

Michigan Wood-based Thermal Energy

Wood-based Heating Appliances

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Forests have huge potential to help supply Michigan with heat and, perhaps, power. However, providing heating and cooling is the low-hanging fruit. A wide range of appliances help serve this purpose.

Heating with wood is an ancient practice. However, advanced modern heating appliances have come a long way over the past decade, let alone over the millennia. Choosing the correct appliance depends upon each site and situation.

Modern appliance choices include outdoor boilers, indoor boilers, furnaces, stoves, fireplaces, fireplace inserts, and larger heating plants.



Cordwood boilers for a larger facility.



Passive solar array for a home heated with wood pellets

Most people are familiar with **outdoor boilers, stoves, and fireplaces**. They are common appliances for residences and small businesses. Older versions of these technologies are often smokier and less efficient than the modern versions. A homeowner can find a wide range of manufacturers of these appliances, and a range in quality and performance.

Less familiar, and potentially more important, are the advanced boilers and furnaces to heat homes and small businesses. Wood pellet boilers and furnaces work similarly to those that consume fossil fuels. A **boiler** provides hot water to a distribution system of pipes, often called a hydronic system. A **furnace** provides hot air to a distribution system of air ducts. Sometimes, solar panels are used in combination with wood pellet heat.

Wood pellets are the best fuel option for people who only want to deal with the thermostat, and prefer to avoid the use of fossil fuels. Advanced pellet boilers and

furnaces are as “hands-off” as those that use natural gas, propane, or fuel oil. Wood pellets can be delivered using trucks, just like propane or fuel oil. The truck comes two or three times per year.

Michigan has yet to see a bulk wood pellet delivery service using either pneumatic or auger trucks. The Michigan Statewide Wood Energy Team, and its partners, are working to create such a delivery service in the southwestern counties. New England has several of these services and wood pellet heating is becoming a significant economic driver in that region.



*Home pellet boiler (top)
Pellet storage bin (middle)
Bulk delivery service (bottom)*

Larger facilities and district heating systems use larger boilers that are best fueled by **wood chips**, rather than pellets or cordwood. There are a number of successful installations like this across Michigan and room for many more.



Pellet system used to heat a school.

A district energy system is a central power plant that heats (and sometimes cools) multiple buildings. Steam and hot water produced by burning natural gas or wood can be distributed through pipes to nearby buildings. Wood is the preferred fuel to reduce environmental impacts. These systems are very efficient, clean, and reliable.

In the world of wood-based thermal energy (heating and cooling), there are three groups of fuels; cordwood, pellets, and wood chips.

Appliances that use **cordwood** (firewood) are well-known. Many of these appliances require frequent attention and are not particularly efficient. However, some of the advanced outdoor cordwood gasification boilers are quite efficient and clean-burning, when dry wood is used.

Wood pellets are often associated with only **indoor stoves**, a free-standing appliance usually designed to enhance the ambiance of an individual room. Using wood pellets to supply a whole-house boiler or furnace is rare in Michigan, but is emerging as an environmentally-friendly alternative.

Wood chip boilers and **district energy systems** are less well-known but offer the greatest benefit to communities and surrounding forests. These are larger systems, but are quite efficient, clean, and reliable. Schools and medical facilities are currently the most common applications, other than those used by forest industries.



*Wood-based Fuels
Cordwood (top)
Wood Chips (middle)
Pellets (bottom)*



Wood chip boiler used to heat a larger facility such as a school or hospital.



Footprint for a wood chip heating operation, including chip storage area, boiler, and wood-handling conveyors.



A district energy facility that both heats and cools with wood chips.

The idea of “heating with wood” can lead to many technology choices. It’s no longer just grandpa’s old wood stove or the fireplace in the den. Wood-based heating and cooling using advanced technologies offers many economic, environmental, and social benefits.