

Gasifier Wood Burning Heating and Hot Water System Case Study – Weiss Centennial Farm, Frankenmuth, Michigan

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Farm overview

Weiss Centennial Farm is a fifth generation family dairy farm owned and operated by Roger and Joanmarie Weiss. The farm milks an average of 55 Holstein cows and at any given time there are 20 dry cows and 25-30 replacements. In 2011 a Lely automated milking system was installed, which increased milk production by fifteen percent. Corn for silage and alfalfa are grown over 175 acres to feed the herd. The farm also grows 35 acres of sugar beets and 40 acres of soybeans. Since 1989, Weiss Centennial Farm has hosted more than ten thousand visitors who want an adventure (i.e. experience farm life). Farm visitors come year-round to experience life on a working farm and learn about robotic milking technology, dairy nutrition, food safety, and Michigan agricultural products.

Project overview

In 2014 a Tier II agricultural energy audit was conducted by field staff with the [Michigan Milk Producers Association](#). The results of the audit indicated that finding new ways to heat water, heat the milking parlor, cool milk, and deliver water to the cow herd would result in reduced electricity costs. Because natural gas is not available at the farm, the farm is dependent upon electricity to generate heat.

In 2015 the farm was awarded a \$15,000 Michigan Farm Energy Implementation Project grant to complete two energy efficiency projects. The first project replaced an electric water heater with a biomass gasifier to heat water for an in-floor radiant heating system in the milking parlor and wash water for the milking equipment. A heat recovery system that works with the gasifier preheats water entering water heaters in the dairy barn and office to 185° Fahrenheit, eliminating the demand for electricity to heat water in the tanks. The gasifier, a Heiss Heater Model 3000, burns wood from a family-owned ten-acre woodlot and corn stover. The gasifier was purchased from and installed by Heiss Heaters LLC of Grand Rapids, MI.

The second project replaced a 1980's vintage compressor used to cool milk in the bulk tank with a [Mueller Model OE](#) 5hp scroll compressor. The scroll compressor was purchased from and installed by Brown Dairy Equipment, Bad Axe, MI. Both projects were completed in 2015.

Energy savings and greenhouse gas reduction

The total project cost was \$50,050. Assuming the current electric bills are reduced by thirty to fifty percent upon the completion of both energy projects, the payback period to the farm is five to seven years. In 2016 it is estimated that the new scroll compressor and gasifier will reduce propane

consumption by 572 gallons and electricity consumption by 68,975 kWh. This equates to a savings of \$1,580 in propane and \$9,670 in electricity expenses (see Table 1).

Table 1. Projected 2016 energy savings based on 2013 energy usage information.

| Month | Electricity Usage (kWh) | Electricity Expense (\$) | Propane Usage (gal) | Propane Expense (\$) |
|--------------|-------------------------|--------------------------|---------------------|----------------------|
| January | 7,671 | 984.24 | 227 | 425.83 |
| February | 8,052 | 797.52 | 176 | 329.47 |
| March | 6,610 | 849.72 | | |
| April | 6,589 | 866.78 | | |
| May | 4,236 | 566.47 | | |
| June | 4,587 | 781.15 | | |
| July | 5,009 | 854.54 | | |
| August | 5,284 | 901.59 | | |
| September | 5,044 | 863.28 | 169 | 298.62 |
| October | 4,587 | 643.47 | | |
| November | 4,201 | 588.48 | | |
| December | 7,105 | 973.47 | 150 | 526.35 |
| TOTAL | 68,975 | 9,670.71 | 572 | 1,580.27 |

It is estimated that 288 MMBtus will be saved as a result of implementing both projects. The energy saved also results in a reduction of greenhouse gases and decreases the farm’s carbon footprint.

Who to contact

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