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Biodiesel Industry – A Statewide Assessment

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Nebraska Biodiesel Industry Development Seminar
August 31, 2006 - Lincoln, NE

Biodiesel Industry – A Statewide Assessment

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University of Nebraska – Lincoln
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Nebraska Soybean Association
USDA – Rural Development Value Added Producer Grant
“Strategically Locating Soybean and Biodiesel Processing Facilities in Nebraska”

• Outline
  – Overview of the Study
  – Summary of the Findings
  – Biofuel Industry Trends
  – The Role of Incentives
  – Questions and Comments

Overview – Introduction of the Project Development Team

• Nebraska Soybean Association, Lori Luebbe, Executive Director
• University of Nebraska – Industrial Agricultural Products Center, Dr. Milford Hanna, Director, Loren Isom, Technical Assistance Coordinator, Robert Weber, Research Coordinator
• Nebraska Department of Economic Development, Zach Schroeder, Development Consultant
• Nebraska Department of Agriculture, Richard Sanne, Ag Promotion and Development
• USDA – Nebraska Agricultural Statistics Service, Mark Harris, Director
• Nebraska Soybean Board, Victor Bohuslavsky, Executive Director
• Nebraska Ethanol Board, Todd Sneller, Executive Director
• Nebraska Public Power District, Brian Wilcox, Industrial & Business Account Consultant

Overview - Objectives

• to conduct a third party feasibility study and market analysis to evaluate the potential success and risk of investment associated with soybean processing and biodiesel production facilities located in Nebraska;
• to identify key site selection criteria for soybean processing and biodiesel production facilities and conducting a statewide assessment of the criteria (feedstocks, markets, and infrastructure) to identify the best location(s); and
• to identify and evaluate multiple business structures to position Nebraska soybean producers to capture the greatest value from soybean processing and biodiesel production.
Overview – Supporting Events

- the Mobile Biodiesel Workshop to West Central Cooperative’s soybean processing and biodiesel production facilities in Ralston, IA; January 2005;
- the IBFG – Feasibility Report presentation to the NSA and NSB board of directors; July 2005;
- the Biodiesel Plant Development Seminar presented by IBFG and other state resource providers; August 2005;
- the National Biodiesel Board presentation to the NSA, NSB, and state legislators regarding federal and state regulatory issues and opportunities for Nebraska legislation; December 2005;
- the Biodiesel Plant Development Workshop presented by the IAPC and the Iowa State University Center for Industrial Research and Service; March 2006; and
- numerous community and individual based presentations

Summary of the findings

- Biodiesel demand
- Biodiesel market price
- Estimated biodiesel production cost
- Competition in the biodiesel industry
- Availability of biodiesel feedstock resources
- Government incentives and public policy

Biodiesel Demand

- IBFG study projected
  – 8 MGPY for NE, and
  – 24 MGPY for NE and surrounding states

- If biodiesel can compete $ for $ w/ #2 diesel
  – Fuel concentration limits (B5 to B20) and feedstock availability are the only limits.

Biodiesel Demand

- Nebraska diesel sales: 730 MGPY
  - 204 MGPY on-farm and
  - 403 MGPY on-highway
- Biodiesel demand: on-farm market
  – assuming a 50% market penetration
    – 6 MGPY if B5 or 24 MGPY if B20 blends
- Biodiesel demand: on-highway market
  – assuming a 50% market penetration
    – 4 MGPY if B2 or 10 MGPY if B5 blends
- Estimated biodiesel demand in NE: 10–34 MGPY
Biodiesel Market Price

- Revised DOE-EIA forecasts, May 2006
  - $1.50/gallon for wholesale, pre-tax diesel in 2010
    - based on $48 per barrel crude oil
    - 33 cents higher than the forecast used in the IBFG study
- Is a biodiesel premium realistic?
  - If not, reduce 37.5 cents
    - the premium is based on a ¾ cent premium for B2 blends
- Is the biodiesel tax credit fully available to producers?
  - If not, reduce from $1.00 to $0.85-95 per gallon
- Passage of the small producer tax credit
  - add $0.10 per gal. for first 15 MGPY under 60 MGPY

Biodiesel Market Price

- Depends on the forecast for petroleum diesel?
- Nebraska Jan. – June 2006 average: $2.70/gallon
  - less state & federal taxes (24.6 and 24.4 cents/gallon)
  - Net: $2.21 per gallon pre-tax
- Forecasts:
  - going higher & higher or peaking and dropping back?

