Bioenergy Markets and Policy Situation and Outlook

David Ripplinger
Market Facilitators Meeting
Carrington, ND
September 28, 2017
Key Factors

• Ample, low cost corn – in most areas
• Growing ethanol demand
  – Domestic
  – International
• Domestic and global refinery expansion
• Growing policy uncertainty
Outlook

Domestic
15.4 billion gallons of ethanol
5,500 million bushels of corn
Exports
Ethanol shaky as Brazil increases production
Objective

Provide a very high overview of the many, recent developments in bioenergy markets and in the policy arena.

(Ask questions during, I’m covering A LOT)
Renewable Power

Renewable Energy: Electric Power Sector: Generating Capacity

Case: Reference case | Region: United States

GW

Source: U.S. Energy Information Administration
BIOFUELS
Sugar/Ethanol Nexus

Brazil sugar output to hit three-year low, as ethanol hits back

Sugar production in Brazil's key Centre South region will drop to a three-year low next season as a dearth of replanting takes its toll on cane yields, and with ethanol raising its take of the harvest.

Kingsman pegged sugar output in the Centre South, which is responsible for more than 90% of output in the top producing country, at 33.99m tonnes for 2018-19, on an April-to-March basis.

Sugar output at that level would represent a fall of 2.1m tonnes year on year, and would be the lowest since the 31.22m tonnes produced in 2015-16.

The decline would represent a double whammy of a lower cane crush, seen dropping to a four-year low of 575.0m tonnes, and a lower proportion of cane being processed into sugar rather than ethanol.

'Ethanol paying better than sugar'

Cane harvest hopes have been cut by lower rates of crop renovation, and so an increase to some 3.8-4.0 years in the average age of crop next season, a factor which "will lead to lower agricultural yields".

More undermining is a developing phenomenon of "ethanol taking".
### Corn-ethanol Crush

**South Dakota Crush (USDA/AMS)**

<table>
<thead>
<tr>
<th></th>
<th>Last Week</th>
<th>Last Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethanol ($/gal)</td>
<td>1.58</td>
<td>1.48</td>
</tr>
<tr>
<td>DDGs ($/ton)</td>
<td>102.65</td>
<td>107.40</td>
</tr>
<tr>
<td>#2 Corn ($/bu)</td>
<td>2.91</td>
<td>2.89</td>
</tr>
<tr>
<td>Simple Crush</td>
<td>2.42</td>
<td>2.20</td>
</tr>
</tbody>
</table>
Thousand Barrels per Day

Weekly U.S. Oxygenate Plant Production of Fuel Ethanol

Source: U.S. Energy Information Administration
Expansion

Debottlenecking
Al-Corn, MN
+70MMGPY
Marion, OH (POET)
+80MMGPY
Ringneck, SD (NEW)
80MMGPY
The RFS

The Renewable Fuel Standard (RFS) mandates minimum use of biofuel by type and year.

There are four categories: advanced, biodiesel, cellulosic, and conventional.

There is a nested structure so advanced, biodiesel, and cellulosic can satisfy the conventional mandate…
Original Annual Mandated Levels (EISA 2007)

- Conventional
- Cellulosic
- Biodiesel
- Other Advanced
How is the system managed?

- EPA is the regulator.
- Approve new biofuel pathways
- Change the mandate
- Oversee compliance
When can mandates be changed?

i) Inadequate supply
ii) Significant economic harm

EPA has regularly cut cellulosic mandates

EPA turned down a request after the 2012 drought

EPA has proposed reducing the conventional mandate due to the ‘blend wall’
RINS & RVOs

Created an accounting mechanism – renewable identification numbers (RINS) – to track compliance. 38 digit number initially assigned to physical biofuel.

Blenders and others are required to meet their annual renewable volume obligation (RVO).
The Life of a RIN

RIN Generated
Biofuel Imported or Produced

RIN Separated
Biofuel Blended or Used

RIN Retired
Submitted by Obligated Party to EPA
RINS

- Source: Progressive Fuels
Energy Beet Pathway

Comment period for initial estimates of the GHG emissions associated with beet production and transportation closed on August 25.

EPA: Thumbs-up to 'energy beet' idea
By Milissa Patek / Agweek Staff Writer on Sep 18, 2017 at 2:40 p.m

Shane Schatz, director of North Dakota State University’s Carrington Research-Extension Center, has been testing “energy beets” — sugar beets without the latest improvements for sugar extraction — for about eight years. Photos taken July 18, 2012, at Carrington, N.D. (Milissa Patek / Agweek News Service)

WEST FARGO, N.D. — The Environmental Protection Agency predicted it might take six months to do an initial evaluation of “energy beets” for their environmental footprint as a feedstock for biofuels.
### Figure 3. US Wood Pellet Exports by Port Region, 2016

