


**Wood Energy:
The OTHER Renewable Option**

***“Wood Energy-Renewable, Clean, Abundant,
Affordable & Supporting Local Communities”***

May 9, 2014



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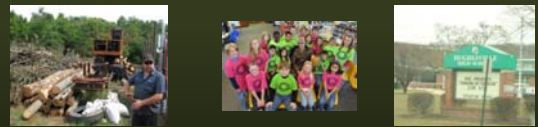
Why Consider Wood as a Heating Fuel?

- Renewable – Sustainable – Carbon Neutral
- Stable fuel price through heating season & over years. No contingency funds.
- Energy savings substantial compared to fuel oil, propane & electric. Allows saving to make other investments.
- Does not rely on grants to be affordable, but helps
- Clean burning & technology widely available




Other Considerations...

- Wood from local sources for energy security
- Contribute to local economic development and infrastructure
 - Maine study – for every \$1 spent on fuel oil for heating, only \$0.15 remains in the local economy.
- Value to school curriculum



Where Is Maryland Now Regarding Biomass Use?

- Maryland has 7 wood energy facilities – 6 sawmills and 1 prison. Prison enjoys 63% fuel cost reduction.
- Advanced, clean and efficient wood energy technologies are readily available
- New regulations now allow use of biomass in MD
- Maryland behind other states in NE in application



PA Wood Energy Tours – Feb 2013-14



Look! No Smoke!



Hospitals



Ebenshades Greenhouse, PA



Schools

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.
- Reduces social costs.



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.



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...

\$0.57/therm	Natural Gas	\$
\$0.80/gal	#2 Oil	
\$.50/gal	Propane	
\$0.023/kWh	Electric	

Or...

Nat Gas	\$0.57/therm	=	WOOD	\$40/ton
#2 Oil	\$3.25/gal	=		\$162/ton
Propane	\$1.75/gal	=		\$140/ton
Electric	\$0.09/kWh	=		\$155/ton

Economic Impact in MD


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

Sector	Total Distillate & Residual Oil Use, gal	Total LPG Use, gal	Thermal Distillate & Residual Oil Use, gal	Thermal LPG Use, gal	Dollars Spent on Thermal	Dollars Leaving Maryland
Residential	115,668,000	89,124,000	115,668,000	57,173,887	\$605,732,947	\$454,299,710
Commercial	61,446,000	35,868,000	32,530,235	18,988,941	\$119,892,439	\$89,919,329
Industrial	63,840,000	19,194,000	26,174,400	9,980,880	\$91,116,631	\$68,337,473
Transportation	581,112,000	3,192,000	0	0	\$0	\$0
Total	822,066,000	147,378,000	174,372,635	86,143,708	\$816,742,017	\$612,556,513

\$90 million could stay in Maryland by using wood for thermal applications in commercial class buildings.

What Are The Most Appropriate Wood Energy Technologies for Maryland?

- Commercial/institutional scale projects (e.g. “Fuels for Schools” type projects)
- Combined heat ‘n power (CHP) – ~3,000 opportunities exist.
- Many retain fossil fuel boiler for backup & trim



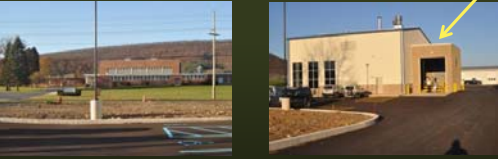
The Technology



Penn Valley School Project - 2011 Penn, PA (near State College, PA)

- High School – 155,000 sq. ft – fuel oil boiler
- Elementary School – 105, 000 sq. ft. – electric heat
- Total fuel bill for oil & electric – heat and hot water
 - \$610,000 per year

Chip storage




Woody Biomass Boiler Installed 2011


- 10 million Btu’s/hr – provides heat & hot water
- Cost saving for fuel - \$250,000 per year (1/3+)
- Project Cost
 - New facility & boiler - 2.7 million
 - Grants 1.5 million
 - Cost to school district 1.2 million
 - Payback period based on \$250,000 yr 4.8 years
 - Payback with no grants 10.8 years
- Considerations – fancier facility with extra room to move in other functions. Demonstration site and used for teaching with students.

