

Community Wood Biomass:

Enhancing the sustainability of community-based biomass production and use for local energy

Lini Wollenberg, Cecilia Danks, Susannah McCandless, David Brynn, Tara Hamilton, Matt Peters, Jenn Colby, Adam Sherman, Carl Demrow

Introduction

How can communities in the Northeast produce and use local forest biomass to meet their energy needs in ways that are sustainable, efficient and fair?

Home owners and public facilities in the Northeast are increasingly interested in wood as a source of carbon-neutral and locally accessible energy for heating or the generation of electricity. Yet information about local woody biomass production and use is limited, and increasing pressures for the development of wood energy raise questions about how to ensure its sustainability.

Objectives

This 3-year action research project aims to:

1. Identify current production and use of forest-based biomass in nine communities.
2. Improve 3 to 5 practices in community biomass production and use.
3. Build capacity for community learning and disseminate lessons learned to other Northern Forest communities with biomass initiatives states by 2011.
4. Develop and share generalizable methods and processes that support stronger university-community partnerships in action research towards sustainable forest management by 2011.



Harwood Union High School's wood-chip-based heating facility, Moretown, Vermont

Significance of Firewood for Heating

In Vermont, firewood harvesting accounts for the majority of non saw-timber harvesting, so understanding its economic viability, energy efficiency and ecological sustainability is necessary to determine Vermont's capabilities for meeting ifuture energy needs from wood. Firewood and wood chips are attractive as thermal energy delivers the maximum energy return per unit of wood harvested compared to other wood energy uses. Vermont has set a target of doubling its current production of 1.5 million green tons by 2025, including at least one million tons of "chunk wood", chips, and pellets. Estimates suggest that Vermont has sufficient wood to heat homes, public facilities, businesses and entire communities (BERC 2007).



Community Initiatives

The project is being implemented in 9 towns of northeastern Addison County and the Mad River Valley. In the Addison County towns, Vermont Family Forests (VFF) is organizing production among landowners, certifying the sustainability of the firewood and coordinating distribution with master loggers. VFF is monitoring the program's impacts as a socially and ecologically sustainable model of wood biomass production to make adjustments to improve their approach. Participating towns are Bristol, Lincoln, Starksboro, New Haven, and Monkton (3,845 households).

In the Mad River Valley, 4 towns are working with the Northern Forest Alliance (NFA) to increase their energy independence through the use of local wood resources. Together with the Biomass Energy Resources Center (BERC), NFA is facilitating the towns to collectively assess their options for procuring local, sustainably grown wood and reduce costs through a distribution system of shared transportation and landings. Participating towns are Warren, Waitsfield, Fayston and Moretown (1,960 households)

In both sites, communities are identifying sustainability indicators that reflect their aspirations for wood-based energy. These includes concerns about the ecological and aesthetic impacts of logging, creating jobs, mitigating climate change, fair wages for loggers, dust and noise, and affordable wood for low income groups.

Results: Residential Consumption of Firewood and Wood Pellets

A wood consumption survey was distributed in January and February 2009 to residents of the nine study towns via local schools, town meetings, grocery stores, vendors and personal networks. 385 responses were received.

	Mean	Maximum	Minimum	Standard Deviation	Sum	Total number of households
No. Cords	4.3	17.00	.30	3.00	1196.55	278
No. Dry Cords	3.0	12.00	.50	2.27	490.75	164
No. Green Cords	3.9	17.0	.5	3.30	694.5	168
Tons of pellets used	3.5	8.0	1.0	1.7	60.0	17

Table 1 Acquisition of firewood and pellets per household 2008 (n=385)

