Biofuels: From Ports-To-Plains

Presented by
Tim Lust
National Sorghum Producers
Blue Revolution
Today’s Transportation Fuels

- Gasoline – 140 billion gallons
- Diesel – 45 billion gallons
- E85 – 10 million gallons
- Ethanol as an additive (E-10)
  - 4.8 billion gallons
  - Extends gasoline – blended in 40% of gasoline
  - Adds 300,000 barrels of supply

- Biodiesel is important as well
Energy Security Benefits

- Two-thirds of known oil reserves in the Mideast
- Today, 97% of transportation energy comes from petroleum, of which 65% is imported
- U.S. energy imports to grow to more than 71% in 2025 according to EIA
- EIA estimates oil prices at near or above $50/barrel through 2030
- Under the RFS, use of renewable fuels will reduce oil imports by 2 billion barrels
Ethanol’s Environmental Benefits

- Reduces emissions of CO, exhaust VOCs and NOx, particulates, hydrocarbons
- Displaces toxics – benzene, toluene
- Renewable – reduces greenhouse gas emissions
- Displaces fossil energy use
- Reduces CO and ozone through oxyfuel and RFG programs

RFA
Renewable Fuels Association
U.S. Ethanol Industry Today

- Annual production record in 2005 of 4 bgy
- 105 plants in 19 states with over 4.8 bgy capacity today *(September 2006)*
- 44 plants under construction, combined with 7 expansions, will increase industry capacity an additional 3 bgy *(August 2006)*
- Dozens of additional plants in various stages of development
Farmers Leading the Fight for Energy Independence

- Rural Revitalization!
- 47% of the 101 current ethanol plants are owned by farmers
- Majority of ethanol plants under development are farmer-driven projects
Historic U.S. Ethanol Production

- Gallons (million) scale ranges from 0 to 4000 million.
- Years span from 1980 to 2004.
- The production shows a steady increase over the years.
Ethanol Production Will Nearly Triple Over the Next Decade

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### Renewable Fuels Standard (RFS)
*(Energy Policy Act of 2005)*

<table>
<thead>
<tr>
<th>Year</th>
<th>RFS (bgy)</th>
<th>2013+</th>
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<tbody>
<tr>
<td>2006</td>
<td>4.0</td>
<td>Proportional to renewable fuels/gasoline ratio</td>
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<tr>
<td>2007</td>
<td>4.7</td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>5.4</td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>6.1</td>
<td>Includes 250 mgy cellulose ethanol requirement</td>
</tr>
<tr>
<td>2010</td>
<td>6.8</td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>7.4</td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>7.5</td>
<td>4.7% of National Fuel Supply by 2012</td>
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<tr>
<td></td>
<td>41.9 = Total</td>
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Total: 41.9
RFS vs. RFA Projections

<table>
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<tr>
<th>Year</th>
<th>RFS</th>
<th>RFA Projections</th>
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<tr>
<td>2006</td>
<td>4.0</td>
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<tr>
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<td>6.6</td>
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<tr>
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<td>5.4</td>
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<tr>
<td>2009</td>
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<td>9.3</td>
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<tr>
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<td>9.9</td>
</tr>
<tr>
<td>2012</td>
<td>7.5</td>
<td>10.3</td>
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Agriculture as Energy Producers

- In 2005, 1.43 billion bushels of corn (13% U.S. crop) and 15% of the nation’s grain sorghum crop used for ethanol
- Ethanol is the 3rd largest market for corn and 2nd largest market for sorghum
- Ethanol dry mills produced record 9 million metric tons of distillers grain livestock feed in 2005
Politics and Ethanol Are LOCAL
EXCEPT WHEN THE PRESIDENT MAKES THEM NATIONAL
Site Evaluation Matrix

- Class 1 rail
- Class A highway access
- Available water
- Available land
- Accessible animal feeding units
- Proximity to local starch source
- Energy access
- Local synergies
Community Leaders on a Mission
Annual Local Economic Impact of a 100 mgy Facility

