The Prospects for Biofuels
Under the Energy Independence and
Security Act of 2007

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Sustaining Energy for Sustainable Development
United Nations 67th Anniversary Commemoration
East Lansing, Michigan
October 23, 2012
History of Biofuel Subsidy Legislation

• Energy Tax Act of 1978
• Clean Air Act Amendments of 1990
• Jobs Creation Act of 2004
• Energy Policy Act of 2005 --- RFS1
• EISA of 2007 ---- RFS2
U.S. Production of Ethanol and Biodiesel (Mil. Gal.)

- Ethanol
- Biodiesel

Production trends from 1980 to 2010.
Ratio of Ethanol and Biodiesel Production to Use in Transportation

- Ethanol
- Biodiesel
Rationale for Biofuel Legislation in 2006 by Sen. Lugar

- Replacing crude oil imports can reduce the trade deficit
- Oil supplies are vulnerable to wars, terrorist attacks
- Worldwide oil reserves are diminishing
- Oil producing nations use energy as an overt weapon, are avoiding needed democratic reforms
- Crude oil is accelerating climate change
- Replacing crude oil can help stem terrorist activities

- Sen. Lugar could also have added:
  - Reduce agricultural production subsidies
  - Enhance rural economies
  - Open up world agricultural trade
Direct and Net (Light Blue) Effect of Biofuels in GHG Emissions Relative to Fossil Fuel if Indirect Foreign Land Use Changes are Included
The Renewable Fuels Standard (RFS2) by Classifications under the Energy Independence and Security Act of 2007 (Mil. Gal.)

- Corn Ethanol
- Corn + Cellulosic Ethanol
- Ethanol + Biodiesel
- RFS Total
Production of Corn Ethanol Relative to the RFS2 (Mil. Gal.)

Production

RFS2

Cellulosic Ethanol Production Versus the RFS2 (Mil. Gal.)

- Production
- RFS2
## Infrastructure for an Ethanol Plant
### Producing 50 Million Gallons Annually

<table>
<thead>
<tr>
<th>Feedstock</th>
<th>Requirements</th>
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<tbody>
<tr>
<td><strong>Corn Grain Feedstock</strong></td>
<td>Needs 50 hopper-bottom semi-trailers daily</td>
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<td>From a maximum of 15 miles</td>
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<td>Assuming that half of the farmers are suppliers</td>
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<tr>
<td><strong>Corn Stover Feedstock</strong></td>
<td>Needs 150 semi-trailers daily</td>
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<tr>
<td></td>
<td>From as maximum of 35 miles</td>
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<tr>
<td></td>
<td>Assuming that half of the farmers are suppliers</td>
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</tbody>
</table>
Projections to 2022 with AGMOD

- Econometric/Simulation Model
- Covers major crop and livestock enterprises
- Sectors include corn ethanol, cellulosic ethanol, biodiesel and food prices
- Projects year by year for 10 to 15 years
- Includes about 1000 equations, 135 of which are statistical regressions
- Exogenous are crude oil prices, population, consumer incomes, interest rates and exchange rates
- Weather is assumed to be normal
Refiners' Acquisition Cost of Crude Oil
Composite of Domestic and Imported ($/Barrel)
The Farm Price of Corn ($/Bu.) Compared to Ending Stocks as a % of Utilization, 1990 to 2012 and Projected to 2022
Corn Production and Use in Ethanol
Crop Years 2000 to 2012 and Projected to 2022 (Mil. Bu.)

Production

Ethanol Use

Crop Years 2000 to 2012 and Projected to 2022 (Mil. Bu.)
Blenders' Tax Credit for Ethanol and Biodiesel ($)

- **Ethanol**
- **Biodiesel**

The graph shows the tax credit for Ethanol and Biodiesel from 2005 to 2012. The credit for Biodiesel remained constant until 2011, after which it dropped sharply. The credit for Ethanol decreased gradually from 2008 onwards, reaching a lower value around 2011.
Wholesale Price of Ethanol Compared to the Energy Equivalent Price
2005 to 2012 and Projected to 2022 ($/Gal) *

* F.O.B., Omaha, NE
Gross Margins for a Representative Dry Mill Ethanol Plant
2005 to 2012 and Projected to 2022 ($/Gal.)

Gross Margin over Variable Costs
Gross Margin
Projections of Biodiesel Production under 3 Scenarios (Mil. Gal.)

- **IHS Global Insight**
- **RFS2 Rulemaking**
- **Minimum**

Production data from 2010 to 2022.
Biodiesel Feedstock Distribution, Jan-June 2012

- Animal Fat
- Yellow Grease
- DDG
- Corn Oil
- Other
- Vegetable Oil
- Soybean Oil
Projected Feed Stock for Biodiesel Production (Mil. Lbs.)

- Soybean Oil
- DDG Corn Oil
- Animal Fat, YG
- Other Vegetable Oil

Returns in $/Gal. of Ethanol from Extracting Corn Oil from DDG with Premiums ($13 to $16/T.) Versus a $5 /T. Discount *

* Projections generated by AGMOD
Monthly Average Biodiesel Prices Compared to Energy Equivalent Prices and RINs ($/gal.) *

* Upper Midwest biodiesel prices from Jacobsen
Trends in Calendar Year Prices of Selected Fats and Oils with Projections to 2022 (Cents/Lb.) *

* Jacobsen prices in Illinois with projections generated by AGMOD
Profit Margins on Soybean Oil, BF Tallow and DDG Corn Oil
Projected to 2022 Assuming Nominal Profits for Soybean Oil ($/Gal.) *

* Projections generated by AGMOD
Trends in Biodiesel Prices and Projections to 2022 *

* Upper Midwest from Jacobsen. Projections generated by AGMOD.
Percent Changes in Prices on Corn, Soybean Oil and Wheat from 2002-06 to 2008-12 and Forecast from 2008-12 to 2018 to 2022 (Calendar Years)
Percent Changes in the Consumer Price Index (CPI) for Food between 2002-06 and 2008-12
Percent Changes in the Consumer Price Index (CPI) for Food Forecast for 2008-12 to 2018-22

- Food at Home
- Food Away
- Food

From Crop Prices
Total

0 2 4 6 8 10 12 14
Variable Production Costs for Corn in 5 Crop Year Averages of 2001-05 and 2007-11 and Forecast for 2017-21 ($/Bushel)
Variable Production Costs for Soybeans in 5 Crop Year Averages of 2001-05 and 2007-11 and Forecast for 2017-21 ($/Bushel)
Variable Production Costs for Wheat in 5 Crop Year Averages of 2001-05 and 2007-11 and Forecast for 2017-21 ($/Bushel)
Summary and Conclusions

• Corn ethanol production will level off at 15 billion gallons beginning in 2015.

• Cellulosic ethanol production will remain nominal.

• Biodiesel production will likely double in the next 10 years assuming that the mandate (RFS2) increases to nearly 2 billion gallons by 2022.

• Corn oil extracted from DDG is a promising feedstock for biodiesel as well as a profit center for dry mill ethanol plants – could supply at least 20 percent of the feedstock by 2022.

• While elevated prices from major field crops because of EISA contributed to higher retail food prices, the impact was relatively minor.