

Importance of Biomass Energy Markets to Forestry: New England's Two Decades of Biomass Energy Experience

By: Eric Kingsley, June 2012

While biomass electricity generation has received a significant amount of public attention over the last several years, New England – particularly Northern New England – has a long history of reliable, renewable biomass electric generation. New England has 19 stand alone biomass electric units, as well as a significant a number of industrial facilities (primarily pulp and paper mills) that have large biomass units integrated into the production facilities. Of the biomass electric units, there are:

- Nine in Maine, all of which have been operational for over two decades;
- Seven in New Hampshire, including a newly converted coal unit, 5 units with over 20 years of near-continuous operations and a facility currently under construction;
- Two in Vermont, both of which have over two decades of operations; and
- One unit in Massachusetts that has over two decades of operations.

These existing projects have provided landowners, foresters and loggers in the region with an important market for forest residue and low-grade wood, and provide an important reference regarding the manner in which these facilities operate and their impact on the region's forests.¹

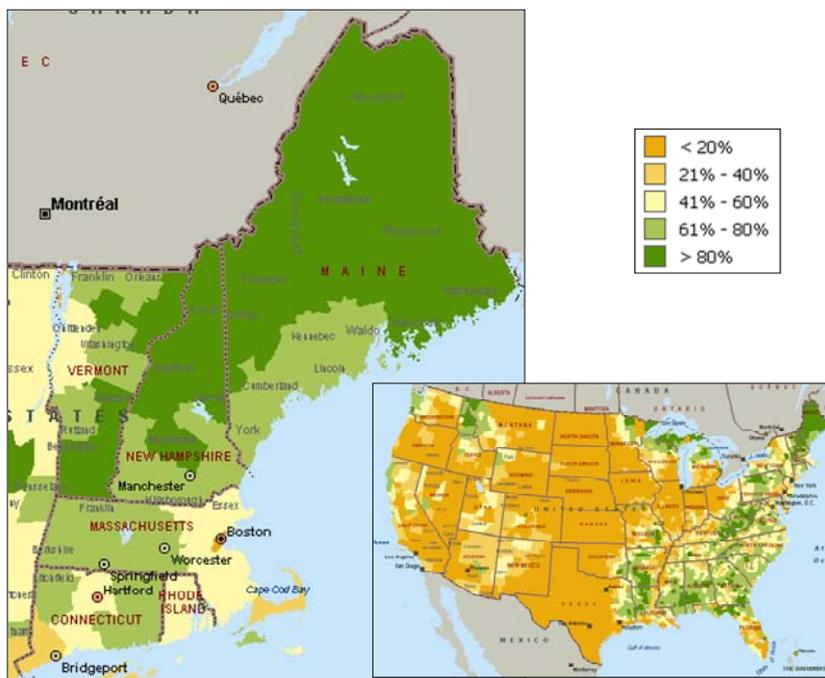
Figure 1. Existing Utility-Scale Biomass Power Plants in New England



New England is one of the most forested areas of the country, and states in the region have successfully integrated biomass markets into existing forest industry and land management practices. The market for low-grade wood provides foresters and landowners with a tool to economically utilize low-grade wood, such as residual fiber from logging and the thinning of small and poorly formed trees, allowing high quality tree stems to add volume and value. Over time, this makes land ownership a better return on investment and promotes forest ownership as an economically viable alternative to conversion to other uses such as development, where land is no longer able to provide a broad range of public benefits. The threat of conversion to non-forest uses exists in all of New England, though it is strongest in Southern New England – a region economically isolated from major markets for low-grade wood.

After more than two decades of biomass electric generation, the region today remains the most forested in the nation. In each of the New England states, annual growth of the forest exceeds harvesting, so the trees are getting bigger and older, on average. This is true in Maine, New Hampshire and Vermont, all with long-standing biomass fuel markets. Maine and New Hampshire are the two most heavily forested states in the national in terms of percent forest area.