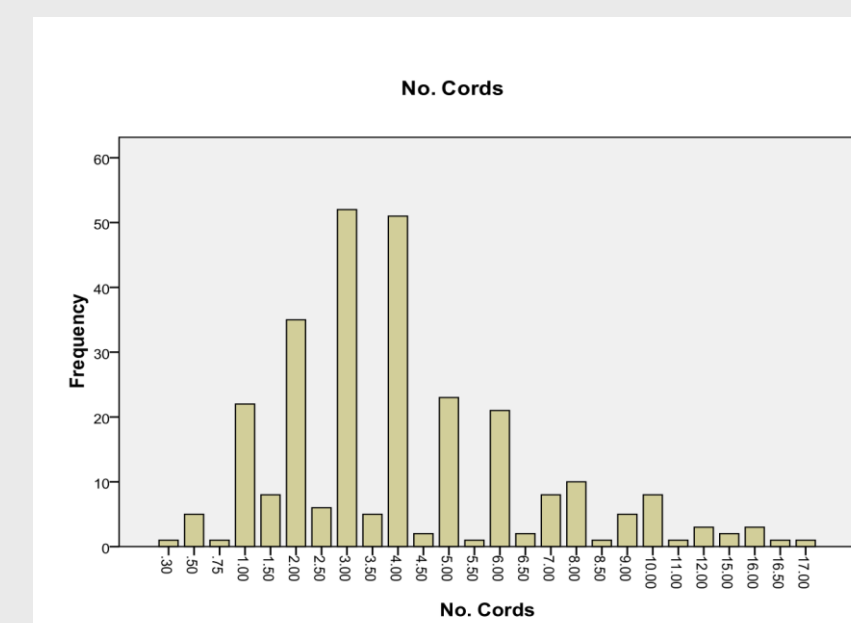


Figure 1 Distribution of total cords of wood acquired 2008 (n=385)

Average firewood consumption was 4.3 cords per household in 2008 (Table 1 and Figure 1). An estimated **92.92 thousand cubic feet of wood (MCF) were acquired by sampled households in 2008 as firewood or wood pellets.**

The number of firewood cords varied significantly by income (F=2.268, p=.049, df 243) (Table 2). Households with incomes below \$25,000 acquired only about 2.5 cords, while households with incomes of \$80-99,000 acquired an average of 5 cords each. Average household spending on firewood was \$622 in 2008. People paid on average \$172/cord for green wood and \$232/cord for dry wood.

Income \$	Mean	Number of households	Std. Deviation
<25,000	2.5367	15	1.73478
25-39,999	4.9286	28	3.80719
40-59,999	4.4597	62	2.84043
60-79,999	3.9184	49	2.12217
80-99,999	5.0488	41	3.91919
>100,000	3.8673	49	2.53060
Total	4.2666	244	2.98274

Table 2 Acquisition of wood by household by income



Table 3. BTUs equivalents of wood acquired in 2008 (n=385)

	Quantity	BTU equivalent (millions BTU)
Addison towns		
Firewood	655.8 cords	13,116
Pellets	41.5 tons	680.6
Total BTUs from wood		13,797
Mad River		
Firewood	540.75 cords	10,815
Pellets	18.5 tons	303.4
Total BTUs from wood		11,118
Total firewood	1196.55 cords	23,931
Total Pellets	60 tons	984
Total BTUs from wood		24,915

The acquired volume of wood is equivalent to 24,915 million BTUs of energy (Table 3), or **177,964 gallons of #2 heating oil** (1 gallon = 140,000 BTUs) saved by using wood-based energy. This sum does not reflect fuel that may have been used in production or transportation.



