

August 2011

**Central Waters Brewing Company – Solar Thermal Panels****Challenge**

Central Waters Brewing Company is a craft brewery in Amherst, producing such beers as Shine On, Mud Puppy Porter, and the Illumination Double IPA. The brewery produced about 5,000 barrels of beer in 2010 and expects to produce about 7,500 in 2011.

Brewing beer requires large amounts of heated water, and heating water was the major energy expenditure for the brewery. The brewery has been expanding since its inception, and the owners decided that the timing was right to install solar thermal panels to help in this process.

Aside from the brewing water, heated water is used for heating the facility through the radiant floor heating system, cleaning kegs, and domestic use. The owners wanted to tie all these water uses into a solar thermal panel system, a challenge that no installer had ever met.

**Strategy**

They bought the Solar Thermal panels from Bubbling Springs Solar of Menomonie. To install the piping and reservoir system, they worked with Bob's Plumbing & Heating of Amherst, who had worked with the brewery to install its radiant floor heating system and had also worked previously with Bubbling Springs Solar.

The installed system contains a display of 24 panels, which together provide 1000 square feet of solar thermal capacity. The panels are grouped into three groups of 8 panels each, and each group is connected to a closed loop glycol piping system. Each of these glycol piping systems runs into a 2,500-gallon underground, insulated reservoir. The reservoir then transfers heat to two miles of spiraled copper piping through a dozen heat exchangers.

Each group of 8 panels is served by a small pump that circulates the glycol. Each pump is powered by two 40-watt solar photovoltaic panels, mounted above the solar thermal panels.

The overall cost of the project was about \$106,000, including \$22,000 for the panels, \$46,000 for support equipment (piping, tanks, etc.), and \$38,000 for installation labor. Grants and tax credits covered about 55% of the



cost. The system went live in February of 2009.

## Results

The solar thermal system provides energy to heat water from 40° - 45° to 120° - 130° on average (ranging from 80° on cold winter days to 140° on hot, sunny days). Water for brewing needs to reach 190°, so the solar thermal panels provide (on average) slightly more than 50% of the energy needed to heat the water. The additional energy is provided by a boiler, run on natural gas.

Additionally, they were able to connect the solar thermal system to their radiant floor heating system, which was installed in 2007.

The solar thermal panels produce hot water each year that would have required 2500 therms of natural gas if using a traditional hot water heater. This hot water is used both for brewing (12 months per year) and building heating (roughly 8 months per year). Central Waters estimate that they heat more than 250,000 gallons per year for process water from 45 - 50 degrees to 120 - 130 degrees, which corresponds to 1500 therms. The annual savings in natural gas is at least \$1200 per year at natural gas rates in 2011. However, these rates are down 35% since 2009 when the system was installed.

Central Waters originally figured an 8 year return on the \$105,000 cost of the solar thermal system. 55% of that cost was covered by grants and incentives, and the cost of natural gas was estimated to increase in line with increases over the last 20 years. Because the costs of natural gas have significantly decreased, it is difficult to calculate an accurate, updated return on investment.

Central Waters installed the solar thermal panels two years after moving into their new facility in Amherst. They anticipate installing additional solar thermal capacity as the output of the brewery continues to increase. They will be able to double the amount of solar thermal panels, without a major increase in the system's infrastructure (the reservoir has capacity for at least 24 more panels). They are looking at photovoltaic options as well.

Aside from the visible energy-saving impacts, the current solar panel system also has positive impacts on the brewery's image. The panels, coupled with the fact that they will donate part of the proceeds from their Shine On ale to the [Midwest Renewable Energy Association](#), undoubtedly serve to increase Central Waters' image as a green brewery.

Paul Graham affirmed that the five full-time and six part-time employees have been wholly supportive of the brewery's green initiatives. Most of them were involved in some way in the planning and/or installation of the solar system. This pride in the company's approach to sustainability has certainly helped boost employee morale and commitment to the job.

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