Figure 2. Percent Forestland by County



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For private landowners to continue to own and manage forests – providing environmental, economic and aesthetic benefits to society as a whole – landowners need markets for low-grade wood. Biomass is well positioned to provide landowners and forest managers this market, and support the public benefits that forests provide.



Wood for Energy as a Forest Product

Biomass fuel supply is highly localized, given that the fuel is low-value and lacks energy density. While coal moves across the country and across oceans, and natural gas is piped across continents, biomass fuel is generally purchased locally. Most facilities seek to purchase the majority of their wood from within a 60-mile distance. This is because woody biomass is a low-density product, and the cost of the diesel, truck and driver can add significantly to the cost of fuel.

The production of biomass fuel from forest operations is almost universally part of an integrated harvesting operation, where products from the land base include sawlogs and usually pulpwood. The following figure shows a log landing in New England where roundwood (front) and forest residue (larger pile behind) are piled next to a slasher; this is typical of a timber harvest in the region.

Figure 3. Multiple Products from a Single Timber Harvesting Operation

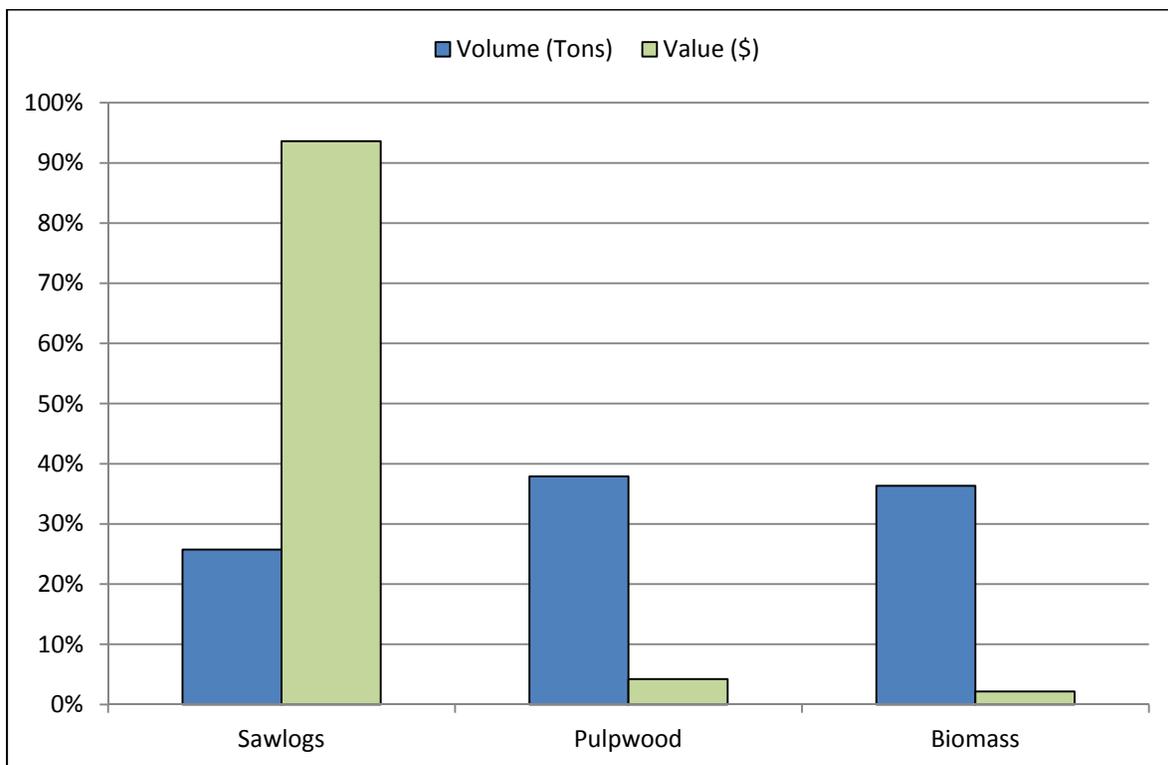


Some states in the region, including New Hampshire, have excellent systems for tracking harvest levels and products generated on an annual basis. This information is publicly available in aggregated form, not at the harvest unit or by landowner. The last complete figures available for New Hampshire are for the year 2010; in this year seven long-standing wood fired power plants were operating in the state. Products from New Hampshire forests are also sold to markets in neighboring states, Quebec and globally.

