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Supporting a Thermal Biomass Industry:

Wood Supply & Logistics

Biomass Bootcamp
Catonsville, Maryland

February 23, 2015

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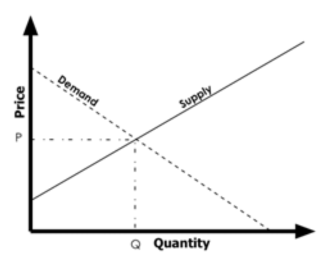
3 Questions Always Asked:

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

The real question being asked:

"What will it cost tomorrow?"



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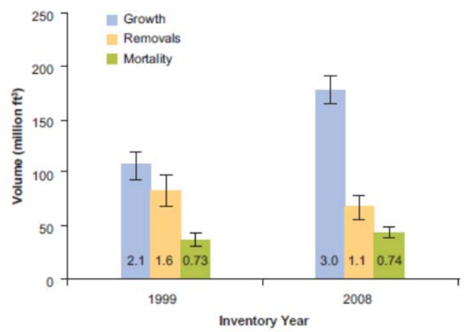
Sustainable

- *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



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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

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Arborists

- Generate wood on a daily basis as a **by-product** of their business.
- Paid for maintaining trees, not for volume of wood produced.
- Fuel market would be valued chiefly for convenience and cost minimization.
- Time more important.
- A reasonable estimate of daily production for an arborist crew is 1.5 tons of wood chips per crew.

5

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Natural Wood Waste Recycling Facilities

29 NWWFs

293,181 tons

(Source: MDE, 2010.)

Occasional tipping fees.

Mulch market is driver.

6

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Loggers

- Roughly 50% of each tree felled for sawlog markets is left in woods to decay.
- Estimated 170 million tons of slash generated annually.
- Loggers with energy markets can do better silviculture.
- Fuel market augments product mix.
- Major investment of capital and operation management.
- Will seek long-term relationship.

7

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Sawmills

- 20+ mills. 160,000 tons coarse residues
- Produce the highest quality fuel chip.
- Already have a market through paper industry.
- Will likely not be interested in severing ties with paper market entirely, but will likely be interested in diversifying their customer base.

8

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Aggregators

- purchase raw materials from the businesses outlined above.
- further process the material.
- offset seasonal production variances.
- consistent quality fuel.
- dampen price fluctuations.
- simplicity of managing fuel deliveries.

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Zones & Drivers

Supplier Type	Range	Primary driver
• Arborists	<20 miles	(cost/convenience)
• NWWF	+30miles	(vs. mulch prices)
• Loggers	+50 miles	(cost of diesel)
• Sawmills	+75 miles	(vs. paper chip)
• Aggregator	+75 miles	($/BTU)

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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**

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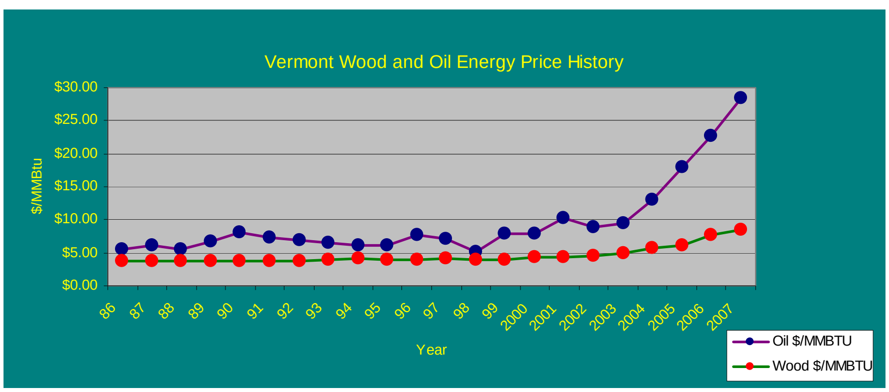
Price Stability



Oil would need to be less than $1.00/gal to have the same $/mBtu value as wood chips at $49./ton

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Conclusions

- Wood is abundant and sustainable.
- Supplier base is diverse.
- Suppliers will be different by region.
- By-products are an advantage: keeps cost low, diversifies supplier base.
- Price stability.
- Larger facilities will likely contract with an aggregator.
- Small facilities can partner with local producers.

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For more information

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Wood~the natural choice.