Results: Wood Harvesting 2005-2008

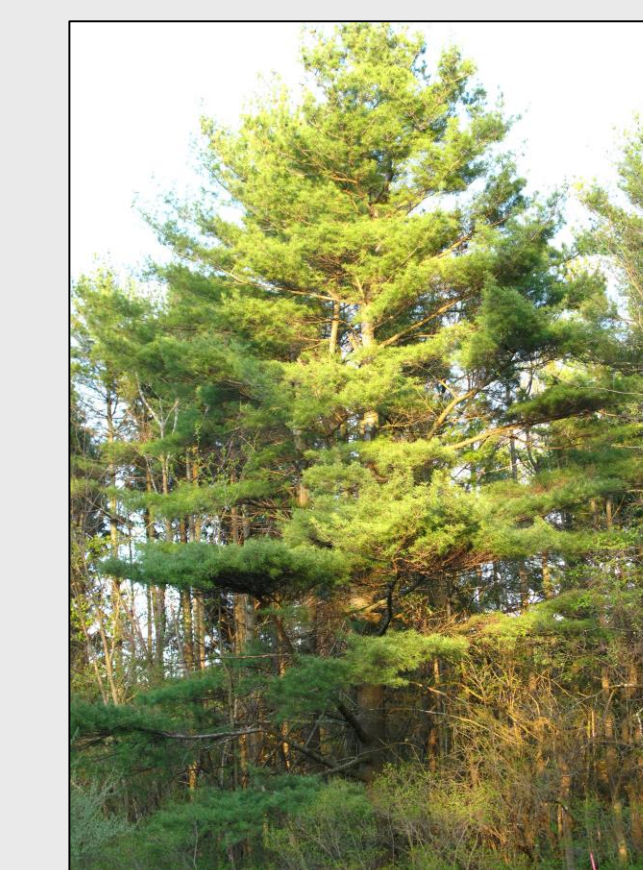
Based on analysis of 2005-2008 harvest data from the state Use Value Appraisal Program for private and public lands in the study town areas, the average annual harvest was Addison towns = 160.5 MCF/yr (5094 gt/yr); Mad River Valley town= 321.0 MCF/yr (10,189 gt/yr); All study towns: 481.5 MCF/yr (15,282 gt/yr).

Of the 2005-2008 cumulative production volume for all focal towns, 60% was sawtimber (reported in board feet) and 40% was low-grade wood (reported in cords or tons of chips).

Average annual harvest of low-grade wood (cordwood and chips) for the Addison towns was 966 cords/yr (2318 gt/yr); and for Mad River Valley towns was 1599 cords/yr (3838 gt/yr); from all focal towns combined was 2565 cords/yr (6156 gt/yr).

The overwhelming majority of production came from private lands, with 94% from private UVA enrolled lands, roughly 3% each from state and federal lands, and none from town lands.

Study towns could potentially heat (primary space heating) 6% and 19% of their households, respectively, with their average annual low-grade harvest volumes, based on an average consumption of 4.3 cords/household/yr (See Residential Consumption Study 2009).



Partners and contact information

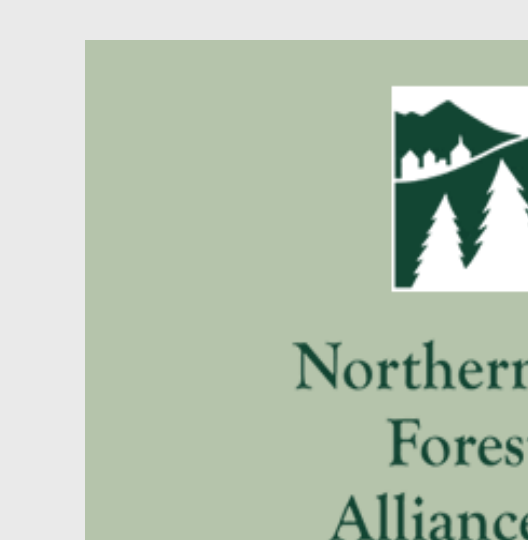


UVM Department of Geography and
UVM Community University Partnerships Office
Biomass Energy Resources Center (BERC)
Middlebury College



For further information, contact
Lini Wollenberg, University of Vermont,
Extension, 656-9891
Lini.Wollenberg@uvm.edu
705 Spear Street
South Burlington 05403

<http://www.uvm.edu/~susagctr/?Page=biomass.html>



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