<table>
<thead>
<tr>
<th>Importing Country</th>
<th>South</th>
<th>West</th>
<th>North</th>
<th>Total</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>United Kingdom</td>
<td>4,242,455</td>
<td>-</td>
<td>47</td>
<td>4,242,503</td>
<td>90.32%</td>
<td>90.32%</td>
</tr>
<tr>
<td>Belgium</td>
<td>306,291</td>
<td>-</td>
<td>-</td>
<td>306,291</td>
<td>6.52%</td>
<td>96.84%</td>
</tr>
<tr>
<td>Denmark</td>
<td>95,172</td>
<td>1</td>
<td>-</td>
<td>95,173</td>
<td>2.03%</td>
<td>98.87%</td>
</tr>
<tr>
<td>Other EU</td>
<td>51,660</td>
<td>17</td>
<td>71</td>
<td>51,749</td>
<td>1.10%</td>
<td>99.97%</td>
</tr>
<tr>
<td>Japan</td>
<td>-</td>
<td>306</td>
<td>-</td>
<td>306</td>
<td>0.01%</td>
<td>99.98%</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>-</td>
<td>32</td>
<td>-</td>
<td>32</td>
<td>0.00%</td>
<td>99.98%</td>
</tr>
<tr>
<td>China</td>
<td>-</td>
<td>23</td>
<td>-</td>
<td>23</td>
<td>0.00%</td>
<td>99.98%</td>
</tr>
<tr>
<td>Singapore</td>
<td>18</td>
<td>-</td>
<td>-</td>
<td>18</td>
<td>0.00%</td>
<td>99.98%</td>
</tr>
<tr>
<td>Thailand</td>
<td>-</td>
<td>-</td>
<td>9</td>
<td>9</td>
<td>0.00%</td>
<td>99.98%</td>
</tr>
<tr>
<td>South Korea</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>2</td>
<td>0.00%</td>
<td>99.98%</td>
</tr>
<tr>
<td>Other</td>
<td>577</td>
<td>258</td>
<td>55</td>
<td>890</td>
<td>0.02%</td>
<td>100.00%</td>
</tr>
<tr>
<td>Total</td>
<td>4,696,174</td>
<td>639</td>
<td>183</td>
<td>4,696,996</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Source:** US Import and Export Merchandise Trade Statistics
TRADE/ MARKET DEVELOPMENT
Mexico adopts E10 ethanol policy

Ethanol organizations welcome change that will allow up to 10% ethanol to be blended in Mexican fuel supply.
China aims to extend ethanol fuel usage countrywide by 2020

China said on Wednesday it would extend the use of ethanol fuel nationwide as it seeks to intensify anti-pollution efforts while finding a use for its huge corn surplus.

The plan will "support the use of ethanol fuel throughout the country by 2020" while strengthening the capacity of the biofuel industry, according to a document from the National Development and Reform Commission and the energy administration.

At the moment, biofuels account for just one percent of the total petroleum products consumed in China, the world's largest automobile market.
How much ethanol is that?

China uses 2.5 million barrels of gasoline each day

There are 42 gallons in a barrel

So China uses 38 billion gallons of gasoline each year

With a 10% blend that’s 3.8 billion gallons of ethanol.

The US is currently producing about 15.5 billion gallons of ethanol each year and using about 14.5.
How much corn is that?

2.75 gallons of ethanol/bushel of corn ->

1.4 billion bushels

33 million MT
Brazil imposes tariff on US ethanol

By Sara Wyant
China Hiking Tariffs on U.S. DDG and Ethanol, Imports Down to Trickle

MARCH 7, 2017 03:39 PM

China's Tariffs on U.S. DDGs at a glance:

- Anti-dumping
- Countervailing
- Value Added
- Tariff percentages differ with U.S. companies
- Most companies are seeing tariffs around 90 percent

China's Tariffs on U.S. ethanol at a glance:

- China upped it from 5 percent
- 30 percent for denatured
- 40 percent for unnatured
Trump & the RFS
EPA erred in its determination of 2014-2016 RVOs (too low, incorrectly applied supply rule)
## Proposed Volume Requirements

<table>
<thead>
<tr>
<th></th>
<th>2018</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cellulosic biofuel (million gallons)</strong></td>
<td>238</td>
<td>n/a</td>
</tr>
<tr>
<td><strong>Biomass-based diesel (billion gallons)</strong></td>
<td>2.1$^b$</td>
<td>2.1</td>
</tr>
<tr>
<td><strong>Advanced biofuel (billion gallons)</strong></td>
<td>4.24</td>
<td>n/a</td>
</tr>
<tr>
<td><strong>Renewable fuel (billion gallons)</strong></td>
<td>19.24</td>
<td>n/a</td>
</tr>
</tbody>
</table>

$^a$ All values are ethanol-equivalent on an energy content basis, except for BBD which is biodiesel-equivalent.

$^b$ The 2018 BBD volume requirement was established in the 2017 final rule (81 FR 89746, December 12, 2016).
EPA announced on Tuesday that they would looking to reduce the biodiesel and advanced biofuel numbers due to inadequate supply…

Biodiesel tax credit have expired
41-68% tariffs are pending on Argentine and Indonesian biodiesel
## Market Effects of Alternative Policy Scenarios

<table>
<thead>
<tr>
<th></th>
<th>Laissez Faire</th>
<th>No RFS</th>
<th>2015 Mandates</th>
<th>2022 Mandates</th>
<th>Optimal Mandates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn price ($/bu.)</td>
<td>3.08</td>
<td>2.75</td>
<td>3.68</td>
<td>3.85</td>
<td>3.88</td>
</tr>
<tr>
<td>Soybean price ($/bu.)</td>
<td>9.26</td>
<td>9.23</td>
<td>10.10</td>
<td>11.18</td>
<td>9.66</td>
</tr>
<tr>
<td>Soybean meal price ($/ton)</td>
<td>378.42</td>
<td>382.07</td>
<td>368.49</td>
<td>362.09</td>
<td>368.20</td>
</tr>
<tr>
<td>Soybean oil price (c/lb.)</td>
<td>22.20</td>
<td>21.17</td>
<td>31.60</td>
<td>42.44</td>
<td>27.81</td>
</tr>
</tbody>
</table>
The Future

Higher blends E15?   E20 or E30?

Death of the internal combustion engine.
Review

Bioenergy (renewables) hasn’t gone and isn’t going anywhere

Major news and very promising developments in bioenergy
– In the last year - domestically
– in the last two weeks - internationally
Questions?