Collaborative Approach to Biomass Resources
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SC Sustainable Biomass Stakeholders Committee:
• Liz Kress, Santee Cooper Renewable Energy
• Tim Adams, SC Forestry Commission
• Tom French, Chair, SC Biomass Council
• Patricia Pierce, Capital Consulting Groups
• Crad Jaynes, SC Timber Producers Association
• Erika Myers, Solar Electric Power
• Cam Crawford, SC Forestry Association
• Hamilton Davis, SC Coastal Conservation League
• Bob Kodrzycki, Encompass Biotechnology
• Pamela Martin, Coastal Carolina University
• Art Samberg, North Carolina State University
• Henry Porter, SC Dept. of Health & Environ. Control
• Jim Frederick, Clemson University

Goal – Determine role of biomass in South Carolina’s energy future. (SC is in process of developing a new State Energy Plan)
South Carolina’s Diversified Energy Portfolio

Total 97,158,000 MWh

- Hydroelectric: 3% of energy
- Biomass: 2% of energy
- Nuclear: 54% of energy
- Fossil Fuels: 40% of energy
- NREL: About 7% of energy
- Existing industries
Biomass – enhance existing rural industries

Forestry and Agriculture Combined:
• Number 1 industry for revenues
• $41.7 Billion in revenues per year
• $8.8 Billion in labor income per year
• 9.1% of SC’s economic activity
• 212,000 jobs
• 10.5% of SC’s workforce
Trends: Forest and urban land use increasing while agricultural land use declining. Agricultural land less than a third of a century ago. Need alternatives.
Trends: Natural plus planted forest acres about the same but wood volume increasing. Both hard and soft wood volumes rising – level off around 2020. ★ Can use more for biomass as long as forest C increasing.

Source: Tim Adams, SC Forestry Commission
88% privately owned
Trends: Greatest increase in larger sized trees.
Need better saw timber markets = more mill residues, logging waste.

Source: Tim Adams, SC Forestry Commission
## Biomass Price Affects Supply

### Tons of Woody Biomass Available

<table>
<thead>
<tr>
<th>Source</th>
<th>Mill Residues</th>
<th>At $20/ton</th>
<th>At $30/ton</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2,571,000</td>
<td>5,610,000</td>
<td></td>
</tr>
<tr>
<td>Logging Residues</td>
<td>600,000</td>
<td>4,530,000</td>
<td></td>
</tr>
<tr>
<td>Standing Residues</td>
<td>392,000</td>
<td>3,269,000</td>
<td></td>
</tr>
<tr>
<td>Urban Wood</td>
<td>1,252,000</td>
<td>2,081,000</td>
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<tr>
<td>Precommercial Thinnings</td>
<td>--</td>
<td>594,000</td>
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</tbody>
</table>

**Total Tons**: 4.8 million at $20/ton, 16.1 million at $30/ton

**MW**: 437 at $20/ton, 1342* at $30/ton

**MWh**: 2,874,000 at $20/ton, 9,640,700 at $30/ton

3.5% of SC use at $20/ton, 11.8% of SC use at $30/ton

**Trend**: Higher the price, the more tonnage that becomes available.

**Debate**: Increased cost for traditional uses vs higher price for landowner.

*Enough tonnage for 50+ 25MW CHP units; over 1000 jobs.*
Northern Coastal Plain
4.9 million acres forest
Remove 294 Mft3/year

Southern Coastal Plain
3.5 million acres forest
Remove 261 Mft3/year

Piedmont
4.6 million acres forest
Remove 271 Mft3/year

Trends: Greatest wood volume in Northern Coastal Plain.
Good state-wide wood supply.
Most row crop production also in Northern Coastal Plain – sandy soils, frequent drought, acreage decline.
Bioenergy crops would not be competing with food crops.
Giant Reed (Arundo donax)

Energy Crops (dry tons)

- Do well on marginal land
- Rural jobs beyond construction
- Almost C neutral
- Soil and wildlife benefits
- Drought tolerant
- Low input
- Fast growth
- Invasive vs non-invasive

Sugarcane/Energy cane

- 4-6 tons/acre

Manure

- 2 – 2.5 tons/acre

Crop Residues

Biomass and Sweet Sorghums

- 5-10 tons/acre

Miscanthus

- 4-6 tons/acre

Fast Growing Hardwood Trees

- 5 - 9 tons/acre

Switchgrass

- 3-6 tons/acre

Not enough cold tolerance
I. **Woody Biomass** - residues and waste wood.

II. **Bioenergy Crops:**

- **Purposely Grown Trees** – good solid and liquid biofuel use.
- **Annual Grasses** – use as needed, risk reducer.
- **Perennial Grasses** – longer term investment, liquid fuels.
- **Crop Residues** – minimal in SC.
- **Manures** – concentrated like in NC.
- **Others in future?**

**Use:** fallow land, marginal ag land, certain sites being remediated.
Coal - $40/ton
Biomass must compete directly or receive financial incentives
Biomass Sustainability - Private versus Public Certification

Forest Best Management Practices:
- Streamside management zones
- Stream crossings
- Forest road construction
- Timber harvesting
- Site Preparation
- Reforestation
- Prescribed burning
- Pesticide application
- Fertilization
- Minor drainage
- Endangered Species Act
- Wildlife management
- Good start, more to go!

Similar for bioenergy crops – soil, water, biodiversity protection. Use no till, pest scouting, set backs, labels, CU crop recommendations. Use forestry BMPs as start for certification of woody biomass. Harvesting BMP Compliance has been over 90% in SC – Education!

Source: SC Forestry Commission
Sustainability for water, soil, air, and biodiversity:

- Financial Incentives – government programs
- Law – follow labels
- State-Wide Biomass Certification Program - use BMPs.
- Voluntary Basis – good stewards of land

Need all 4!
Sustainable Biomass
Preserving Our Resources

From the Past

For the Future

Of the Present
Tracking:

- Currently done for higher value commodities – cotton, tobacco, vegetables.
- Could be done on a per land parcel basis for bioenergy crops.
- Additional expense.
Conclusions:

• SC - Diverse portfolio of feedstocks (reduced risk).
• Woody biomass initially, bioenergy crops complement.
• Price will be driver - which feedstocks, quality and amount.
• Potentially meet 10 – 15% of State’s electricity requirements.
• Sustainability certification process achievable.
• Some co-firing possible with coal and natural gas.
• Combined Heat and Power facilities – place where biomass located. Don’t need large quantities of biomass. Thus, better for energy crops. Ideally use multiple feedstocks.
• Benefits to EJ Communities – Community Biomass.
• Game changers – government programs, new technologies, and new uses (bio-products/chemicals).

Questions?