### B100 profitability ($50/barrel crude)?

<table>
<thead>
<tr>
<th>Crude oil</th>
<th>US refiners cost</th>
<th>$50/barrel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petro-diesel</td>
<td>Cost to terminal</td>
<td>$1.70/gallon</td>
</tr>
<tr>
<td>Biodiesel</td>
<td>Non-SBO costs to terminal</td>
<td>$0.03/gallon</td>
</tr>
<tr>
<td></td>
<td>B100 profitability @</td>
<td>$0.63/gallon</td>
</tr>
<tr>
<td></td>
<td>SBO oil price</td>
<td>$1.01/gallon</td>
</tr>
<tr>
<td></td>
<td>40 cts/lb</td>
<td>-$1.01/gallon</td>
</tr>
<tr>
<td></td>
<td>35 cts/lb</td>
<td>-$0.63/gallon</td>
</tr>
<tr>
<td></td>
<td>30 cts/lb</td>
<td>-$0.24/gallon</td>
</tr>
<tr>
<td></td>
<td>25 cts/lb</td>
<td>$0.15/gallon</td>
</tr>
<tr>
<td></td>
<td>20 cts/lb</td>
<td>$0.53/gallon</td>
</tr>
</tbody>
</table>

### Breakeven at different crude oil/SBO prices?

- Very volatile market situation
- We estimate:
  - If crude oil $70/barrel biodiesel profitable up to 35cts/lb
  - If $60 ........................................... 31cts/lb
  - If $50 ........................................... 26 cts/lb
  - If $40 ........................................... 23 cts/lb
  - If $30 ........................................... 19 cts/lb

NB Critical factors:

- Future energy prices?
- Technology?
- Change in subsidies?
Estimated Biodiesel Production Costs

Source: Rudy Pruszko, Iowa State – prices as of Oct. 2004

<table>
<thead>
<tr>
<th>Cost of Biodiesel Production</th>
<th>3 MGY</th>
<th>30 MGPY</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per Gallon</td>
<td>Per Cent</td>
<td>Per Gallon</td>
<td>Per Cent</td>
</tr>
<tr>
<td>Feedstock</td>
<td>$1.71</td>
<td>71.5%</td>
<td>$1.61</td>
</tr>
<tr>
<td>Chemicals</td>
<td>0.24</td>
<td>10.0%</td>
<td>0.18</td>
</tr>
<tr>
<td>Energy</td>
<td>0.04</td>
<td>1.7%</td>
<td>0.02</td>
</tr>
<tr>
<td>Labor</td>
<td>0.14</td>
<td>5.9%</td>
<td>0.02</td>
</tr>
<tr>
<td>Depreciation and Maintenance</td>
<td>0.2</td>
<td>4.4%</td>
<td>0.08</td>
</tr>
<tr>
<td>Administration and Overhead</td>
<td>0.06</td>
<td>2.5%</td>
<td>0.01</td>
</tr>
<tr>
<td>Biodiesel Cost per Gallon</td>
<td>$2.39</td>
<td>100.0%</td>
<td>$1.92</td>
</tr>
</tbody>
</table>
# Estimated Biodiesel Production Costs
Source: Building a Successful Biodiesel Business - prices as of Oct. 2004

<table>
<thead>
<tr>
<th>Cost of Biodiesel Production (soybean oil vs. animal fat)</th>
<th>10 MGPY (soybean oil, $3.22/lb.)</th>
<th>10 MGPY (animal fat, $3.14/lb.)</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of Feedstock</td>
<td>$1.61 (80.9%)</td>
<td>$1.02 (70.3%)</td>
<td>$0.59</td>
</tr>
<tr>
<td>Cost of Chemicals</td>
<td>0.18 (9.0%)</td>
<td>0.18 (12.4%)</td>
<td>0</td>
</tr>
<tr>
<td>Cost of Energy</td>
<td>0.02 (1.3%)</td>
<td>0.04 (2.8%)</td>
<td>-0.02</td>
</tr>
<tr>
<td>Cost of Labor</td>
<td>0.04 (2.3%)</td>
<td>0.04 (2.8%)</td>
<td>0</td>
</tr>
<tr>
<td>Depreciation and Maintenance</td>
<td>0.12 (6.0%)</td>
<td>0.15 (10.3%)</td>
<td>-0.03</td>
</tr>
<tr>
<td>Administration and Overhead</td>
<td>0.02 (1.0%)</td>
<td>0.02 (1.4%)</td>
<td>0</td>
</tr>
<tr>
<td>Biodiesel Cost per Gallon</td>
<td>$1.99 (100.0%)</td>
<td>$1.45 (100.0%)</td>
<td>$0.54</td>
</tr>
</tbody>
</table>

