US Energy – A Place for Bioenergy

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September 26, 2012
AGENDA

• Energy Overview

• Policy

• USDA Activities

• Opportunities
Energy use grows slowly over the projection in response to a slow and extended economic recovery and improving energy efficiency.

U.S. primary energy consumption
quadrillion Btu per year

<table>
<thead>
<tr>
<th>Year</th>
<th>Oil and other liquids</th>
<th>Coal</th>
<th>Nuclear</th>
<th>Natural gas</th>
<th>Liquid biofuels</th>
<th>Renewables (excluding liquid biofuels)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>37%</td>
<td>21%</td>
<td>9%</td>
<td>25%</td>
<td>7%</td>
<td>1%</td>
</tr>
<tr>
<td>2035</td>
<td>32%</td>
<td>20%</td>
<td>9%</td>
<td>26%</td>
<td>4%</td>
<td>11%</td>
</tr>
</tbody>
</table>

Source: EIA, Annual Energy Outlook 2012
U.S. Primary Energy Consumption by Fuel, 1960-2030 (quadrillion Btu)

Source: EIA, AER and AEO2012
New Light-Duty Vehicle Fuel Efficiency (miles per gallon)
The Transportation Sector Dominates Liquid Fuels Consumption.

Source: EIA, AER and AEO2012
U.S. Electricity Demand Growth Trends

<table>
<thead>
<tr>
<th>Decade</th>
<th>Annual Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950s</td>
<td>9.0%</td>
</tr>
<tr>
<td>1960s</td>
<td>7.3%</td>
</tr>
<tr>
<td>1970s</td>
<td>4.2%</td>
</tr>
<tr>
<td>1980s</td>
<td>3.1%</td>
</tr>
<tr>
<td>1990s</td>
<td>2.4%</td>
</tr>
<tr>
<td>2000-2005</td>
<td>1.2%</td>
</tr>
<tr>
<td>2005-2030</td>
<td>1.1%</td>
</tr>
</tbody>
</table>

Source: EIA, AER and AEO2012
U.S. imports of liquid fuels continue to decline due to increased production of gas liquids and biofuels and greater fuel efficiency.

Source: EIA, Annual Energy Outlook 2012
U.S. dependence on imported petroleum continues to decline.

U.S. liquid fuel supply
million barrels per day

History 2005 2010 Projections

Consumption

Net petroleum imports
60% 49%

Domestic supply


Source: EIA, Annual Energy Outlook 2012
Electricity mix gradually shifts to lower-carbon options, led by growth in renewables and natural gas.
Non-hydro renewable sources more than double between 2010 and 2035

Source: EIA, Annual Energy Outlook 2012
POLICY

• Energy Independence and Security Act of 2007
  – RFS 2
  – GHG Reductions

• Food, Conservation and Energy Act of 2008
  – Energy Title IX

• Blueprint for a Secure Energy Future
U.S. Ethanol Production, 1980-2011
EPA expects the following feedstocks and the associated number of gallons by 2022:

- Switchgrass (perennial grass): 7.9 bg
- Soy biodiesel and corn oil: 1.34 bg
- Crop residues (corn stover, includes bagasse): 5.5 bg
- Woody biomass (forestry residue): 0.1 bg

(data does not include short-term woody crops)
- Corn ethanol: 15.0 bg
- Other (municipal solid waste (MSW)): 2.6 bg
- Animal fats and yellow grease: 0.38 bg
- Algae: 0.1 bg
- Imports: 2.2 bg

USDA estimates the following feedstocks and the associated gallons by 2022: (this count does not include tallow, MSW, or algae)

- Dedicated energy crops:
  - perennial grasses, energy cane, biomass sorghum: 13.4 bg
  - Oilseeds (soy, canola): 0.5 bg
  - Crop residues (corn stover, straw): 4.3 bg
  - Woody biomass (logging residues only): 2.8 bg
  - Corn starch ethanol: 15.0 bg
Food, Conservation, and Energy Act of 2008 - Title IX – Energy

- Federal Procurement of Biobased Products (9002)
- Biorefinery Assistance Program (9003)
- Repowering Assistance Program (9004)
- Bioenergy Program for Advanced Biofuels (9005)
- Rural Energy for America Program (REAP - 9007)
- Biomass Research and Development (9008)
- Biomass Crop Assistance Program (9011)
- Community Wood Energy Program (9013)
- …..
Food, Conservation, and Energy Act of 2008

- EXPIRES 2012
- BUDGET CONSTRAINTS
America’s Energy Security- Blueprint for a Secure Energy Future

- Reduction of Imported Oil by 1/3 by 2025
- Expanding Biofuels Markets and Commercializing New Technologies
  - 4 Commercial-scale cellulosic or advanced biorefineries in the next 2 years
  - Expedite development of “drop-in” biodiesel and bio-jet fuel
- Clean Energy Standard
  - 80% of Nation’s electricity from clean energy sources by 2035
Other Drivers in Biofuels Development