Sullivan County School District

- Project installation:
 - 2.8 mmBtu/hr biomass gasification unit & boiler
 - 3000 gallons thermal storage tank
 - 450 ft piping to existing facility
 - Total project cost -- \$1.65 million
 - First year fuel savings \$115,000 -
 - Ten temporary construction jobs created
 - Sustainably harvested fuel keeps \$825,000 in local economy over project life (\$33,000/year)



Hughesville High School East Lycoming School District, PA




Evangelical Community Hospital Lewiston, PA

- 350,000 sq. ft plus
- System: 500 hp steam boiler
- Cost: \$5 million
- Grants: \$1.25 million
- Fuel savings: \$600K plus
- Payback period: 6-8 years





Clearfield Middle School - PA

- **System Size/Type:** 8.5 MM BTU 15 psig steam Wood fired boiler syst.
- **Past Fuel Type:** #2 fuel oil / natural gas
- **Fuel cost savings:**
> \$89K / year (natural gas)
> \$138K / year (fuel oil)
- Total- \$227K
- Wood Chips: 640 tons @ \$35/ton, total of \$22,400.
- Savings: ~\$205K




Fuel for Schools The Vermont Experience

- By early 2007, 30 Vermont Schools installed wood chip heating systems.
- Schools range in size between 23,000 ft² and 390,000 ft²; average is 136,400 ft².
- All schools combined use over 18,400 tons of wood chips per year.
- Annual fuel cost savings average \$48,000; total statewide savings \$1.5 million.
 - "New" systems are averaging 60% savings in fuel costs.



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




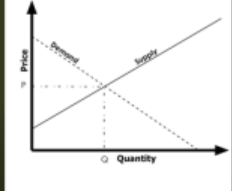
Fuel Type	NO _x	SO _x	Hg	Particulate Matter	Greenhouse Gases
Coal	High	High	High	Medium	High
Oil	Medium	Medium to High	Medium	Low	High
Natural Gas	Medium	Negligible	Negligible	Low	High
Wood	Low	Low	Negligible	Medium	Low

Fuel Supply

3 Questions Always Asked:

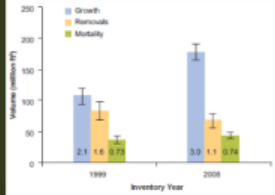
1. How much wood is there?
2. When will it run out?
3. Who will supply it?

The real question being asked:
"What will it cost tomorrow?"

Sustainability

- 334 million tons of live trees.
- 2.5 million acres (43% of MD)
- Growing 2.6x more than removals.
- Literally grows in your backyard.
- Diverse: Urban & Rural



Inventory Year	Growth	Removals	Mortality
1999	2.1	1.6	0.7
2009	5.9	1.1	0.7

Suppliers

Supplier network is in place and highly diverse, which is advantageous for price stability and fuel delivery reliability.

- NWWF/Landfills
- Sawmills
- Loggers
- Arborists
- Aggregators

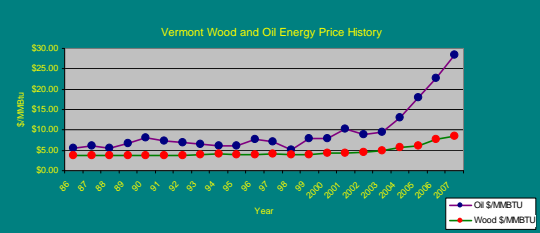


Potential Available Volume

- NWWF 280,000 tons
- Arborists 600,000 tons
- Loggers 86,000 tons*
- Sawmills 160,000 tons
- Aggregators (market response)
- **Total 825,000+ tons**

*...enough for 10 CHPs and 65 schools***

Price Stability




Green wood chips at \$40/ton would be equivalent to:

Oil	\$0.80/gal
Gas	\$0.57/therm
Electric	\$0.02/kwh

Moving Forward With School Projects

- Best prospects are:
 - New construction
 - Boilers slated for replacement
 - Replacing fuel oil, propane or electricity
- Simple assessment can be based on:
 - Present fuel costs
 - Square footage
 - Boiler cost
 - Calculate payback period
 - Other factors



On-line Resources

- Financial Calculators for Facilities
www.woodenergy.umn.edu/
<http://michiganwoodenergy.org/>
- Fuel Cost Comparison
www.fpl.fs.fed.us/documnts/techline/fuel-value-calculator.pdf

Other Resources

- Biomass Thermal Energy Council - www.biomassthermal.org/
- Biomass Energy Resource Center - www.biomasscenter.org/
- Vermont Fuels For Schools - www.vtfrp.org/energy/for_energy_schools.cfm
- Pennsylvania Fuels for Schools - www.pafuelsforschools.psu.edu

Questions or Assistance?

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