Renewable and Sustainable: Appropriate Expansion of Biodiesel In Hawai`i
The Sustainable Biofuel Model

- Source feedstock locally
  - Sequester all waste oil and grease
  - Support local farmers (Food and Fuel)
- Expand processing capacity with increasing local oil supply
- Develop co-products and high value sidestreams
- Develop local training for industry jobs
- Implement long-term government direction and real support

www.biodiesel.com
Benefits of Biodiesel

- Improved emissions over petroleum diesel:
  - 67% reduction in unburned hydrocarbons
  - 48% reduction in carbon monoxide
  - 47% reduction in particulate matter
  - 99% reduction in sulfates
  - 78% reduction in carbon dioxide (life cycle)

- Easy to use / Integrate:
  - No noticeable changes in power, economy
  - No costly vehicle or infrastructure modifications
  - Allows existing vehicle platforms to qualify as alternative fuel vehicles
  - Superior lubrication properties to petroleum diesel
  - Can be blended with petroleum diesel in any proportion
Renewable Energy Portfolio

Wind
Solar
Geothermal
Biomass
Biofuels
Biodiesel Priorities

- **FARM EQUIPMENT**
- **MASS TRANSIT**
- **TRUCK FLEETS**
- **EMERGENCY BACK-UP POWER**
## Hawaii Fuel Usage

**Monthly Energy Trend: State**  
Month of February - 2011

<table>
<thead>
<tr>
<th>Series</th>
<th>Unit</th>
<th>Month</th>
<th>Current Period</th>
<th>% Change Year Ago</th>
<th>Year-to-Date</th>
<th>% Change Year Ago</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NYMEX WTI Future Price</strong></td>
<td>$ per Barrel</td>
<td>February 11</td>
<td>89.74</td>
<td>17.4%</td>
<td>89.66</td>
<td>15.8%</td>
</tr>
<tr>
<td><strong>Gasoline Prices (National)</strong></td>
<td>$ per Gallon</td>
<td>February 11</td>
<td>3.177</td>
<td>19.8%</td>
<td>3.137</td>
<td>16.9%</td>
</tr>
<tr>
<td>Regular</td>
<td></td>
<td></td>
<td>3.309</td>
<td>17.5%</td>
<td>3.299</td>
<td>15.8%</td>
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<tr>
<td>Mid Grade</td>
<td></td>
<td></td>
<td>3.439</td>
<td>17.9%</td>
<td>3.423</td>
<td>16.0%</td>
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<tr>
<td>Premium</td>
<td></td>
<td></td>
<td>3.552</td>
<td>24.9%</td>
<td>3.466</td>
<td>20.9%</td>
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<tr>
<td><strong>Diesel Prices (National)</strong></td>
<td>$ per Gallon</td>
<td>February 11</td>
<td>3.746</td>
<td>9.2%</td>
<td>3.72</td>
<td>9.2%</td>
</tr>
<tr>
<td>Regular</td>
<td></td>
<td></td>
<td>3.828</td>
<td>5.6%</td>
<td>3.87</td>
<td>7.4%</td>
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<tr>
<td>Mid Grade</td>
<td></td>
<td></td>
<td>3.906</td>
<td>5.8%</td>
<td>3.94</td>
<td>7.5%</td>
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<tr>
<td>Premium</td>
<td></td>
<td></td>
<td>4.173</td>
<td>6.3%</td>
<td>4.14</td>
<td>5.5%</td>
</tr>
<tr>
<td><strong>Fuel Surcharges</strong></td>
<td>Percentage</td>
<td>February 11</td>
<td>22.09%</td>
<td>-17.4%</td>
<td>21.92%</td>
<td>-13.6%</td>
</tr>
<tr>
<td>Matson Navigation Company</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Foreign Imports</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crude Oil</td>
