

Using Biomass in Minnesota



Case Study

Hedstrom Lumber

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Hedstrom Lumber is a sawmill located in Grand Marais, Minnesota. The company processes logs into dimensional lumber. It employs around thirty people and delivers over seven hundred truckloads of lumber annually to retail yards throughout the Midwest.

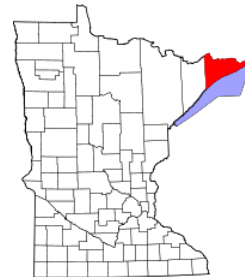
Hedstrom Lumber has decades of experience utilizing biomass at its site. The first boiler was self-installed in the 1970s, and the company has stuck with biomass as a heat source

ever since. Upgrading the size and technology of the boilers has been continuous and the company is currently on their fourth boiler, which was installed about fifteen years ago. The Johnston steam boiler has custom burners and controls, and it provides one hundred percent of the heat load for Hedstrom Lumber's fifty thousand square foot facility.

Prior to using biomass for heating, the company used fuel oil, the price of which fluctuated and made heating of their facilities expensive.

Case Study

Highlights



Facility

- 1504 Gunflint Trail Grand Marais, Minnesota 55604
- 50,000 square feet

Biomass System

- Custom Johnston wood boiler
- 20 million Btu/hour
- Provides 100% of the facility's heat load
- Components: steam boiler, distribution system, storage silos, conveyor, and auger feed

Fuel

- 50% sawdust and 50% bark (both green)
- Processed through hammer mill for resizing and ground up
- Silos store 50-70 tons of fuel
- ~32 gallons of ash produced per day

Costs/Savings

- ~\$50,000 for labor
- ~\$40,000 for electric power
- ~\$50,000 for parts, and supplies and chemicals

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They have found that heating with biomass is the most economical option for their business.

In fact, the primary reason that Hedstrom Lumber switched to biomass and has stayed with it was to save money and lower heating costs. According to Howard Hedstrom, President of Hedstrom Lumber, “With a fuel oil system, all it takes is a flip of a switch to turn the system on and off. Using wood is a much more hands-on and time consuming process for maintenance and operations, so the only real reason to use it is because it is cheaper.”

The boiler uses a fuel mixture that is half sawdust and half bark, both of which are “green” wood with high moisture content. Woodchips are also used for fuel once in a while when hog fuel has too much snow content during the winter. Before it is burned, the fuel is processed through a hammer mill and is ground up and resized for better consistency. The dry-basis moisture content of the fuel ranges from forty-five to fifty-five percent. This high moisture content is appropriate and can be beneficial to the spreader-stoker type of system.

They store enough fuel to last three to four days (between fifty and seventy tons) of consumption in their silos. Fuel degradation problems are non-existent because the fuel moves through quickly and they do not store a large amount of long-term fuel.

The system produces about thirty-two gallons of ash per day, which they provide to farmers to use as a soil enhancer.



Aside from the labor needed for ash removal, the system is mostly automated and can be run practically unattended. Generally, about ten to fifteen hours per week are needed to operate the system.

Hedstrom Lumber uses about five thousand tons of fuel per year. All of the fuel comes from byproducts of the mill operations, making it a very efficient and inexpensive onsite heating source. Since the fuel comes from onsite sources, they do not have to worry about fuel expenses.

The mill byproducts that are not used for heating, are sold throughout the Midwest region. Sawdust is sold to wood pellet producers and excess woodchips are sold as mulch. In view of the availability of these other markets, the use of wood for fuel results in opportunity costs. From a lost revenue perspective, they lose about \$20.00 of revenue per ton for fuel, or about \$100,000 in lost revenue per year. This figure must be considered in calculating fuel costs.

Since the 1970s, Hedstrom Lumber has worked hard to continuously improve different aspects of their biomass system.

Generally, they have focused on upgrading the controls and fuel handling because those are the most critical operations and the hardest to optimize. One of the most notable improvements Hedstrom Lumber has made is the computerization of the biomass system, which allows for more precise control over inputs. The system utilizes modulating controls that help maintain steadier temperatures as the system is always in the process of burning and drying. Also, the current boiler has a spreader-stoker with a good turn down ability and it can handle a wide range of fuel types with varying moisture contents.

As Hedstrom explains, buying the right biomass system is very site specific, and there is not a one-size-fits-all recommendation for making the right choice. Installers might say that they have the perfect system for you, but people need to realize that the owner/operator is the one who have to live with the system. In choosing the right system, it is important to consider the climate because too much moisture can accumulate with snow and ice, and you have to adjust heating temperatures to first deal with the moisture content/ice and then burn the wood (which takes much more energy).

Hedstrom believes that the most important considerations before installing a biomass heating system are what techniques to use when handling the fuel, matching the fuel with the equipment, and having the right type of bins, conveyors, and controls. He explained, "In every biomass facility I have been in, the storage, handling, and delivery of fuel are the major issues and the ones that are usually not well thought



out ahead of time. I have also seen where not enough thought has gone into the ash handling." However, he pointed out that there are advantages and disadvantages associated with any type of biomass equipment and there is no one "best" way of heating with biomass: "We use chain conveyors. Others use belt conveyors. Spillage and wind throw are hard to contain from belt systems, but chain systems have issues too."

A key lesson to take away from Hedstrom Lumber's experience is that "Wood does not burn like gas or oil. You have to plan on the time and cost of the extra attention that biomass systems require, both in manpower, time, and necessary skills." As Hedstrom Lumber's experience illustrates, if implemented thoughtfully, biomass can be an economically sound method for heating and can play a significant role in the success of a business.