Biomass Electricity in the United States
Understanding the Economics

Forests & Bio-Energy:

Federal & State Policies to Ensure Sustainability

February 9-10, 2009

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Overview

1. Who we are
2. Where we operate
3. Myths about Biomass
4. Biomass Economics 101
5. Thoughts on sustainability

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Who We Are

- Owners, operators, fuel providers, stakeholders
- Created in 1999
- 50 members, 20 states, 2000 MW
- 1% of nations power
- www.biomasspowerassociation.org

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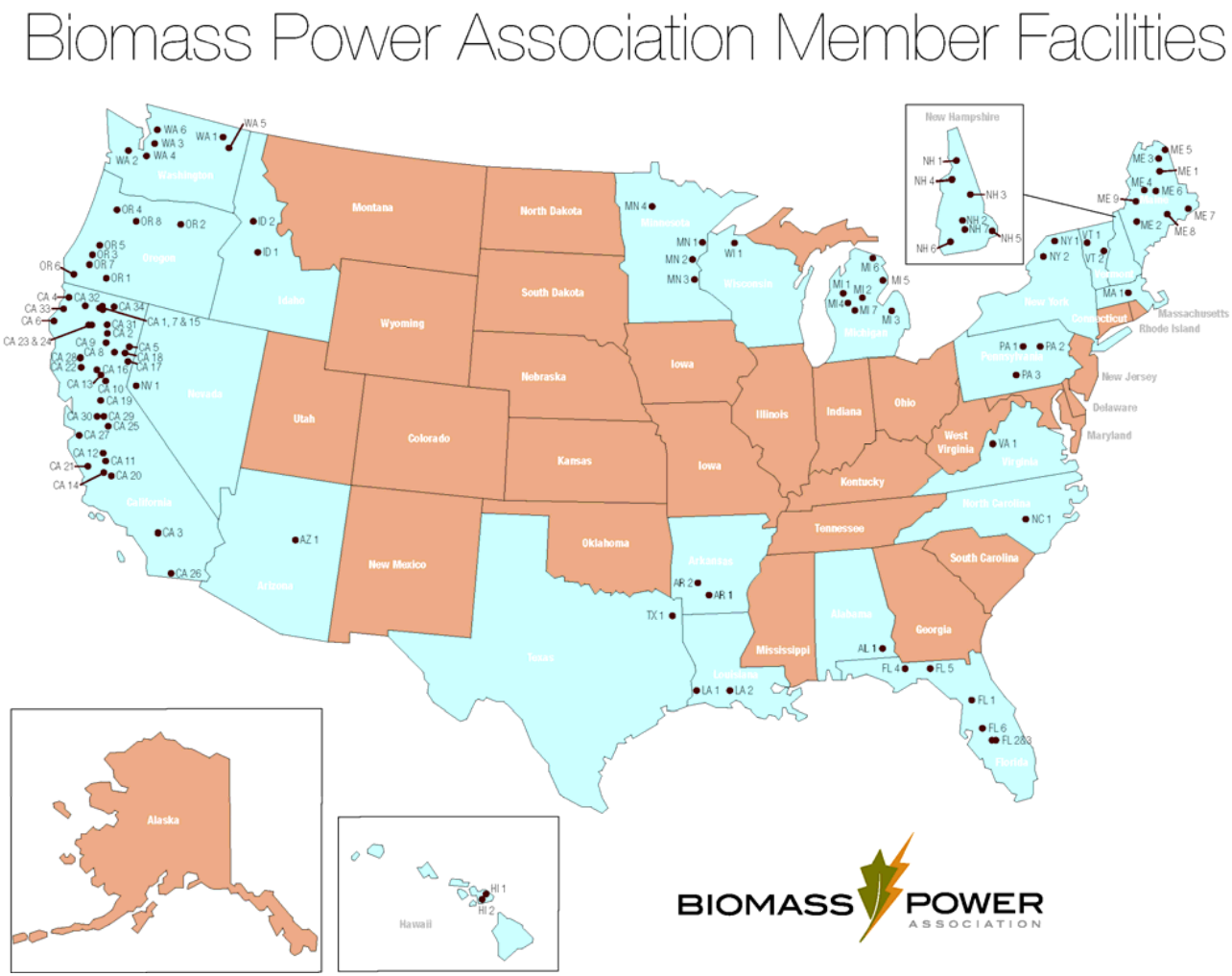
Where We Operate