## Competition in the Biodiesel Industry
Source: Leland Tong, IBFG as of January 2006

<table>
<thead>
<tr>
<th>Plant Size (gallons per year)</th>
<th>Existing Plants (53 total)</th>
<th>Plants Under Construction (42 total)</th>
<th>Plants in Pre-construction (22 total)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1,000,001</td>
<td>12</td>
<td>12</td>
<td>1</td>
</tr>
<tr>
<td>1,000,001 – 5,000,000</td>
<td>26</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td>5,000,001 – 10,000,000</td>
<td>3</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>10,000,001 – 15,000,000</td>
<td>6</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>15,000,001 – 20,000,000</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>&gt;20,000,000</td>
<td>5</td>
<td>5</td>
<td>9</td>
</tr>
</tbody>
</table>

## Biodiesel Feedstock Resources
- **Buy feedstock or crush soybeans?**
- Estimated soybean meal production in NE:
  - 2.0 million tons, source: ProExporter Network, 04-05
  - Estimated soybean meal fed in NE:
    - 1.5 million tons, source: ProExporter Network, 04-05
- Competition form current and expanding distillers grains
  - 4.8 million tons

<table>
<thead>
<tr>
<th>Nebraska Ethanol Production</th>
<th>Ethanol MGPY</th>
<th>Annual Grind (million bu/year)</th>
<th>DDGS (tons/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Production</td>
<td>560</td>
<td>303</td>
<td>2,272,500</td>
</tr>
<tr>
<td>Expansion and Development</td>
<td>884</td>
<td>340</td>
<td>2,550,000</td>
</tr>
<tr>
<td>Total</td>
<td>1,444</td>
<td>643</td>
<td>4,822,500</td>
</tr>
</tbody>
</table>
Biodiesel Feedstock Resources

<table>
<thead>
<tr>
<th>Feedstock Type</th>
<th>MGPY</th>
<th>Million pounds per year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soybean oil from extrusion expellers</td>
<td>5</td>
<td>40</td>
</tr>
<tr>
<td>Soybean oil from solvent extractions</td>
<td>75</td>
<td>5,780</td>
</tr>
<tr>
<td>Refined corn oil from wet milling plants</td>
<td>45</td>
<td>340</td>
</tr>
<tr>
<td>Refined corn oil potential from current dry mill ethanol plants</td>
<td>22</td>
<td>169</td>
</tr>
<tr>
<td>Refined corn oil potential from expanding or developing dry mill ethanol plants</td>
<td>95</td>
<td>720</td>
</tr>
<tr>
<td>Animal fat from cattle slaughtering</td>
<td>119</td>
<td>908</td>
</tr>
<tr>
<td>Animal fat from pork slaughtering</td>
<td>27</td>
<td>207</td>
</tr>
<tr>
<td>Yellow grease from restaurants</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>390</strong></td>
<td><strong>2,964</strong></td>
</tr>
</tbody>
</table>

Note: major quantities will still go to traditional applications.
Best Locations in Nebraska

- Concentrations of feedstock resources
  - soybean processors
  - animal processors
  - ethanol producers
- Co-processing
- Supporting infrastructure for:
  - regional distribution terminals and
  - national marketing (railroads)
- PROJECT SPECIFIC: size, feedstock preferences, joint venture opportunities with feedstock processors

State Incentives and Public Policy

- Minnesota biodiesel mandate
  - at least 2% biodiesel
- Illinois sales tax exemption
  - exempts 15 to 20 cents per gallon
- Missouri farmer owned reimbursement
  - reimburses development costs
- Iowa income tax credit
  - 3 cent per gallon credit to retailers of B2+
- Kansas biodiesel producer incentive
  - 30 cent per gallon incentive to producers

Biofuel Industry Trends

Todd Sneller, Nebraska Ethanol Board

- Where is the money coming from?
- Who owns the plants? How are they structured?
  - Fuel
  - Co-products
- Who is selling the products?
- What is the petroleum industry doing?

The Role of Incentives

Todd Sneller, Nebraska Ethanol Board

- Focus on the Goal: Production
- Competitive Position vs. Other States
- The Function of a Production Incentive
- The Advantage of a Performance Based Production Incentive
- Justifying Support for a Production Incentive: Rationale
- Process, Opportunity and Timing