Wood Energy: The Other Renewable
“Wood Energy-Renewable, Clean, Abundant, Affordable & Supporting Local Communities”

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What Type of Energy - Renewables!

- 30% Electrical
  - Solar, wind, hydro
- 30% Transportation
- 40% Thermal
  - Geothermal, biomass (wood)
What is Woody Biomass?

- Native forests
- Short rotation woody crops (SRWC)
- Sawmill residue
- Urban wood waste – tree removals, construction debris

Is Removing Biomass From MD Forests Sustainable?

**YES!**

- The Potential for Sustainable Wood-Based Bioenergy in Maryland – Pinchot Institute, August 2010
- Maryland’s Forest Biomass Harvesting and Retention Guidelines developed by working group
  - Allows for harvest in an ecologically sustainable manner

We are growing 2.6 times more wood we are removing through harvests or mortality in Maryland!
Why the MD Wood Energy Coalition?

- Advance wood energy in state policy but no one organization had capacity
- Started in April 2010 by University of MD Extension and DNR Forest Service.
- Representatives of MDE, MEA, DNR, DBED, UME, non-profits (Alliance for Green Heat, Pinchot Institute, MD Forests Assoc., SAF) and wood-based industry started meeting every month.

Maryland Wood Energy Coalition

*Organized April 2010*

**Mission:**

- To advance the responsible use of Maryland’s vast supply of woody biomass for clean, affordable thermal energy production.
- Best achieved through:
  - small to medium-sized commercial and institutional applications for government, schools, and businesses
  - residential thermal applications.
A Prospectus For Advancing Biomass Thermal Energy In Maryland
Developed By the Maryland Wood Energy Coalition
Specific policy recommendations on Page 2 & 3

20-page research based document
Released Feb. 2, 2012
Available at: www.extension.umd.edu/woodland

Justifying Wood as a Heating Fuel

- Renewable – Sustainable – Carbon Neutral
- Stable fuel price
- Energy savings substantial
- Does not rely on tax credits/grants
- Clean burning technology widely available
- Helps low & middle class with energy bills
Other Considerations...

- Wood from local sources provides energy security
- Contributes to local economic development Maine study – for every $1 spent on fuel oil for heating, only $0.15 remains in the local economy.
- Renewable teaching opportunity

Where Is Maryland Now Regarding Biomass Use?

- Maryland has one wood energy facility – 4 MW Eastern Correctional Institution. Cut fuel costs by 63%
- New regulations in MD
- Maryland behind other states in application
- Technology readily available
**Fuel for Schools - The Vermont Experience**

- By early 2007, 30 Vermont Schools installed wood chip heating systems.
- Schools size - 23,000 ft² to 390,000 ft²; Average - 136,400 ft².
- Schools combined use over 18,400 tons of wood chips/yr.
- Annual fuel cost savings average $48,000; total statewide savings $1.5 million.
- “New” systems are averaging 60% savings in fuel costs.

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**The Technology**

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The Vision

Create a whole new industry!

A few benefits:
- Jobs
- Better management
- Wealth retention
- Energy independence
- Energy security/reliability

Promise of Wood

From Consumer Perspective:
- Cheap
- Predictable
- Clean
- Sustainable
- Fuel $ stay local
Promise of Wood

From Forester perspective:

- Market niche
- Improved silviculture
- Ubiquitous: rural - urban
- Market steady and reliable

Promise of Wood

From Public generally:

- Clean
- Retains wealth
  Responsible
- Safe
- Secure
- Dispatchable
Coalition Activities to engage & educate policymakers, regulators & industry

- Two statewide wood energy conferences in November 2012 & October 2013.
- Two-day tour of wood energy facilities in PA Feb/Mar 2012 & 2013
- UME Residential heating workshops
- Research on outdoor wood boilers
- Biomass Boot Camp

PA Wood Energy Tour – Feb 2013

Ebenshades Greenhouse, PA
Coalition’s Four Priorities Addressed
May 2014

1) Update MDE air emission regulations  DONE!
2) Establish thermal renewable energy credits as an incentive  In Progress!
3) Provide sustained support for the Maryland Wood Grant Program  DONE!
   • $50K pilot program by MEA extended indefinitely
4) Public agencies & facilities to lead the way  In Progress!
   • Dept Gov Service promoting biomass as a fuel

Major Barrier to Biomass Use Removed
April 28, 2014

• Prohibition on use of biomass in commercial boilers since 1972.
• We now know the rules...

<table>
<thead>
<tr>
<th>Size of Boiler MMBtu</th>
<th>Particulate Emissions (lb/MMBtu)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rural Area Areas I, II, V &amp; VI</td>
</tr>
<tr>
<td></td>
<td>Urban Areas Areas III &amp; IV</td>
</tr>
<tr>
<td>1.5 – 10</td>
<td>0.35</td>
</tr>
<tr>
<td></td>
<td>0.1</td>
</tr>
</tbody>
</table>
What About Emissions of Biomass Boilers?

