

## Milwaukee Brewing Company (MBC)

At MBC we feel sustainable manufacturing practices are not an option, but the responsibility of any modern manufacturing operation. Access to knowledge, technology, and the reality of environmental impact mandate modern manufacturers to consider intelligent application of energy conservation and overall environmental impact as a core value. Even though our 2nd Street Brewery is engineered using many used components, energy conservation is central to the design.

We are in the process of installing a solar thermal system to continue moving us along our sustainable journey. With a solar thermal system as the new center piece of our energy efficiency program, we believe our company will gain a reputation throughout the city, state and larger brewing community for our ability to produce a great product with a conscience for the environment. Below is a list of several energy and resource conservation measures that have been implemented at the Brewery.

### **Biodiesel**

When the power source for heating was laid out, we installed two boilers at double the needed capacity. In our original design concept, one boiler would be dedicated to burning waste vegetable oil, while the other would burn Natural Gas. Once we perfected a biodiesel formula for using the vegetable oil in a reliable format, we have been using biodiesel as an alternative energy source to run our boiler system since February of 2009. We convert used kitchen oil to burnable biodiesel on premise. We not only convert all used kitchen oil from our brew pub, but also acquire used oil from the Milwaukee County Parks System giving them a responsible, traceable, and fun option for the disposal of their waste product.



### **High Efficiency Fluorescent Lighting**

When the Brewery was constructed in 2008 older High Pressure Sodium fixtures were replaced with high-bay Fluorescent fixtures, saving 40% of electrical costs for production and warehouse area lighting needs.

### **Variable Speed Drives**

Working with Rockwell Automation, the 2ndStreet Brewery motors are exclusively powered by Powerflex Variable Speed Drives. This allows the Brewery to operate motors at the ideal speed for the application at any time, saving considerable electrical energy. A project currently under way is to integrate all the drives into an overall process management system to further optimize electrical energy usage in the Brewery. The addition of a VFD on the solar loop pump is also being considered.

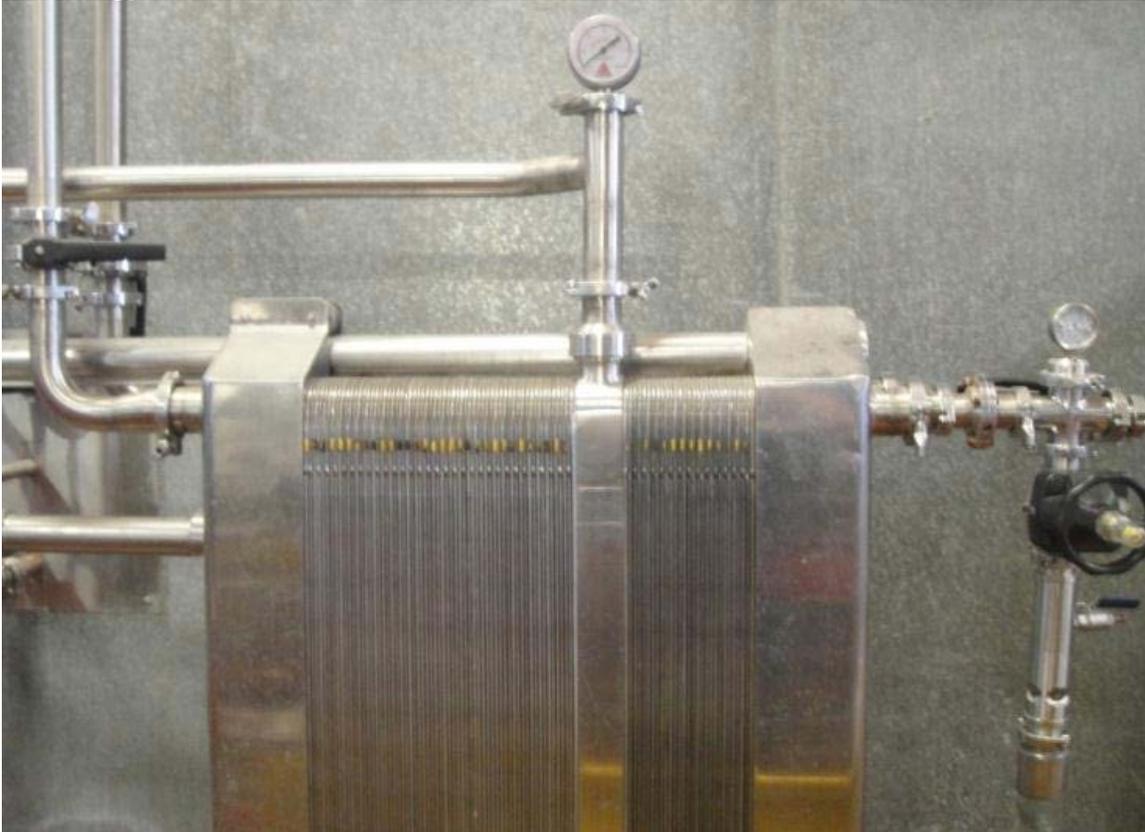
### **Refrigeration Heat Recovery**

In the original design of our 2ndStreet Brewery, we recognized the huge refrigeration load as an opportunity for energy conservation. Our facility was previously used by a produce distribution company, and the huge storage coolers were already in place, with large separate compressors on each. Instead of running on the independent refrigeration compressors for each load, we replaced them with a refrigeration rack system. We installed an additional system to recover the heat given off by the refrigeration process, which heats water in building utility water tanks for restrooms, sinks, and wash-down hot water needs. Normally this heat would be wasted out a rooftop condenser.