<td>1000 Barrels</td>
<td>December 10</td>
<td>3,842</td>
<td>185.4%</td>
<td>42,331</td>
<td>3.3%</td>
</tr>
<tr>
<td>Distillate</td>
<td>1000 Barrels</td>
<td>December 10</td>
<td>-</td>
<td>N/A</td>
<td>-</td>
<td>N/A</td>
</tr>
<tr>
<td>Jet Fuel, Kerosene</td>
<td>1000 Barrels</td>
<td>December 10</td>
<td>-</td>
<td>N/A</td>
<td>3,873</td>
<td>140.9%</td>
</tr>
<tr>
<td>Residual Fuel Oil</td>
<td>1000 Barrels</td>
<td>December 10</td>
<td>-</td>
<td>N/A</td>
<td>297</td>
<td>280.8%</td>
</tr>
<tr>
<td>Propane</td>
<td>1000 Barrels</td>
<td>December 10</td>
<td>45</td>
<td>N/A</td>
<td>338</td>
<td>170.4%</td>
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<tr>
<td>Fuel Ethanol</td>
<td>1000 Barrels</td>
<td>December 10</td>
<td>-</td>
<td>N/A</td>
<td>-</td>
<td>-100.0%</td>
</tr>
<tr>
<td>Other Refined Petroleum Products</td>
<td>1000 Barrels</td>
<td>December 10</td>
<td>-</td>
<td>N/A</td>
<td>337</td>
<td>37.6%</td>
</tr>
<tr>
<td><strong>Liquid Fuel Tax Base</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gasoline</td>
<td>Gallons</td>
<td>December 10</td>
<td>34,862,003</td>
<td>0.4%</td>
<td>4,146,661,154</td>
<td>-6.9%</td>
</tr>
<tr>
<td>Diesel Oil (non-hwy)</td>
<td>Gallons</td>
<td>December 10</td>
<td>8,713,761</td>
<td>-40.6%</td>
<td>126,495,107</td>
<td>-28.2%</td>
</tr>
<tr>
<td>Diesel Oil (hwy use)</td>
<td>Gallons</td>
<td>December 10</td>
<td>4,761,191</td>
<td>-21.8%</td>
<td>50,187,158</td>
<td>7.1%</td>
</tr>
<tr>
<td>LPG (off hwy)</td>
<td>Gallons</td>
<td>December 10</td>
<td>-</td>
<td>N/A</td>
<td>-</td>
<td>N/A</td>
</tr>
<tr>
<td>LPG (hwy use)</td>
<td>Gallons</td>
<td>December 10</td>
<td>-</td>
<td>-100.0%</td>
<td>52,996</td>
<td>-28.9%</td>
</tr>
<tr>
<td>SB (gas)</td>
<td>Gallons</td>
<td>December 10</td>
<td>70,288</td>
<td>158.1%</td>
<td>830,158</td>
<td>-31.6%</td>
</tr>
<tr>
<td>SB (diesel)</td>
<td>Gallons</td>
<td>December 10</td>
<td>177,820</td>
<td>130.6%</td>
<td>1,048,221</td>
<td>-23.2%</td>
</tr>
<tr>
<td>Aviation Fuel</td>
<td>Gallons</td>
<td>December 10</td>
<td>9,636,504</td>
<td>-41.0%</td>
<td>175,279,476</td>
<td>-9.8%</td>
</tr>
<tr>
<td>Other Fuel</td>
<td>Gallons</td>
<td>December 10</td>
<td>3,386,592</td>
<td>-9.3%</td>
<td>36,081,107</td>
<td>-33.3%</td>
</tr>
<tr>
<td>Agricultural Refund</td>
<td>Gallons</td>
<td>December 10</td>
<td>-</td>
<td>-100.0%</td>
<td>387,203</td>
<td>12.7%</td>
</tr>
</tbody>
</table>

* On-road diesel fuel Tax Base down from 66 million gallons in 2007
Biodiesel Production in Hawaii
Current/Near Term potential

1 mgy – UCO (Current)*
1 mgy – UCO (unsequestered)
.85 mgy – Grease Trap potential

Near-Term potential = 15% of total req’d to meet State Hwy Use Goal for diesel use

2030 goal requirement: 50m x 40% = 20 mgy
Feedstock

- Recover all useable waste grease first
- Encourage sustainable biofuel crop production on all islands
- Replace mainland cooking oil with local supply, then recycle it; “Food then Fuel”
- Develop animal feed markets for meal
- Develop human food markets for edible meal
- Develop oleo chemical and nutriceutical markets for added-value