Negative perception unwarranted!
Modern systems readily meet standards:
Rural area, <0.23lbs/mmbtu-hr
Urban area, <0.1lbs/mmbtu-hr

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>NO.</th>
<th>SO₂</th>
<th>Hg</th>
<th>Particulate Matter</th>
<th>Greenhouse Gases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>Oil</td>
<td>Medium</td>
<td>Medium to High</td>
<td>Medium</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>Medium</td>
<td>Negligible</td>
<td>Medium</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Wood</td>
<td>Low</td>
<td>Low</td>
<td>Negligible</td>
<td>Medium</td>
<td>Low</td>
</tr>
</tbody>
</table>

Thermal Renewable Energy Credits
SB 154 & HB636 – In Legislature NOW

- Establish separate tier for thermal renewable energy credits (TREC’s).
- Woody biomass (other biomass) is an eligible thermal energy source as is geothermal.
- Annual revenue from TREC’s help to attract capital investment.
Wood Energy Infrastructure
More Costly for Woody Biomass Boilers

Projects pay for themselves based on fuel savings compared to fossil fuels

Fuel Cost Comparisons
If wood chips cost $40/ton, then you could pay no more than...

<table>
<thead>
<tr>
<th>Fuel</th>
<th>Cost per unit</th>
<th>Equivalent Wood Cost per ton</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Gas</td>
<td>$0.55/therm</td>
<td>$40/ton</td>
</tr>
<tr>
<td>#2 Oil</td>
<td>$0.80/gal</td>
<td>$162/ton</td>
</tr>
<tr>
<td>Propane</td>
<td>$0.50/gal</td>
<td>$140/ton</td>
</tr>
<tr>
<td>Electric</td>
<td>$0.023/kWh</td>
<td>$155/ton</td>
</tr>
</tbody>
</table>

Or...

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<td>Nat Gas</td>
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<td>#2 Oil</td>
<td>$3.25/gal</td>
<td>$162/ton</td>
</tr>
<tr>
<td>Propane</td>
<td>$1.75/gal</td>
<td>$140/ton</td>
</tr>
<tr>
<td>Electric</td>
<td>$0.09/kWh</td>
<td>$155/ton</td>
</tr>
</tbody>
</table>
Economic Impact in MD

Table 2 – MD State Fuel Oil and Propane Use and Cost for Thermal Applications

<table>
<thead>
<tr>
<th>Sector</th>
<th>Total Distillate &amp; Residual Oil Use, gal</th>
<th>Total LPG Use, gal</th>
<th>Thermal Distillate &amp; Residual Oil Use, gal</th>
<th>Thermal LPG Use, gas</th>
<th>Dollars Spent on Thermal</th>
<th>Dollars Leaving Maryland</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>115,668,000</td>
<td>89,124,000</td>
<td>115,668,000</td>
<td>57,173,897</td>
<td>$605,732,947</td>
<td>$451,290,710</td>
</tr>
<tr>
<td>Commercial</td>
<td>62,446,000</td>
<td>35,868,000</td>
<td>32,620,233</td>
<td>18,988,941</td>
<td>$119,092,430</td>
<td>$89,920,339</td>
</tr>
<tr>
<td>Industrial</td>
<td>63,840,000</td>
<td>14,194,000</td>
<td>26,174,400</td>
<td>9,980,880</td>
<td>$91,416,631</td>
<td>$58,337,473</td>
</tr>
<tr>
<td>Transportation</td>
<td>381,112,000</td>
<td>3,192,000</td>
<td>0</td>
<td>0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>Total</td>
<td>822,060,000</td>
<td>147,378,000</td>
<td>174,372,635</td>
<td>56,143,708</td>
<td>$816,742,017</td>
<td>$612,556,513</td>
</tr>
</tbody>
</table>

Major impact if only 20% of this could stay in Maryland by using wood for thermal applications in commercial class buildings.

The Door Is Open...Who Will Enter!
Woody Biomass

Maryland has many opportunities for similar projects:

- Universities
- Public Schools
- Military Bases
- Government Districts
- Poultry Houses
- Office & Retail Complexes
- Prisons

Biomass Boot Camp

*Immerse new recruits into renewable biomass culture*

- Session 1: Biomass Fuels
- Session 2: The Technology
- Session 3: Development Considerations

- When you leave you will be ready for duty!!

- Planning Wood Energy day trip to Bedford PA in March. Are you interested?
Highlights from Prospectus for Advancing Biomass Thermal Energy In Maryland – 2/2/2012 – Presented by Jonathan Kays, Chair of Maryland Wood Energy Coalition

Questions?
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Look! No Smoke!