Biomass Energy: An Economic & Climate Imperative

Dialogue on Ensuring Forest Sustainability
Raleigh, NC, August 27, 2009
Biopower: Our Southern Advantage

SE Bio-Energy Conference
Tifton, GA, August 12, 2009
Which Path Forward?

District Energy? CHP? Cooling?

Biofuels?

Biopower?

Torrefaction?

Biochar?
North Carolina’s GHG Emissions

Coal is a Wealth Transfer

Annual Coal Import Expenditures, 2006 (million $)

- $10.7 billion
- 10% from overseas

Source: Map created by UCS using EIA and FERC data.
**Commerically Feasible and Cost-Competitive**

**Levelized Cost of Energy Comparison**

Certain Alternative Energy generation technologies are already cost-competitive with conventional generation technologies under some scenarios, even before factoring in environmental and other externalities (e.g., RECs, potential carbon emission costs, transmission costs) as well as construction and fuel costs dynamics affecting conventional generation technologies.

<table>
<thead>
<tr>
<th>Alternative Energy</th>
<th>Levelized Cost ($/MWh)</th>
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<tbody>
<tr>
<td>Solar PV – Crystalline</td>
<td>$77 (a)</td>
</tr>
<tr>
<td>Solar PV – Thin-Film</td>
<td>$160 (b)</td>
</tr>
<tr>
<td>Solar Thermal</td>
<td>$131 (c)</td>
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<tr>
<td>Fuel Cell</td>
<td>$127</td>
</tr>
<tr>
<td>Biomass Direct</td>
<td>$113</td>
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<tr>
<td>Geothermal</td>
<td>$93</td>
</tr>
<tr>
<td>Wind</td>
<td>$113</td>
</tr>
<tr>
<td>Energy Efficiency</td>
<td>$50</td>
</tr>
<tr>
<td>Gas Peaking</td>
<td>$225</td>
</tr>
<tr>
<td>IGCC</td>
<td>$107</td>
</tr>
<tr>
<td>Nuclear</td>
<td>$138</td>
</tr>
<tr>
<td>Coal</td>
<td>$344</td>
</tr>
<tr>
<td>Gas Combined Cycle</td>
<td>$74</td>
</tr>
</tbody>
</table>

Source: Lazard’s Levelized Costs of Energy, 2009
Biopower Potential: Economics

- 7- or 8-fold expansion to meet 25x25
- Projected jobs: 4.5 to 9 per MW
- Tens of thousands new jobs (direct)
- Indirect jobs – hundreds of thousands?
- Tens of billions new revenue & income
Current Biopower: Quantified

Figure 26: Renewable electricity produced by source in the South, 2005

~ 25,000 GWh now on grid

*Geothermal and Solar were negligible.

Source: SAFER Alliance, “Southern Bioenergy Roadmap”
Near Term RE Potential

29%
Total Potential Relative to Current Retail Electricity Sales
(5% existing, 24% additional)

- Existing Biomass (8%)
- Existing Hydroelectric (8%)
- Low-Impact Hydroelectric (10%)
- Solar (8%)
- Onshore Wind (9%)
- Crop Residues (10%)
- Forest Residues (17%)
- Energy Crops (22%)
- Urban Wood Residues (6%)
- Biogas:
  - Landfills (2%)
  - Livestock Manure (1%)

Approximately 4% of current cropland

Approximately 0.2% of current forest stocks, or about 15% of annual growth

Based on review of referenced studies

Near term assumes:
- Hydroelectric: Current + 90%
- Solar: 15%
- Onshore wind: 90%
- Biomass: Current + 90%

25% x ‘25

- Baseload = Reliable
- Cost-competitive
- Rapidly Deployed
- Early Workhorse
- 205,000 GWh Proj.
- Feasible Generation
- 2/3rds near-term potential in RE.
Charred Biomass: Energy Source *and* Carbon Storage

- Pyrolysis or Gasification
- Incomplete Combustion
- Starved of O2, 400° to 1000°F
- >4,000 years old
- Stable
- Beneficial to soils & climate
Sustainability Concerns

- Carbon Lifecycle
- Concentration of Demand
- Pollution Emissions
- Soil Productivity
- Water Quality & Quantity
- Biodiversity & Wildlife
- Indirect Effects
- Land Use
Sustainability Provisions

- Soil & Water BMPs
- State Biomass Harvest Guidelines
- Enhanced Forest Management Plans
- Improved Forest Certif. Programs
- Look-Back Provisions
• Strong National Renewable Electricity Standard (RES) 25% x 2025

• Carbon Cap & Trade Law

• Helpful State Level Policies (Net Metering, Intercon. Standards, Fair Payment)
Questions?

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