### **Casting Back in Brewing Process**

At the end of the brewing process the pre-fermented beer is cooled to proper fermentation temperatures using cold water. We have setup a return system for this cooling water, in which it is pumped back into our hot water reserve tank to be heated and used again. This process saves hundreds of gallons of water per brew session that would otherwise be dumped, as well as recovery of significant amounts of heat energy that otherwise would be lost down the drain.



### **CIP (Clean-In-Place) recirculation**

Using valve technology normally reserved for very large breweries, our cleaning system can recirculate cleaning solution to save water, chemicals, and waste stream volume. The system monitors the efficacy of the cleaning and sanitizing liquid, allowing the brewery to optimize resource consumption during cleaning cycles.

### **Recycling**

At our 2<sup>nd</sup> Street Brewery we have contracted directly to recycle as many solid waste streams as possible. Cardboard, glass, office paper, plastic, aluminum, steel, and even stretch wrap are separated. The contractor provides certification that the materials are actually recycled, as we have found that many waste haulers landfill otherwise reusable materials.

### **Spent Grain Donation**

One of the biggest waste products generated at a brewery is the spent grain from the brewing process. At the production brewery we work with Growing Power, a Milwaukee based urban farming organization that uses our spent grain in compost and worm casting production. In addition, at the company's restaurant, the Ale House spent grain is picked up and used by a local livestock farmer as feed.



*Spent grain collected after brewing session.*

### **HVLV Fan**

Working with local manufacturer Rite-Hite, the Brewery operates a 24' High Volume-Low Velocity fan. This locally sourced piece of equipment is the latest technology for managing building temperatures in a comfortable way. This fan handles destratification without creating breezes, or hot/cold spots. Older ceiling fans use much more energy and push air in windy columns, versus gently blending air from floor to ceiling.



*HVLV fan when not in use reminds us of our country*

### **Efficient Brewery Scheduling**

In an effort to cut down on the energy exhaustion of system startup and shut down we created a shift brewing system in which the brewing system including steam, hot water, air compressors and glycol coolant is only started up once and multiple brews are completed in a single day. The same concept has been applied to our packaging runs. We take advantage of the large amount of energy used to prep, run, clean and break down our bottling and labeling system by packaging larger numbers of cases in a single day.

### **Canning vs Bottling**

We are proud to say that we are the first micro-brewery in Wisconsin to introduce canned beer into our lineup. We began canning two of our top selling brands two years ago. Cans have quickly become a staple within the craft brewing world because of the advantages they offer. Freight energy wastage is cut down shipping cans because of their light weight. Aluminum cans are 100% recyclable, made from higher percentage of recycled material

initially and are the most recycled beverage container. Aluminum cans are not susceptible to light penetration, which can affect beer flavor and are also completely airtight, making oxygenation impossible as well. Aluminum cans also take far less energy for breweries and consumers to chill to storage and drinking temperature.



*Bottle filler in action on packaging day*

### **Local Sourcing**

We have created a brand that focuses on local production with pride in the neighborhood and city in which we reside. Part of our company's mission is to support and use local vendors whenever possible. If we can source equipment or raw materials locally, we support our local economy and conserve energy required to move goods to and from Milwaukee.

Notable Examples:

*Malt that we order from Briess in Chilton Wisconsin.* Not only cut down on shipping costs, but also to offset the tremendous energy wastage coupled with long distance freight. Briess is our primary malt supplier, furnishing 97% of brewing grains.



*Malted barley from Briess (a Green Tier company) in storage at the Milwaukee Ale house*

*Tanks purchased from Sprinkman* In the last decade the Craft Beer industry has been sourcing inexpensive tanks manufactured in China. Although we are paying a premium for tanks manufactured in Wisconsin, the benefits are clear. Fabricating these huge custom vessels in Wisconsin supports highly skilled local labor, and requires massively smaller carbon footprint to ship from a few hours away, versus the opposite side of the world.



*New fermentation tanks arrived from Sprinkman on August 17, 2012*

### **Rockwell Automation Partnership**

We are working with Rockwell Automation to create semi-automated brewing system in which pumps, valves, temperatures and more are controlled by a computerized program. This project will not only make the brewing process more consistent, controllable and labor efficient, but also extremely energy and resource efficient as well. Water and heat consumed will be optimized with this automated system. This system will also be connected with the Brewery monitoring system showing how much energy and resource usage is taking place on a live basis and broadcast on a screen in the Brewery. Our hope is that the new computerized system will provide a very public venue for our sustainability efforts while promoting Rockwell's innovation.