Biodiesel in West Virginia

West Virginia 2010 Energy Summit
West Virginia:
Maintaining Energy Leadership

Dean Cordle
Executive Vice President
AC & S, Inc.
Biodiesel Defined

- Biodiesel -- a fuel comprised of mono-alkyl esters of long chain fatty acids derived from vegetable oils or animal fats, designated B100

- Biodiesel blend -- a blend of biodiesel fuel with petroleum-based diesel fuel

- B5 is 5% Biodiesel and 95% petroleum diesel fuel
Production

\[
100 \text{ pounds triglyceride} + 10 \text{ pounds Methanol} = 100 \text{ pounds Biodiesel} + 10 \text{ pounds Glycerin}
\]

(Catalyst)

B100 = Biodiesel
Specified by ASTM D 6751
Biodiesel Impacts

- Reduces Imports of Foreign Oil
- Reduces Greenhouse Gases
- Provides Economic Growth to America
Biodiesel Physical Properties

- Integrates into existing petroleum infrastructure
- Biodegradable
- Increases lubricity by up to 65%
- High Cetane (>50 vs. 42)
- Flash Point (>300° F vs. 150° F)
- Non-Toxic
Environmental Attributes

- **Energy Balance**
  - for every unit of fossil energy to make biodiesel, 4.5 units of energy are gained, corn based ethanol is 1.34 units.

- **Biodegradable and Non-Toxic**

- **Reduces emissions**
  - A 78% life cycle decrease in CO$_2$ according to a USDA/DOE study
# Average Biodiesel Emissions Compared to Conventional Diesel

<table>
<thead>
<tr>
<th>Emission Type</th>
<th>B100</th>
<th>B20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Unburned Hydrocarbons</td>
<td>-67%</td>
<td>-20%</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>-48%</td>
<td>-12%</td>
</tr>
<tr>
<td>Particulate Matter</td>
<td>-47%</td>
<td>-12%</td>
</tr>
<tr>
<td>Nitrogen Oxides (Nox)</td>
<td>+10%</td>
<td>-2% to +2%</td>
</tr>
<tr>
<td>Sulfates</td>
<td>-100%</td>
<td>-20%</td>
</tr>
<tr>
<td>PAH (Polycyclic Aromatic Hydrocarbons)</td>
<td>-80%</td>
<td>-13%</td>
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</tbody>
</table>
Distribution Locations

Type of Seller
- Both Retail & Bulk Distribution (227)
- Bulk Distribution (1365)
- Retail Outlets (489)
Energy Security

- Increases Domestic Fuel Production
  - Putting renewable feeds through existing refineries doesn’t do this

- Reduces Energy Imports and Dependence on Sources of Foreign Oil

- Good Fit as ‘Distributed Energy’ for Energy Security
Federal Energy Policy

Renewable Fuel Standard (RFS 2)
Energy Independence and Security Act 2007 (EISA)

Mandates Renewable Fuels Use
800 million gallons of biodiesel in 2011
8% of all gasoline and diesel fuel will be from renewable sources in 2011

Biodiesel Blender’s Tax Credit
Expired at the end of 2009
States Having or Considering Biodiesel Use Mandates

Pennsylvania
Minnesota
Florida
Connecticut
Missouri
California
Oregon
Mississippi
Arkansas
Montana
New Mexico
West Virginia Energy Policy & Initiatives

Foundation Allowance For Transportation Cost  18-9A-7
Provides Additional Funding for County Schools Using Alternatively Fueled Buses

Renewable Portfolio Standard  24-2F-1
Biodiesel qualifies as a “Renewable Energy Resource”

2009 Senate Concurrent Resolution 51
Joint Committee on Government and Finance “requested to study the potential beneficial use of alternative and biofuels by state government and private industry”

July 2009 Executive Memorandum
Governor Manchin directed Cabinet Secretaries and Bureau Chiefs to evaluate the use “of alternative fuels and biofuels when entering into fuel-purchasing contracts for the fleet of state-owned vehicles”
West Virginia's energy plan

Promotes increased energy efficiency, fossil energy, renewable energy and biodiesel

www.energywv.org
West Virginia County School Systems Using Biodiesel
## West Virginia 2008 Diesel Fuel Use (Gallons)

<table>
<thead>
<tr>
<th>Category</th>
<th>Gallons</th>
</tr>
</thead>
<tbody>
<tr>
<td>On Highway</td>
<td>286,733,000</td>
</tr>
<tr>
<td>Industrial - mining</td>
<td>204,257,000</td>
</tr>
<tr>
<td>River Boats, Railroad &amp; Off Highway</td>
<td>46,167,000</td>
</tr>
<tr>
<td>All Others</td>
<td>47,821,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>584,978,000</strong></td>
</tr>
</tbody>
</table>

Source: Energy Information Agency
AC & S and Biodiesel

- In 2008 became the first renewable transportation fuel producer in WV
- Production capacity of 3 million gals/yr
- 35 County School Districts now using Biodiesel blends, up from 21 in 2007
- Working to expand the use of biodiesel blends into state fleet vehicles
AC & S
Biodiesel Business Model

Utilize Idled Chemical Manufacturing Equipment

Use In-house Resources for Construction

Design the Biodiesel Production Unit For Multi-use Chemical Manufacturing
AC & S Biodiesel Production Unit
AC & S Biodiesel Production Unit
United States 1973

- On October 17, 1973 OPEC announced they would no longer ship oil to countries who supported Israel in the Yom Kippur war
- OPEC quadrupled the price of crude oil
- In 1972 the U.S. imported 28% of its crude oil
2009 U.S. net imports of Petroleum

Net Imports and Domestic Petroleum as Shares of U.S. Demand, 2009

- U.S. Petroleum: 49%
- Net Imports: 51%

Sources of U.S. Net Petroleum Imports, 2009

- Western Hemisphere: 51%
- Africa: 22%
- Persian Gulf: 17%
- Other: 10%

Kuwait 1991
September 11, 2001
Katrina
August 2006
September 11, 2006
Chavez & Ahmadinejad

5-yr anniversary of 911: anti-American conference of 100 countries in Cuba
United States 2010
Dean Cordle, CHMM
Executive Vice President
AC & S, Incorporated
dcordle@acandsinc.com
304-755-9275