- Spend an estimated $88.2 million for goods and services
- Use 36.4 million bushels of sorghum/corn
- Operational spending will generate $406 million for the local economy
- Increase the size of the state economy by $223 million
- Generate nearly 1,600 new jobs
- Increase household income by more than $50 million

CBOT Ethanol Futures versus NYMEX Unleaded Futures
March 23, 2005 - present

Source: Oil Price Information Service (OPIS) and The Chicago Board of Trade
Industry Responds to Rising Demand

- **2005 Production** represents a 17% increase from 2004 production and a 126% increase from 2001 – mostly in new coastal markets
- Once just a niche fuel, today 40% of all gasoline sold in the U.S. contains ethanol!
- Increasing production activity outside corn belt, including CA, CO, OR, NM, TX, AZ
Importance of the Industry

A recent study concluded gasoline prices would increase 14.6% in the short term (36.5 cents/gallon if gas is $2.50/gallon), and 3.7% in the long term (9.3 cents/gallon if gas is $2.50/gallon) even after refiners build new capacity or secure alternative sources of supply.

According to the Consumer Federation of America, consumers could pay as much as 8 cents per gallon less if oil companies blended ethanol rather than higher-priced petroleum products (May 2005).
Grain to Ethanol Production

What does it look like today??
Sweet Sorghum

Grows in 35 U.S. States

Yield = 20–25 Dry Ton / (Acre·Yr)

Source: William Rooney, Soil and Crop Sciences, Texas A&M University
What about Cellulosic ethanol?

- Technology and cost are limiting factors.
- Current technology for cellulosic ethanol is the acid hydrolysis process.
  - Capital costs are almost 4X that of dry mill ethanol.
  - Operating costs are 50% above corn dry mill costs.
- Enzymatic process holds promise for lower costs, but is not yet commercialized.
- Cellulose ethanol will happen, but large scale production not likely before 2015.

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CONCLUSION

- Good and not so good
Benefits

- Rural America
  - Builds infrastructure to support bioenergy
  - Creates new tax base to support rural America
  - Encourages job development in rural America
Benefits

● National Security
  – Reduce dependency on Foreign Energy
  – Creates job security in rural America
  – Investment into rural America
  – Less dependence on Foreign export for our Agricultural communities
  – Development of new energy technologies
Challenges to Consider

- Water Laws (state/local level)
- Transportation Issues
CORN, DDG & ETHANOL COMBINED TON-MILE DEMAND on RAILROADS, Current Estimate and PRX Forecast

Rail ton-mile demand on RR's will increase by about 61 percent in ten years from 2005 to 2015. (Dip in 2011-13 is from lower corn exports to foreign.)
CORN & DDG TON-MILE DEMAND on LOCAL TRUCKS, Current Estimate and PRX Forecast

Billion ton-miles

Calculated from regional corn production and estimated origination distance of 15 to 20 miles; and from regional DDG production and estimated truck to user distance of 50 miles, gradually increasing.

Truck ton-mile demand for corn origination and for DDG delivery to feed users will increase by about 65 percent in ten years from 2005 to 2015.
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<th>Capacity (MGPY)</th>
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<tbody>
<tr>
<td></td>
<td>30</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>Grain In (Trucks/yr)</td>
<td>11,080</td>
<td>18,467</td>
<td>36,934</td>
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<tr>
<td>Grain In (Trucks/day)</td>
<td>30</td>
<td>51</td>
<td>101</td>
</tr>
<tr>
<td>DDGS Out (Trucks/yr)</td>
<td>8,733</td>
<td>14,555</td>
<td>29,110</td>
</tr>
<tr>
<td>DDGS Out (Trucks/day)</td>
<td>24</td>
<td>40</td>
<td>80</td>
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The Future’s Bright

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The greatest nation on the face of the Earth

The United States of America

One Million Dollars
Thank You