Information collected by the New Hampshire Department of Revenue Administration and the New Hampshire Division of Forests & Lands is in commercial units, often thousand board feet (for sawlogs) and cords (for pulpwood). INRS has converted all data to common units (green tons) in order to compare relative harvest volumes of productsⁱⁱⁱ.

While the New Hampshire volumes of sawlogs, pulpwood (and firewood) and biomass fuel were relatively even on a statewide basis in 2010, the value to landowners was not. Using product prices for stumpage (the amount paid to landowners for the value of wood “on the stump”, before the logger incurs the cost of accessing, harvesting, processing and transporting wood to market), INRS calculated the stumpage value of these products. Sawlogs, which account for 26% of the volume, are responsible for 94% of all landowner profits. Pulpwood (and firewood), 38% of statewide harvests, are 4% of the stumpage value to landowners. Biomass chips, 36% of the volume harvested statewide, reflect only 2% of the value to landowners^{iv}.

Figure 4. Volume and Value of Harvested Products, New Hampshire 2010*



As noted in *Good Forestry in the Granite State*, “sawtimber is usually the most valuable product by volume. For example, a trailer load of veneer may be worth 100 times the value of an equal volume of (biomass) chipwood.”^{vi} This economic reality illustrates the volume to value difference between biomass and sawlogs. Importantly, it serves as the single greatest disincentive to clearing forests for biomass fuel.

Markets for Low-Grade Wood Promote Sound Forestry

From a landowner’s perspective – the individual ultimately responsible for approving a harvest plan – there is extremely limited financial value in generating only biomass fuel from their forests. Rather, biomass fuel provides an outlet for forest residue, an opportunity to leave a forest with limited slash, and a market for low-grade wood that encourages thinning and other forestry practices that support long-term value generation through the growth of high quality timber.

Low-grade wood is removed during every timber harvest employing responsible forest practices. Depending upon the stand quality and the silvicultural prescription (selection harvest, clearcut, etc.), the amount of low-grade wood removed can vary widely. Loggers and foresters in New England report that -- depending upon the forest type, stand conditions, and other factors – between 20% and 80% of the volume removed during a timber harvest is sent to low-grade – either pulpwood or biomass – markets. Research from the USDA Forest Service’s Bartlett Experimental Forest on the White Mountain National Forest indicate the following percentage of low-grade wood by harvest type:

Harvest Type	% Low-grade (volume)
Selection cut	55 %
Patch cut	57 %
Diameter limit	30 %
Clearcut	41 %

The removal of low-grade stems has a number of long-term forestry benefits in a managed stand, including the development of certain wildlife habitat types, improved forest productivity, and the potential for improved long-term forest economics that helps shield forestland from development pressure. Absent a low-grade market, forest landowners often resort to high-grading, defined by *Good Forestry in the Granite State* as “an exploitive logging practice that removes only the best, most accessible and marketable trees in a stand.”^{vii}

The management options and forest benefits that low-grade markets can provide are well documented and are fundamental to good forest management. Unfortunately, parts of New England are without substantial and consistent markets for low-grade wood, including pulpwood. This is particularly true in Southern New England, which is economically distant to pulp mills in Maine and New York, and currently lacking a consistent biomass market. In these regions, the forests often show signs of high-grading, and could see improved management if a local and consistent low-grade market was available.



