



Minnesota Woody Biomass Facility Survey



**Minnesota Department of Natural Resources
Division of Forestry
Forest Products Utilization & Marketing Program**

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Woody Biomass Utilization Survey Report 2008

Overview

Minnesota DNR Forest Product Utilization and Marketing staff has gathered information via a survey on the current utilization of woody biomass for heat and/or energy production. Prior to the survey, volumes of woody biomass used for industrial energy markets were not well known. Although other important markets for woody biomass exist such as engineered wood products, animal bedding, specialty products, residential fuelwood and landscape mulch, information on those sources is largely available through other sources such as the Minnesota DNR's Primary Forest Products Directory.

Report Highlights:

Facilities that utilize woody biomass were surveyed in 2008 to determine the volume of wood use and to develop a marketing directory. Fifty-five facilities returned survey forms. Since the data were compiled one facility has suspended operation. The surveyed facilities consumed approximately 4.7 million green tons of woody biomass in 2007. An undetermined portion of that volume is supplied from outside the borders of Minnesota.

A Directory of those facilities wanting to be listed is being produced. It is anticipated that the facility directory will be available on the DNR website in November 2008 at

<http://www.dnr.state.mn.us/forestry/um/index.html>.

Purpose of the Survey:

The Biomass Utilization Survey was proposed after the "Logged Area Residue Analysis" was completed in 2005. There were still many questions left unanswered after the analysis and from earlier reports and directories. Two key questions are: How much woody biomass was consumed? In what form was it consumed and where was it sourced by the utilities and other facilities? It was also determined that information was needed on the type of energy that was produced and how that energy was put to use. With the earlier surveys and directories as a guide the initial mailing list for this survey was compiled.

The intent of this project was to better determine current woody biomass demand in Minnesota, and to produce a directory of woody biomass-using facilities. The information gathered will enable informed decision – making related to siting of new woody biomass energy facilities, and also assist in marketing & supply of biomass to existing facilities. The directory will be available on the DNR website as well as in hard copy.

Background:

This report updates information that was last collected in the early 1990s. At that time the Department of Public Service – Energy Division gathered information on facilities that burned wood to produce heat, electricity or steam for industrial processes. The “Minnesota Biomass Systems Pictorial Directory” was produced as a result of that initiative. The Minnesota Department of Natural Resources Division of Forestry published an earlier report in 1983 “ Status of Wood Energy Use in Minnesota” that had an emphasis on automated systems. That report presented a chronological list of wood use for energy beginning about 1970.

Wood energy facilities have existed for decades. The price of fossil fuels has ebbed and flowed over that time and the number of facilities has followed that trend. With increasing fossil fuel prices in the mid to late 1970s many conversions were made from gas, fuel oil and coal to wood. Government policy at that time encouraged and supported these conversions with subsidies and grants. In the 1990s as prices for fossil fuels decreased many systems were converted back to natural gas; cheap prices enabling the conversions to be quickly repaid.

While the total number of facilities burning wood to produce heat or electricity has decreased over the last three decades, the interest shown in wood fuel by larger utilities and industries has increased recently. Over the last decade several utilities have studied and eventually developed facilities to burn wood. This has caused increased competition for woody biomass in some regions and increased business opportunities for loggers and other companies willing to supply wood to the utilities. This is due in large part to the State’s legislative mandate to develop alternate sources of energy production. Many smaller users continue to burn wood and seek to maintain a stable supply. Pellet and other densified wood producers are also experiencing an increasing demand for their products, and there are proposals for additional development of densified wood processors in Minnesota.

Facilities that burned wood in the two previous surveys are summarized in Table 1 of the Appendix. Table 2 summarizes the numbers of surveys sent and received for the 2008 survey.

2008 Methodology:

A draft survey form was sent out to several partners interested in woody biomass as an alternative energy source for comment and corrections. After receiving input from a wide range of respondents from other agencies, industry cooperators and energy consultants, the survey form was finalized and mailed.

Surveys were sent to 240 of the 258 facilities listed in the 1990 Minnesota Biomass Systems Pictorial Directory and to the 23 heating boilers that the Minnesota Pollution Control Agency requires reporting and annual inspections. Although addresses were updated as much as possible, many ended up being undeliverable because of changes in the business throughout the years. The returned, undeliverable surveys were rechecked in an attempt to find a new address, 24 surveys remained undeliverable. An appeal was sent out to other Utilization and Marketing staff in the Division of Forestry to identify as many additional woody biomass facilities as possible. A total of 15 more surveys were added and sent. Of those five additional surveys were returned. There were 55 completed and returned surveys at the end of the survey period.

Competing Uses for Woody Biomass:

In many parts of the state there may be other uses that compete for the supply of woody biomass. Each region may have unique requirements depending on the industrial base. For example any region that has a dairy industry experiences an increasing demand and price for sawdust used for animal bedding. Many sawmills supply larger dairy operations with this product.