Myths About Biomass

1. We cut down trees to generate electricity.
2. We compete with the pulp and paper industry for pulp-grade fiber, driving up the cost of paper, and threatening U.S. manufacturing.
3. A Federal RES will turn the landscape of the Southeast into something that looks like Scotland.
4. There is a biomass boom in this country that, if left unchecked, will result in the next “corn to ethanol”. But instead of food vs. fuel we will have paper vs. fuel.

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NEW NORTH AMERICAN WOOD BIOMASS PROJECTS

Recent Announcements

Project type	Company	Location	Region	Wood Use[1]	Start date	Annual Production	Cost (US$/million)
Wood Energy	Oglethorpe Power	GA (undetermined)	South Atlantic	1,000	2Q/2014	100 MW	$400-500
Wood Energy	Oglethorpe Power	GA (undetermined)	South Atlantic	1,000	2Q/2014	100 MW	$400-500
Liquid Biofuels	Raven Biofuels	MS (undetermined)	South Central	1,000	Unavailable	33 million gal.	Unavailable
Liquid Biofuels	Mascoma	Kiross, MI	Lake States	950	1Q/2012	40 million gal.	$200
Wood Pellets	Woodlands Alt. Fuels	Meigs, GA	South Atlantic	600	2Q/2009	300,000 tons	$15
Wood Energy	Catalyst Renewables	Geddes, NY	Northeast	540	1Q/2011	40 MW	$100
Wood Energy	Loblolly Green Power	Newberry Co., SC	South Atlantic	500	4Q/2011	50 MW	$170
Wood Energy	Decker Energy	Linville, TX	South Central	450	Unavailable	35-50 MW	$130
Wood Energy	SunMark Energy	Henderson, TX	South Central	400	1Q/2012	60 MW	$160
Liquid Biofuels	Raven Biofuels	Kamloops, BC	Western Canada	370	Unavailable	11 million gal.	$26
Wood Pellets	Integro Earth Fuels	Roxboro, NC	South Atlantic	360	Phased 2Q/2	170,000 tons	$20
Wood Pellets	Integro Earth Fuels	Eastman, GA	South Atlantic	350	4Q/2009	168,000 tons	$20
Wood Energy	NRG Energy	Uncasville, NH	Northeast	300	Unavailable	30 MW	Unavailable
Wood Energy	Terrace Bay Pulp	Terrace Bay, ON	Eastern Canada	300	4Q/2008	30 MW	$36
Wood Energy	Evergreen Comm.	Reading, PA	Northeast	300	1Q/2009	30 MW	$115
Wood Energy	Clean Power Devel.	Berlin, NH	Northeast	250	4Q/2010	22-27 MW	$80-85
Wood Energy	Xcel Energy	Ashland, WI	Lake States	218	4Q/2012	30 MW	$55-70
Wood Energy	Kandiyohi	Rockford, MN	Lake States	200	Unavailable	20-21 MW	75
Wood Pellets	American Refining	McCean Co., P.A.	Northeast	180	Unavailable	65,000 tons	Unavailable
Wood Pellets	Indeck Energy	Magnolia, MS	South Central	180	3Q/2009	90,000 tons	Unavailable
Wood Pellets	First Nations Wood Pellet	Johnstown, PA	Northeast	160	1Q/2009	78,000 tons	$5
Wood Energy	Roseburg Forest Product	Weed, CA	Pacific Northeast/ West	150	Unavailable	15 MW	Unavailable
Wood Energy	IntelliWatt Energy	Coal Township, PA	Northeast	120	4Q/2009	12 MW	Unavailable
Wood Energy	Koda Energy	Shakopee, MN	Lake States	67	4Q/2008	24 MW	$60
Wood Energy	Kruger	Westminster, BC	Western Canada	66	1Q/2009	Unavailable	$7-10
TOTAL WOOD USE				**10,011**			

Note: [1] Wood use (1000 green tons/year)