www.biodiesel.com
Next steps: Biofuel Crop Plan

Jatropha farm, Big Island

100 Days from “Soil to Oil”
## Hawaii's Biomass Potential

<table>
<thead>
<tr>
<th>Estimated Available Acreage for Biomass Production (Acres)</th>
<th>Maui</th>
<th>Kauai</th>
<th>Oahu</th>
<th>Hawaii</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stillwater/Kinoshita estimates</td>
<td>26,000</td>
<td>7,000</td>
<td>25,500</td>
<td>27,000</td>
<td>85,500</td>
</tr>
<tr>
<td>Land currently used for sugar production</td>
<td>36,700</td>
<td>11,100</td>
<td>0</td>
<td>0</td>
<td>47,800</td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td><strong>62,700</strong></td>
<td><strong>18,100</strong></td>
<td><strong>25,500</strong></td>
<td><strong>27,000</strong></td>
<td><strong>133,300</strong></td>
</tr>
<tr>
<td>Additional available prime farmland</td>
<td>0</td>
<td>35,500</td>
<td>15,300</td>
<td>30,000</td>
<td>80,800</td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td><strong>62,700</strong></td>
<td><strong>53,600</strong></td>
<td><strong>40,800</strong></td>
<td><strong>57,000</strong></td>
<td><strong>214,200</strong></td>
</tr>
<tr>
<td>Existing non-sugar agricultural production</td>
<td>9,300</td>
<td>3,000</td>
<td>17,300</td>
<td>11,800</td>
<td>41,400</td>
</tr>
<tr>
<td><strong>Max potential (exclusive of non-sugar ag land)</strong></td>
<td><strong>53,400</strong></td>
<td><strong>50,600</strong></td>
<td><strong>23,500</strong></td>
<td><strong>45,200</strong></td>
<td><strong>172,800</strong></td>
</tr>
</tbody>
</table>

*2007 Hawaii Energy Strategy Report (Draft), 2/07*
Next steps:
Develop Processing Equipment

- Planting
- Harvesting
- Crushing
Next steps: Biodiesel Processing
TECHNOLOGY: Advances in scalable process

- Glycerin refinement
- Methanol recapture
- Waterless process
- Automated control system
- High vacuum distillation
- Efficient labor/energy costs
HCEI Transportation
Biodiesel Processing Req.

- Oahu – 10 million gpy
- Maui – 5 million gpy
- Hawai`i – 5 million gpy
- Kaua`i – 2.5 million gpy
- Moloka`i (?)

* Timeline 3-7 years with incentives in place
* $50 million construction costs + Ag. investments
Next steps: Develop Biodiesel By-products

By-product Uses
- Animal feed
- Soap and Oleochemical
- Fertilizer
- Energy
Current Issues

• Definition of biodiesel (confusion with ethanol, SVO, “green” or “renewable diesel)

• OEMs still not fully supportive
  – Navy is example of end user clout

• Tax credit uncertainties
  – USDA loan guarantee; FET credit; BCAP
  – Competing with $550 billion subsidized oil

• Biofuel myths (i.e. Food vs Fuel; high cost of food blamed on biofuels)

• How to quantify sustainability?
State and Fed. Incentives

- SB 772 – Expand Ethanol Facility incentives to include other biofuels
- SB 146 – Statewide mandate to blend 5% biodiesel into every gallon of on-road diesel
- H.R. 684 – Extends Federal Biodiesel FET credit for 5 more years
- BCAP – Tax credits for biofuel crop farmers and oilseed processors
- USDA Loan Guarantee program
- State Preference for purchasing “Local”
February 1, 2011

To: Retail Dealers, Nonretail Dealers, and Wholesale Dealers of Diesel Fuel in the State of Oregon.

NOTICE: Minimum Biodiesel Blending Requirement Increases to 5% By Volume (B5) Effective April 1, 2011.

If you are a retail dealer, nonretail dealer (e.g., card lock), or a wholesale dealer (e.g., fuel loading terminal or fuel distributor) of diesel fuel in the State of Oregon, this rule affects you.

Oregon’s in-state biodiesel production capacity has reached at least 15 million gallons on an annualized basis. In compliance with Oregon’s Renewable Fuel Standard [Ref. Oregon Revised Statute (ORS) 646.921 and ORS 646.922], effective April 1, 2011, all diesel fuel sold or offered for sale in Oregon must contain a minimum of 5% by volume biodiesel, creating a B5 biodiesel blend, except for 1) railroad locomotives, 2) marine engines, and 3) home heating applications.
A SUSTAINABLE FUEL FUTURE
Diversified Agriculture – Farmers
Community-based – Local Economy
Sustainable source – Energy Security
Environmental impact – GHG Reduction

All sustainability is local!