In the Metro area wood residue supplies are processed for landscape mulch markets. Most garden stores and landscape supply dealers offer these products for sale. This has been the largest competitor for wood residue in the past several years. A 1994 report details this information the full report is found on the DNR website: <http://files.dnr.state.mn.us/forestry/um/woodwaste.pdf>

Other uses including pet bedding and erosion control products. Other products are also possible. The Utilization and Marketing Primary and Secondary Forest product Directories also list many alternate products. The directories can be accessed in searchable format at the link following.
<http://www.dnr.state.mn.us/forestry/um/index.html>

Summary: The survey results provide woody biomass providers, developers and policy makers with a reasonable estimate of the amount of demand that currently exists. There have been significant changes in the number of facilities that consume woody biomass as an energy source. There was not a summary of volume consumed in the previous surveys and directories published in the 1990s, so the estimates that were collated from this survey provide us with the best numbers that currently exist. Approximately 4.7 million tons of green woody biomass was consumed in Minnesota in 2007. An undetermined portion of this total resulted from wood being imported from outside of Minnesota's borders.

Future of Woody Biomass: Demand for woody biomass will continue to grow as hydro-carbon sources of energy continue to increase in price and scarcity. Conversion to wood and expansion of wood as an alternative energy source whether burned or transformed to other forms will be a source of business opportunities. The capital markets and policy-makers will need to address the expansion of collection and consumption of wood as biomass. Further industrial processing of wood into various chemical components (Bio-refining) will be a source of innovation and expansion of the forest products industry in Minnesota and the Lake States region for decades to come.

These developments are also having continued impacts on forest management in the state. The Minnesota Department of Natural Resources will become a larger part of the alternative energy sector. Each region of the state has a different set of challenges for the future and the Division of Forestry will continue to address these issues and challenges as we progress in our management of our state's forest resources.

Appendix:

Table 1 Facility Summary from previously published reports and directories

	1983 "Status of Wood Energy Use in Minnesota" DNR – Division of Forestry			1990's " Minnesota Biomass Systems Pictorial Directory" Dept. of Public Service – Energy Division			
Facility	Densified Wood Fuels	Other Green or Dry Fuels	Green Wood Fuels	Waste Wood	Chunk Wood Users	Densified Wood Fuel	Green Wood Fuel
Individual school facilities, not districts	36	***	8	1	***	58	17
Public Facilities	11	***	9	***	40	9	8
Private Facilities	5	31	***	46	***	55	41
Total	52	31	17	47	40	122	66

Table 2 Responses From Current Survey 2008

Total Surveys Mailed (240)	Business or commercial	School facilities	Totals
Surveys – Undeliverable due to business no longer existing. (no response –survey not returned)	23 (62)	(14) Uncorrectable address	99
Surveys returned - facilities not currently using wood	46	40	86
Surveys returned – facilities currently using wood	48	7	55
Totals	94	47	240

Responses of those facilities utilizing wood as an energy source:

Type of Wood Energy Facility:

<u>Type</u>	<u>Number of Facilities</u>
Hot Water	14
Steam	38
Radiant	9
Gasification	2
Other: Thermal oil	4
Total ***	66

*** Eleven facilities indicated multiple energy types.

Season of Use by Percent of Facilities:

<u>Season of Use</u>	<u>Percent of Facilities</u>
Continuous	66
Seasonal	29
Not indicated	5
Total	100%

Output of Facility by Number of Facilities:

<u>Output Type ***</u>	<u>Number</u>
Heat	22
Electricity	7
Combined heat & power (CHP)	2
Steam	31
Hot Water	12

*** 17 facilities indicated Multiple Energy outputs.

Size of Fuel:

<u>Size:</u>	<u>Percent of Facilities</u>
Coarse, undefined size	56
Small, uniform defined size	40
Both sizes indicated	4
Total	100%

Wood Fuel by Type: (See directory for detailed information)

<u>Source of Supply</u>	<u>Number of Facilities</u>
Pelletized or other densified	4
Sawdust, shavings, slabs or other mill residue	31
Round-wood split wood or urban clearing	12
Chips derived from forest harvest	9
Chips from mill residue	20
Other source (specify)	4
Multiple sources indicated	21
Total Facilities reporting:	54

Fuel Supply Source by Number of Facilities

Source Description	Number of facilities
Waste residue from own operations	32
Forest harvest operations	13
Purchased or obtained free of charge	25
Multiple sources indicated	16

Total Annual Volume of Woody Biomass Consumed Statewide:

Volume Measure	Volume	Converted to Green Tons
Green tons	4,199,013	4,199,013
Dry tons	245,838	491,676
Cords	247	568
Cubic volume (cubic yards)	51,400	24,937
Total - Aggregate volume consumed ***		4,716,194

*** **Note-** Two small facilities did not provide volume figures, this value is based on 53 facilities.

Readers should also be aware that only a portion of total woody biomass consumed is derived from forest harvest in Minnesota. Significant volumes of wood biomass from energy are derived from wood residue imported from outside Minnesota's borders for manufacturing purposes, and also from urban sources.

Conversions to Green Tons:

Dry tons to Green tons	Two times the dry ton value
Cords to Green tons	Multiply cord volume by 2.3 tons per cord
Cubic volume to Green tons	Cubic yard = 27 cubic feet /128 cubic feet = 1 cord; multiply number of cords by average weight 2.3 tons per cord.