ANNOUNCEMENTS 2007 TO PRESENT, WOOD DEMAND

Wood Energy	**27,504**
Wood Pellets	**12,218**
Liquid Biofuels	**3,685**
TOTAL WOOD USE (000 green tons/year)	**43,407**

Source: Wood Biomass Market Report
December, 2008

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Biomass Economics 101

- **Bottom line**
  - **The biomass power industry cannot pay enough for its fuel to credibly compete for the chip and pulpwood supplies of the nation's pulp & paper industry.**
  - **Even with the full PTC, a fairly large new biomass power facility selling power and green tags at a current market price of 8 cents/kwh can only afford to pay less than $40/bone dry ton (BDT) for its fuel supply and earn an acceptable investor return.**
  - **By contrast, current prices of chips and pulpwood in the South, traditionally the area of lowest prices, range from $60/BDT for hardwood chips to $70+/BDT for conifer chips or pulpwood.**

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Assumptions

- In order to answer questions regarding the overall economics of biomass power and the impact of an expansion of biomass power capacity on other wood users, a complete financial model of a new 25MW plant was developed. A plant size of 25MW is large enough to achieve economies of scale in terms of capital and operating cost without an unreasonably large fuel working circle.

The plant parameters are as follows:

Boiler Size	250,000 lb/hr steam at 900 psig/900ºF
Turbine Size	30MW, 3600 RPM
Boiler Technology	Traveling grate stoker fed design
Pollution Control	Electrostatic precipitator for particulate control
	Ammonia injection for NOx control
Gross Plant Output	27MW
Net Plant Output	24.6Mw
Plant Capital Cost	$57,900,000
Plant Cost/net KW	$ 2,353
Annual Fuel Requirement	194,000 bone dry tons (BDT)
Power Value – 1st yr	8.0¢/KWH
Power Value Escalation	2%/yr
General Inflation	3%/yr
Plant Startup Date	2010
Depreciation	MACRS depreciation
Property Tax Rate	2.1% of investment/yr
State Income Tax Rate	6%
Federal Income Tax Rate	35%
Plant Staffing	19 personnel

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Assumptions Cont.

- The 8¢/KWH starting power sales price was chosen so as to be indicative of a current bundled (electricity plus green tags) power selling price in large areas of the country such as the Southeast, Rocky Mountains, Pacific Northwest and Midwest. There are pockets of higher bundled renewable pricing such as in California and parts of New England, but these are isolated situations driven by aggressive Renewable Portfolio Standard (RPS) timetables.

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Analysis

- The financial model was then tested to determine what starting delivered wood fuel price would produce a 12% unlevered net present value after tax return over the 20 year life of a power contract. The 12% after tax return is the amount judged to be necessary to attract equity investors in today's markets. The results for varying levels of federal production tax credit (PTC) are as follows:

2010 PTC	2010 Max. Wood Fuel Price	After Tax Return
(1/2) 1.1¢/KWH	$28/bone dry ton (BDT)	12%
(full) 2.1¢/KWH	$37/bone dry ton	12%

- The allowable $28/BDT when receiving the current ½ of the federal PTC is not sufficient to move material from the woods as fuel for the plant. With the current tax situation, the 25MW plant is not likely to be built. With the full PTC, the $37/BDT allowable fuel price is thought to be sufficient to grind and move slash piles left behind by harvesting operations, but only within less than a 50 road mile radius.

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Competition for Pulp and Paper

- To determine if biomass power represents a legitimate threat to chip and pulpwood supplies to the nation's pulp & paper industry it is necessary to look at current prices of these materials when delivered to the pulp mill. The following represent current prices in the South, which have historically been the lowest prices in the US for such material. These are prices tracked by Wood Resources International on a quarterly basis for many years:

	Conifer	Non Conifer
Chips	$70/BDT	$61/BDT
Roundwood	$70/BDT	$72/BDT

- The only logical conclusion is that biomass power does not represent a credible threat to the pulp & paper industry as the biomass power industry can only afford to pay less than half current prices with the current ½ PTC and only 60% of current prices with the full PTC.

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Sustainability

- Inevitable for use biomass uses
- But, lets not reinvent the wheel
- Rely upon existing state standards
- Keep definitions consistent with Section 45 of the IRC

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