The New World of Biofuels: Implications for Agriculture and Energy

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Overview

- Ag 101
- Status of Biofuels & Market Implications
- Public Policy and Biofuels
- Role of Research
- USDA Energy Policy & 2007 Farm Bill
## Ag at a Glance

<table>
<thead>
<tr>
<th>Item</th>
<th>2006</th>
<th>2007F</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Billion $</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farm cash receipts</td>
<td>243</td>
<td>259</td>
</tr>
<tr>
<td>Crop receipts</td>
<td>122</td>
<td>134</td>
</tr>
<tr>
<td>Corn receipts</td>
<td>23</td>
<td>31</td>
</tr>
<tr>
<td>Livestock receipts</td>
<td>121</td>
<td>125</td>
</tr>
<tr>
<td>Livestock feed costs</td>
<td>31</td>
<td>35</td>
</tr>
<tr>
<td>Value of exports (FY)</td>
<td>69</td>
<td>78</td>
</tr>
</tbody>
</table>
Farm Program Payments . . .

corn accounts for a large share

Billion $

Other crops
Corn

Fiscal Year

Corn Ethanol Production . . .
expect to use 27% of ’07 corn crop for nearly 9 bil. gal.
Biodiesel Production . . .
expect to use 17% of ’07 soyoil crop for 500 mil. gal.
Global Coarse Grain Stocks . . .

*getting uncomfortably tight*

% of total use

19% & Record corn prices

2006/07F: 12%

Crop Year

Expected Net Returns . . . favor corn

$ per acre

- Corn
- Soybeans
- Wheat
- Upland Cotton

2006 vs. 2007
Corn Acres Planted . . .

highest Since 1945 expected

Million acres

Projected Corn Ethanol Production...
expect 12 bil. gal. in 2016/17– 30% of corn crop
Ethanol Imports Augment Demand…

*imports soaring, led by Brazil*

Source: Census and Customs CBI TRQ data
Projected Soy Biodiesel Production…

expect 700 mil. gal. in 2016/17 – 23% of soyoil production
Ethanol-Corn Price Spread . . .

weekly data (2.75 x P_{eth} - P_{crn})
Ethanol-Corn Price Spread . . .

annual data with alternative $P_{eth}$ scenarios

- Ethanol priced = historical premium
- Priced = gasoline
- Priced = 70% gasoline
Challenges Facing Ethanol

- Corn trend acreage & yields
- Global weather
- Demand growth for blends/E85
- Ethanol distribution system
- Tax credit, tariff, RFS/AFS issues
- Livestock feed costs & adjustments
- DDG quality
- Meat and consumer food prices
- Environmental issues: nitrogen, water quantity & quality, CRP
Change in Fuel Use Since 2005 Met by Ethanol/Biodiesel

Source: 2007 EIA Annual Energy Outlook
Options to Maintain Biofuel Growth

- Do nothing
- Minimum prices (price controls)
- Maintain or amend subsidies/tax preferences
- Increase renewable fuel standards
Projected Corn Ethanol Production... w/o tax credit and import tariff (USDA analysis)

Billion gallons

- With credit/tariff
- W/O credit/tariff

2007/08  2009/10  2011/12  2013/14  2015/16
Projected Corn Prices…

\textit{w/o tax credit and import tariff (USDA analysis)}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{corn_prices_graph.png}
\caption{Projected corn prices per bushel from 2007/08 to 2015/16, comparing with and without tax credit and import tariff.}
\end{figure}

\textbf{With credit/tariff} \textbf{W/O credit/tariff}
Projected Soy Biodiesel Production...

\textit{w/o tax credit (USDA analysis)}

\begin{figure}
\centering
\includegraphics[width=\textwidth]{projected_biodiesel_production_graph}
\caption{Projected soy biodiesel production with and without tax credit from 2007/08 to 2015/16.}
\end{figure}
President’s “20 in 10” Proposal

- Reduce U.S. gasoline use by 20% in the next 10 years

- Path:
  - Modify CAFÉ
  - Require 35 billion gallons of renewable and alternative fuels by 2017

- Easy to achieve?

- Role of Ethanol and Biodiesel?
USDA Baseline Biofuel Production

“20 in 10”

22 billion
Biomass Potential by 2017
(excluding corn based ethanol)
(310 million tons of biomass = 28 billion gallons of ethanol)

Source: “Billion-Ton” Study
## Cost Competitiveness of Cellulosic Ethanol

<table>
<thead>
<tr>
<th></th>
<th>Corn Based</th>
<th>Cellulosic Today?—Illustrative</th>
<th>Cellulosic 2010-12—DOE target</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Feedstock</strong></td>
<td>$1.17</td>
<td>$1.00</td>
<td>$0.33</td>
</tr>
<tr>
<td>@ $3.22/bu</td>
<td>@$60/dt</td>
<td>@$30/dt</td>
<td></td>
</tr>
<tr>
<td>2.75g/bu</td>
<td>60g/dt</td>
<td>90g/dt</td>
<td></td>
</tr>
<tr>
<td><strong>By-Product</strong></td>
<td>-$0.38</td>
<td>-$0.10</td>
<td>-$0.09</td>
</tr>
<tr>
<td><strong>Enzymes</strong></td>
<td>$0.04</td>
<td>$0.40</td>
<td>$0.10</td>
</tr>
<tr>
<td><strong>Other Costs</strong>**</td>
<td>$0.62</td>
<td>$0.80</td>
<td>$0.22</td>
</tr>
<tr>
<td><strong>Capital Cost</strong></td>
<td>$0.20</td>
<td>$0.55</td>
<td>$0.54</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$1.65</td>
<td>$2.65</td>
<td>$1.10</td>
</tr>
</tbody>
</table>

** (includes preprocessing, fermentation, labor)
Role for Research

- Reduce Production Costs
  - Land Costs
    -- Cropland
    -- Grassland/Pasture
  - Establishment and Reseeding
  - Bailing and Staging

- Transportation Costs
Cropland Rents . . .
hard for dedicated crops to compete for land

Cropland rents over $100/acre need over 3 dt/acre just to cover land costs
Production Costs . . .

(actual economic data are limited)

- **University of Nebraska/ARS**
  --Switchgrass, 173 acres, 5 years, 10 farmers
  --Average yield = 3.4 tons/acre
  --Land cost = $17/ton
  --Production cost = $27/ton
  \[\text{Total cost} = \$44/\text{ton}\]

- **Iowa State University**
  --Switchgrass from Pasture
  --Average yield = 4 tons/acre
  --Land cost = $13/ton
  --Establishment + reseeding cost = $7/ton
  --Production cost = $40/ton
  \[\text{Total cost} = \$60/\text{ton}\]
2007 Farm Bill Proposal

- $500 million -- Ag Bioenergy and Biobased Products Research Initiative
- $150 million -- Biomass Research and Development Act
- $100 million -- Cellulosic Bioenergy Program
- $150 million -- Forest Wood-to-Energy Program
- Biomass Reserve Program (BRP)
Conclusions

- *Tight agricultural markets raising risks*
- **Corn ethanol:**
  -- Approaching limits
  -- Making minor inroads in crude oil market
  -- Can do a little more with better yields
- **Cellulosic technology:**
  -- Great prospects
  -- Large potential biomass feedstock base (technical)
  -- Must focus on economic potential
  -- Need to improve yields to reduce feedstock costs
  -- Public policy goal to get over initial adjustment costs