As noted by the Society of American Foresters,

“Foresters in Massachusetts have long lamented the lack of stable markets for low-grade forest products, and...[this situation] furthers an economic environment which encourages maximizing current profit at the expense of long-term forest health and productivity. At the same time they [regulations discouraging biomass markets] sacrifice the forests' ability to provide society all those things upon which we depend including a rich mix of forest products, an esthetically pleasing forested environment, a full matrix of habitat features, and provision of clean drinking water.”^{viii}

Landowners recognize the value that biomass markets can provide to them. The Cows Company, Massachusetts’ largest private landowner and a family forest ownership dating back over two and a half centuries, notes the value that biomass has the potential to provide:

“Biomass markets are important for Massachusetts landowners because markets for low value, low grade trees from forest thinning are poor and sometimes non-existent --- making it hard for landowners to get thinning done at a reasonable cost. Biomass markets will help us keep forests for open space recreation, water and air quality, wildlife habitat and maintain a working landscape.”^{ix}

Markets for low-grade wood, including biomass, provide a range of benefits. As noted by the North East *State* Foresters Association:

“Biomass energy when used for generation of electricity, heat or (someday) liquid fuel has a number of benefits. Biomass is a locally sourced fuel and...benefits the local economy through jobs in the harvesting, processing and use of wood...Biomass fuel is made from low-grade wood – generally not suited for higher value markets – and provides for landowners and land managers options and opportunities when practicing forestry.”^x

New England’s biomass markets have served the region well for over twenty years. By providing a market for forest residue and other low-grade wood, these markets have supported the practice of forestry, allowed landowners and foresters to manage for high-value products, and enhanced the economic value – and therefore conservation – of privately held forestland.

Thank you to the National Alliance of Forest Owners for their support in making this paper possible.



Endnotes

ⁱ This work is based, in part, on a report compete by INRS and Draper/Lennon, Inc., Identifying and Implementing Alternatives to Sustain the Wood-Fired Electricity Generating Industry in New Hampshire. This analysis was completed for the NH Department of Resources & Economic Development in January 2002, and is available at http://www.inrsllc.com/download/wood_fireelectricityinNH.pdf

ⁱⁱ Maps developed by Innovative Natural Resource Solutions LLC, using data from the USDA Forest Service, Forest Inventory and Analysis, EVALIDATOR Version 4.01, <http://fiatools.fs.fed.us/Evalidator401/tmattribute.jsp>

ⁱⁱⁱ Conversion factors are softwood sawlogs at 3.75 tons per MBF, hardwood sawlogs at 4.73 tons per MBF, hardwood pulpwood at 2.6 tons per cord, and softwood pulpwood at 2.3 tons per cord.

^{iv} Figures may not add to 100% due to rounding error.

^v Charts developed from:

- Volume data provided by Jonathan Horton, Forest Resource Analyst, NH Division of Forests & Lands. *New Hampshire Report of Cut Data, 2010*. New Hampshire Division of Forests & Lands. 2012.
- Product price data from the New Hampshire Timberland Owners Association. "Market Pulse, 2nd Quarter 2010." *Timber Crier*. Summer 2010.

^{vi} Bennet, Karen P. (editor) *Good Forestry in the Granite State: Recommended Voluntary Forest Management Practices for New Hampshire*. <http://extension.unh.edu/goodforestry/index.htm> December 2010.

^{vii} New Hampshire Forest Sustainability Standards Work Team. *Good Forestry in the Granite State: Recommended Voluntary Forest Management Practices for New Hampshire*. New Hampshire Division of Forests & Lands, DRED and the Society for the Protection of New Hampshire Forests. 1997.

^{viii} Michael Lester, John Clarke, William VanDoren and Chris Pryor. "Society of American Foresters comments on Massachusetts 225 CMR 14.00". October 21, 2010.

^{ix} Cinda Jones, The Cows Company. Email titled "Comments on DOER biomass energy hearings." October 11, 2010.

^x North East *State* Foresters Association. *The Economic Importance of New Hampshire's Forest-Based Economy*. 2011.