- November 2010, Secretary Vilsack announces establishment of Biomass Research centers leveraging resources to support 1st, 2nd and 3rd generation renewable fuels

- PARTNERING with other agencies and other countries like China, Brazil, and other countries
## Regional Biomass Research Centers

<table>
<thead>
<tr>
<th>Region</th>
<th>Leadership</th>
<th>Primary feedstocks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southeastern</td>
<td>ARS, FS</td>
<td>Energy cane, Biomass sorghum, Perennial grasses, Woody biomass, Soybean</td>
</tr>
<tr>
<td>Central-Eastern</td>
<td>ARS</td>
<td>Perennial grasses, Biomass sorghum, Corn stover residues, Soybean, Woody biomass, Corn grain ethanol</td>
</tr>
<tr>
<td>Northern-Eastern</td>
<td>FS</td>
<td>Woody biomass, Municipal solid waste</td>
</tr>
<tr>
<td>Western</td>
<td>ARS</td>
<td>Woody biomass, Oil seeds, Municipal solid waste</td>
</tr>
<tr>
<td>Northwestern</td>
<td>ARS, FS</td>
<td>Woody biomass, Oil seeds, Cereal and grass straw residue</td>
</tr>
</tbody>
</table>
Initiatives & MOUs

- **Flexible Fuel Pumps** - a goal of making **10,000 new flex fuel pumps** available to America's drivers within the next five years.

- **Wood to Energy** interagency team was established to build opportunities for utilizing wood from hazardous-fuels treatment and small-diameter thinning as feedstock for biofuel and bioenergy.

- **Digester Initiative** USDA goal of providing assistance for a **digester a week for 5 years**

- **Farm to Fly** accelerate the availability of commercially viable and sustainable aviation biofuels in the United States
Initiatives & MOUs

• MOU – Dairy Innovation Center reduce GHG emissions by 25% (2020) and accelerate adoption of anaerobic digesters by dairy farmers.

• MOU – Department of Navy working jointly to encourage maximum use of renewable energy with the goal of providing technical assistance and financial products to qualified entities for the development of advanced biofuels and other renewable energy systems to meet both commercial and military transportation needs.

• MOU DPA – DOE/DON departments will work in a cooperative effort to assist the development and support of sustainable commercial biofuels industry
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Midwest Aviation Sustainable Biofuels Initiative (MASBI)

Brings together representatives from across the biofuels value chain to address ways to best leverage regional assets to:

- become a national leader in the emerging aviation biofuels market
- position the Midwest to achieve economic development and job growth
- diversify current jet fuel supply in the region and for the nation
- promote U.S. energy security, and
- reduce environmental impact

The Midwest holds great promise in becoming a leader in the development of advanced aviation biofuels. The region has significant natural resources, a vibrant investment community, excellent research centers, productive agricultural centers, and policymakers that have long made advanced biofuels a priority.
2012 & Future Political Realities

• Fiscal Reality
• 2012 Presidential Election Year
• 2012 New Farm Bill
• Renewable Energy Issues
  – Food and Security
  – Blend Wall
  – Energy security
  – Rural economic development
Opportunities

• Commitment By Administration to Renewable Energy
• Demand for Biomass
  – Fuels
  – Electricity
  – Bioproducts
• New Technology Increasing Supplies of Fossil Fuel
• Cellulosic Development Coming
Opportunities & Future

- No silver bullet
- It will be difficult and challenging
- Require interdisciplinary cooperation, coordination, and leveraging resources
- USDA is positioned to meet the challenge ahead
List of State Energy Links

Michigan

Department of Agriculture
Department of Economic Development
Department of Energy
Department of Environment
State Forester

USDA State Offices
Farm Service Agency (FSA)
Natural Resources Conservation Service (NRCS)
Rural Development (RD)
THANK YOU
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<tr>
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<th>Leadership</th>
<th>States</th>
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<tbody>
<tr>
<td>Southeastern</td>
<td>ARS, FS</td>
<td>FL, GA, SC, AL, MS, LA, AR, NC, TN, KY, eastern TX, and HI</td>
</tr>
<tr>
<td>Central-Eastern</td>
<td>ARS</td>
<td>100&lt;sup&gt;th&lt;/sup&gt; Meridian east: NE, eastern ND and SD, KS, OK, MN, IA, MO, WI, IL, MI, IN, OH, KY, TN, PA, DE, MD, and VA</td>
</tr>
<tr>
<td>Northern-Eastern</td>
<td>FS</td>
<td>MN, WI, MI, NY, VT, NH, ME, MA, CT, RI, PA, OH, DE, MD, and WV</td>
</tr>
<tr>
<td>Western</td>
<td>ARS</td>
<td>NM, AZ, CA, NV, UT, CO, MT, WY, ID, and western TX</td>
</tr>
<tr>
<td>Northwestern</td>
<td>ARS, FS</td>
<td>WA, OR, ID, MT, CO, WY, ND and SD, CA and AK</td>
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</tbody>
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Energy Use: Per Capita and Per Dollar of GDP

Source: EIA, AER and AEO2012