U.S. Agriculture’s Role in the International Biofuel Market

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Ethanol Explosion

Source: Renewable Fuels Association
Biodiesel Growth

Source: National Biodiesel Board

Million Gallons

1999 2000 2001 2002 2003 2004 2005 2006

2006

Source: National Biodiesel Board
Renewable Fuels Standard

Source: Renewable Fuels Association

Billion Gallons

2006 2007 2008 2009 2010 2011 2012

Source: Renewable Fuels Association
# Ethanol Industry Snapshots

<table>
<thead>
<tr>
<th>Jan. Year</th>
<th>Ethanol Plants</th>
<th>Capacity (mgy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>54</td>
<td>1,749</td>
</tr>
<tr>
<td>2001</td>
<td>56</td>
<td>1,921</td>
</tr>
<tr>
<td>2002</td>
<td>61</td>
<td>2,347</td>
</tr>
<tr>
<td>2003</td>
<td>68</td>
<td>2,707</td>
</tr>
<tr>
<td>2004</td>
<td>72</td>
<td>3,101</td>
</tr>
<tr>
<td>2005</td>
<td>81</td>
<td>3,644</td>
</tr>
<tr>
<td>2006</td>
<td>95</td>
<td>4,336</td>
</tr>
<tr>
<td>2007</td>
<td>110</td>
<td>5,386</td>
</tr>
</tbody>
</table>

Source: Renewable Fuels Association
Where Are We Headed?

• Based on construction announcements for ethanol plants, by the end of 2008, ethanol production capacity could exceed 12 billion gallons

• Announced biodiesel capacity exceeds 2 billion gallons
World Ethanol Production, 2005

35% U.S.
35% Brazil
8% China
6% Europe
1% Africa
7% Asia
8% Rest of World

Total = 12.15 billion gallons
World Ethanol Imports, 2006

62% - Rest of World
3% - U.S.
15% - EU
10% - India
8% - Japan
2% - South Korea
Projected World Oil Consumption

Figure 26. World Oil Consumption by Sector, 2003-2030

Million Barrels per Day

Projected World Energy Sources

Figure 3. World Marketed Energy Use by Energy Type, 1980-2030

Quadrillion Btu

History

Projections


Oil

Coal

Natural Gas

Renewables

Nuclear


Biofuel Feedstocks

- Corn – U.S., China
- Sugarcane – Brazil, Central and South America, Southeast Asia, India
- Soybean Oil – U.S., Brazil
- Rapeseed and Sunflower Oil – Europe
- Palm Oil – Malaysia and Indonesia
Biofuel Programs

• U.S. – Renewable Fuels Standard
• Brazil – Ethanol blend requirement, preferential tax policies
• Argentina – Require use E-5 blend over the next 5 years
• India – 5% ethanol in all gasoline
• EU – 5.75% biofuel (energy content) target by 2010
Biofuel Programs

- Columbia – Mandated use of E-10 in big cities
- Venezuela – Phasing in a national E-10 blending mandate
- Japan – Long term goal of replacing 20% of oil needs with biofuels or gas-to-liquid fuels
- Canada – 45% of gasoline to be E-10 by 2010
- Thailand – Mandating nationwide E-10 in 2007
Biofuel Programs

• China – Mandates E-10 blends in five provinces
• Philippines – Will mandate E-5 and 2% biodiesel in 2007
Trade Barriers

- U.S. tariff of 2.5% plus 54 cents per gallon
- Brazil and Argentina – 20% tariff
- European Union – 87 cents per gallon tariff
- Canada – 19 cents per gallon tariff
- Thailand – 30% tariff
- India – 186% tariff
U.S. Energy Department Projections

- U.S. liquid fuel demand will grow by 1% a year through 2030
- U.S. ethanol production will average a 5.2% growth rate
- But U.S. ethanol imports will average a 8.4% growth rate
- The U.S. will remain a net importer of ethanol
U.S. Energy Department Projections

- World petroleum demand will grow by 1.3% per year

- China’s petroleum needs increase 3.2% per year

- India’s oil requirements go up 2.3% per year
Given Energy Demand Projections…

- The U.S., China, India, the EU, Japan, and South Korea are all expected to be importers of ethanol over the next decade.

- Brazil will be the major exporter of ethanol
  - Already exports roughly 25% of production, over 1 billion gallons.
Cellulosic Ethanol …

• Ethanol derived from any lignocellulosic or hemicellulosic matter that is available on a renewable basis

• Sources: trees, wood and crop residues, grasses, fibers, energy crops, and other non-petroleum wastes

• Federal legislative support via the Biomass Research and Development Act of 2000, extended by the 2002 Farm Bill and the Energy Policy Act of 2005
U.S. Production Incentives

• Goal: 1 billion gallons of cellulosic biofuel per year and biofuel price-competitiveness by 2015

• Per gallon production incentive set by the Sec. of Energy until
  – 2008 or
  – 100 million gallons per year of cellulosic biofuel

• Then a reverse auction sets the incentive until
  – 2015 or
  – 1 billion gallons per year of cellulosic biofuel
Production Incentives (cont.)

• Bidders submit desired incentive and estimated production

• Incentive paid on actual production

• Funding for auction set at $250 million
Other Features of the Energy Act

• Preprocessing and harvesting grants for cellulosic biomass

• Minimum target of 250 million gallons of renewable fuel from cellulosic biomass by 2013

• Production credit: 1 gallon of cellulosic biomass ethanol = 2.5 gallons of renewable fuel (until 2013)

• Additional loan guarantees and grants
Potential Outlook for U.S. Biomass