

# Michigan Wood-based Thermal Energy

## Republic-Michigamme Schools

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Republic-Michigamme Schools serve a rural area of the Upper Peninsula of Michigan with about 136 students, K-12. A single building of 67,000 square feet, plus a bus garage and heating plant, heats with a wood chip heating system. The school is not on the natural gas grid and until 2012 had heated with fuel oil using steam heat.



The cost-savings using wood chips has helped keep the local school operating and helped maintain lower property taxes. Funding through a \$4.2 million school bond was controversial. However, almost all opposition disappeared after open houses featured the new heating system and energy improvements.

The heating system was about \$2 million of the bond, with the remainder for energy efficiency and conservation upgrades. The heating system consisted of a 4.0 million btu Messersmith wood chip boiler, wood-handling equipment, computer controls, new building, new piping, new propane back-up system, and removal of the old fuel oil tanks and residual system. Hot water radiant heat is distributed through a single circulatory system, all above ground, with no thermal storage tank. Pipe pressures run at an average of 15-20 psi. Domestic hot water is also heated with the wood chip system.

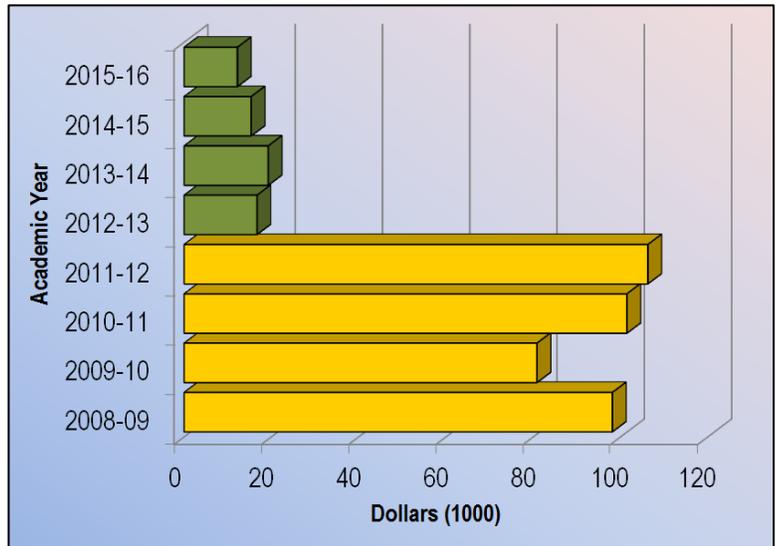


*Heating plant and chip storage building.*



*60-foot long chip storage bin, walking auger in back, under chips.*

Fuel oil costs for the four seasons prior to the wood chip system installation averaged \$96,650, at an average \$2.63 per gallon. Wood chip costs for the last four seasons (including two very cold winters) from 2012 to 2016 averaged \$15,800, at around \$45/green ton.<sup>1</sup> Each wood chip load runs 35-38 tons and the school requires 8-10 loads per year. During periods where temperatures are below zero (Fahrenheit), a load is consumed in about two weeks. Chips are delivered from a local forest products company. Maintenance is very low, about 7-8 hours per heating season.



*Annual fuel cost reduction from fuel oil to wood chips.*



*Walking auger feeds conveyor to the combustion chamber and boiler.*



*Combustion/boiler unit.*



*Ash is removed by hand. Cyclone separator behind.*



*Piping used in heat distribution system, without insulation jacket.*

***“This was the best thing the school had ever done.”***  
*- Jon Jarvi, Maintenance Supervisor*

<sup>1</sup> – Dollar values for fuel oil and wood chips are based on seven years of school receipts.