Michigan Wood-based Thermal Energy

Bordine's Nursery

Bill Cook, Michigan State University Extension, 2017.

Bordine's Nursery
9100 Torrey Road
Grand Blanc, MI 48439
http://bordines.com
Contact: Mike Wright at mikew@bordine.com or 248-762-0134

Bordine's is the largest family-owned grower and retail garden center in Michigan. It has been in operation for over 75 years. The production is centralized at the Grand Blanc facility, serving four retail outlets in Grand Blanc, Rochester, Brighton, and Clarkston. Energy demands are substantial and the family is dedicated to the most sustainable and cost-saving technologies.

The "Bordine Farm" production facility has eleven acres of greenhouses (33 buildings) and over fifty 30 x 200 foot hoop houses. The greenhouses have both in-slab and hot water radiant heat supplied by a 10 million btu / 3 megawatt Belgian Vyncke boiler. The system was installed in 2008 at a cost of 1.5 to 2.0 million dollars, including the boiler, all piping, buildings, conveyors, thermal storage, and other infrastructure components. The payback period over natural gas was four to five years. ThermoEnergy Systems, Inc. of Kingston, Ontario designed and built the project. The company specializes in greenhouse energy. The wood chip fueled system saves Bordine's about $250,000 per year over natural gas. There are a pair of ten million btu natural gas backup boilers.

Vyncke boiler, 10 million btu and 3 megawatt capacity.

Wood chips and wood waste are obtained at no cost from area waste management companies and various factories (especially old pallets), who deliver useable material to the fuel yard. Bordine's receives feedstock at no cost and suppliers avoid landfilling or other disposal costs. All material is run through a Morbark Wood Hog drum chipper prior to loading into the chip storage building. Processing and yard labor costs run about $60,000 per year, including boiler maintenance.

Feedstock delivery from local contractors.

Power plant and 210,000-gallon thermal storage tank.

Chip feed from storage bin to conveyor.

Conveyors are fed via a walking floor under the storage bin, which holds 120-140 cubic yards (45-53 green tons), which is a day's use in the winter. Chips are screened and then fed into the boiler. Annual fuel use is 20,000 to 25,000 cubic yards, or about 7,500 to 9,375 green tons (using 750 pounds per cubic yard). Hot water is stored in a 210,000 gallon storage tank. The greenhouses have over ten miles of above-ground piping, not including the in-slab components. Pipe sizes begin at 10-12 inches and scales-down through the distribution system to a 2-inch pipe. Hot water pressure runs 10-12 PSI. Argus Controls monitor and regulate the heating system. Two computer systems operate, one in the boiler room and an environmental system in the greenhouses. The environmental monitors can override the boiler controls, within safety parameters.

One of the greenhouses heated with wood chips.

Between 1200-1500 cubic yards of wood ash are generated each year, including the ash from the cyclone separator. Bordine's tills the ash into fields to be used for future expansion. Running full-out, the boiler can produce seven yards of ash per day.

Bordine's provides about 30 tours per year of their production facility, including the wood-based heating system. Most of the tours are from area schools.