr>
<td>Renewable fuel</td>
<td>9.23%</td>
</tr>
</tbody>
</table>
Renewable Identification Numbers (RINS)

- RFS is actually enforced using RINS, a tradable credit system administered by the U.S. EPA
- 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
Daily Price of Current Year RINS in the Secondary Market, April 1, 2008 - October 25, 2012

- **Ethanol**
- **Biodiesel/1.5**
- **Advanced**
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
- Uncertainty whether higher blends of ethanol will damage engines without modification
- 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

- Reformulated with Ethanol
- Conventional with Ethanol
- Reformulated w/out Ethanol
- Conventional w/out Ethanol

Barrels per Month (thousands)
RFS Mandate for Renewable Fuel (Corn Based Ethanol) and E10 Blend Wall, 2009 - 2015

- Ethanol (bil. gal.)
- Marketing Year
- Mandate
- Blend Wall
Is E15 the Way Around the Blend Wall?

- US EPA approved E15 blends for 2001 and newer vehicle models in January 2011

- Implementation, has been delayed by a number of factors
  - Lack of clarification of liability issues associated with dispensing E15
  - Cost of installing blender pumps at retail stations
  - Engine warranties using E15

- E85 has been approved for “flex fuel” vehicles for some time
  - 10 million flex fuel vehicles on the road
  - E85 only offered by a very small number of retailers at the present time
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Bottom-line: US is likely to be stuck at the E10 blend wall for at least the next several years.
How Will the RFS be Implemented in the Next Several Years Given the Blend Wall?
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<thead>
<tr>
<th>Calendar Year</th>
<th>Total</th>
<th>Cellulosic</th>
<th>Biodiesel(a)</th>
<th>Undifferentiated</th>
<th>Total</th>
<th>Renewable</th>
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<tbody>
<tr>
<td>2012</td>
<td>15.20</td>
<td>0.50</td>
<td>1.00</td>
<td>0.50</td>
<td>2.00</td>
<td>13.20</td>
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<tr>
<td>2013</td>
<td>16.55</td>
<td>1.00</td>
<td>1.28</td>
<td>0.47</td>
<td>2.75</td>
<td>13.80</td>
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<tr>
<td>2014</td>
<td>18.15</td>
<td>1.75</td>
<td>*</td>
<td>0.47</td>
<td>2.00</td>
<td>14.40</td>
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<tr>
<td>2015</td>
<td>20.50</td>
<td>3.00</td>
<td>*</td>
<td>2.00</td>
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(a) each gallon of biodiesel receives 1.5 gallons credit towards RFS
* minimum of 1.0 billion gallons

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<td>0.50</td>
<td>2.00</td>
<td>13.20</td>
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<tr>
<td>2013</td>
<td>16.55</td>
<td>0.00</td>
<td>1.28</td>
<td>0.83</td>
<td>2.75</td>
<td>13.80</td>
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<tr>
<td>2014</td>
<td>18.15</td>
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<td>1.28</td>
<td>1.83</td>
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<td>14.40</td>
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<tr>
<td>2015</td>
<td>20.50</td>
<td>0.00</td>
<td>1.28</td>
<td>3.58</td>
<td>5.50</td>
<td>15.00</td>
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* minimum of 1.0 billion gallons

### U.S. Ethanol Balance Sheet and Implied Corn Consumption for 2012-2015---Billion Gallons except Corn

<table>
<thead>
<tr>
<th>Calendar Year</th>
<th>RFS</th>
<th>Consumption</th>
<th>Imports</th>
<th>Exports</th>
<th>Production</th>
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<tbody>
<tr>
<td>2012</td>
<td>13.2</td>
<td>13.1</td>
<td>0.50</td>
<td>0.74</td>
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<td>2013</td>
<td>13.8</td>
<td>13.3</td>
<td>0.83</td>
<td>0.50</td>
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<td>14.4</td>
<td>13.4</td>
<td>1.00</td>
<td>0.50</td>
<td>12.90</td>
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<td>2015</td>
<td>15.0</td>
<td>13.5</td>
<td>1.00</td>
<td>0.50</td>
<td>13.00</td>
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Note: Assumes zero stock change each year.

<table>
<thead>
<tr>
<th>Calendar Year</th>
<th>Mandate</th>
<th>Undifferentiated Biodiesel Gap</th>
<th>Renewable Gap</th>
<th>Total</th>
<th>Feedstock Requirement (bil. lbs.)</th>
</tr>
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<tbody>
<tr>
<td>2012</td>
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<td>0.00</td>
<td>0.00</td>
<td>1.00</td>
<td>7.5</td>
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<td>2013</td>
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<td>0.00</td>
<td>0.00</td>
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<tr>
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<td>0.55</td>
<td>0.95</td>
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<td>20.9</td>
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<tr>
<td>2015</td>
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<td>1.72</td>
<td>1.67</td>
<td>4.67</td>
<td>35.0</td>
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