

Michigan Wood-based Thermal Energy

Case Studies-Messersmith Manufacturing, Inc.



Bill Cook, Michigan State University Extension, 2016

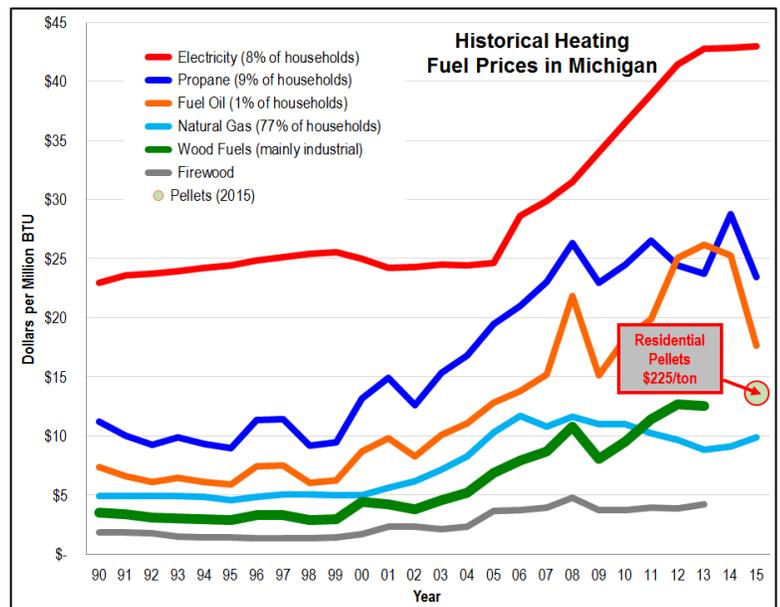
Messersmith Manufacturing, Inc.
2612 F Road
Bark River, MI 49807
<http://www.burnchips.com>
Contact: Rick Kinsey or Gerry Guard at 906-466-9010 x109



Messersmith Manufacturing, Inc. works with clients to custom-build wood-chip thermal energy systems. Engineer and CAD technician designs include the chip bins, augers and conveyors, chip sorters, combustion chambers, emissions control, and other components to suit the requirements of each particular project. Additional buildings may be required. Boilers and computer control systems are

purchased through third-party contractors. Messersmith builds and installs the system, trains operators, and provides support. The boilers can produce either hot water (30-100 psi) or steam (15-300 psi). Wood-chip systems are best suited to larger buildings or groups of buildings, at least 20,000 square feet. Messersmith manufactures systems in the 1-32 million btu per hour range. The main system components can last over 30 years. Computer controls are usually updated more frequently. The Messersmith office and manufacturing buildings are heated with one of their own wood chip systems, about 32,000 square feet.

Messersmith was incorporated in 1982 and has undergone major expansions in 1998, 1999, 2006, and 2007. There are 16 employees. Major clients are schools, health care facilities, sawmills, and greenhouses. The company



Source: Energy Information Administration



Combustion unit under construction.

builds 8-12 units per year and now has 114 major installations across much of the United States, with nine Michigan facilities. There are only about a half-dozen manufacturers of this sort in the USA.

Wood chip heating and cooling systems can be cost-competitive with natural gas and readily undercuts the prices of propane, fuel oil, and electricity. Roughly 200 green tons of wood chips are needed per million btus per year. A standard trucking chip van in Michigan holds about 40 tons of wood chips. For example, a 5 million btu/hour system would consume about 1000-1200 tons of green chips per year. During peak cold in the Upper Peninsula of Michigan, that's about a van load every week or so. For schools in the 100,000 – 150,000 square foot range, the savings are roughly equivalent to a teacher's salary.



Hybrid Boiler Unit.

Wood Chip System Components

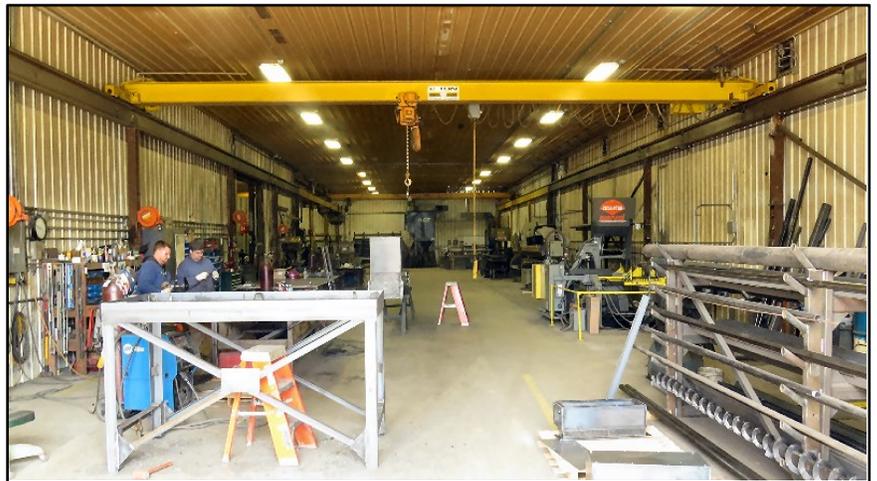
Chip vans (semi-trucks) unload wood chips into an indoor storage building that does not freeze during the winter. An auger system moves chips from the bottom of the storage bin onto a conveyor. A chip sorting device removes oversized feedstock, before chips are loaded into the metering bin for the boiler or boilers. The metering augers feed the boiler at variable rates depending on the heat demand. Stoker augers feed the chips onto sloped grates inside the fire chamber where initial combustion occurs. Gases move into the overfire chamber to produce a clean, efficient burn. Carbon monoxide emissions are under 100 ppm. Particulate emissions are removed by either a cyclone separator or an electro-static precipitator, based on the needs of the facility. Ash from both the boiler and emissions stream contain no environmental contaminants and can be disposed of in various ways. A 55 gallon drum of ash is generated by roughly 40 tons of green wood chips.

Heat is transferred to the hot water or steam circulatory system that includes a network of underground insulated pipes and, possibly, a thermal storage tank. The piping network can service one or several buildings. Each building typically has a heat transfer unit and an independent heat distribution system (either radiant heat or forced air). The entire process is computer-controlled and can be remotely monitored. Built-in warning alarms can also be received remotely.

Each installation has its own characteristics based on the physical and economic conditions at the site.

Consumption of Wood Chips

Distributed heat systems using wood chip boiler technology have proven to be a very dependable, low-cost, alternative to fossil fuel systems. Wood chips are commonly available in most forested regions, including the upper Great Lakes states. So, energy dollars are locally retained along with other economic benefits to existing contractors and communities. Forest management options are expanded to help provide healthier forest ecosystems and related environmental services.



One of two manufacturing bays.



Hand-crafting.

Financing

Usually, these wood chip systems have higher capital investment costs than standard fossil fuel heating and cooling systems. However, significantly lower operating costs often result in payback schedules in the five to ten year range. In some cases, performance contracting may be available. Federal loan and grant programs vary from year to year, such as those through the USDA Rural Development and Fuels for Schools. Schools may have access to less expensive capital than other entities. Installing a new or replacement heating and cooling system is a substantial financial commitment that will span at least the next couple of decades. Projected fossil fuel pricing and price volatility make low-cost, stable-priced wood-based systems increasingly attractive.