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Green Brewing: Part One

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solar panels at lucky lab brewery, portland, or
Similar to their fellow Northwest residents, most brewers would consider environmental sustainability a personal value. From purchasing ingredients to packaging and storing the finished product, brewers and brewery owners are faced with numerous decisions that significantly affect the environment. The vast majority of breweries reduce their environmental impact by doing things like recycling their spent grains to local farmers for animal feed rather than dumping them in a landfill, or by utilizing solar panels to help generate electricity. Brewery owners and operators are continuously scrutinizing their operations to see what additional steps can be taken to lessen their environmental impact.

So, why focus on reducing the brewery’s environmental impact? “I spend most of my free time snowboarding, cycling, and hiking; the devastation that man is reeking upon the planet has to stop,” stresses Christian Ettinger, owner and brewmaster of Hopworks Urban Brewery in Portland. “It’s an idealistic pursuit; knowing what we’re doing right now as a society is truly unsustainable so I’m trying to lead by example.”

Certainly, Ettinger is not alone in his perspective. Long-term players like Sierra Nevada, Full Sail, and New Belgium have already earned reputations as “green breweries,” with comprehensive sustainability programs and ongoing efforts to reduce the environmental impact of their businesses.
In less than two years, Hopworks Urban Brewery (HUB) not only garnered quick success with their award-winning organic beers, but also claimed the title of Portland’s first Eco-brewery. What particularly distinguishes this brewery from others is the emphasis on sustainability from its inception by owner and brewmaster, Christian Ettinger.

Focusing on the three Rs: reduce, reuse, and recycle, Ettinger’s first decision was to deconstruct a 1948 commercial building. Although it cost 30-40 percent more than demolition, he reused or recycled 75 percent of the materials. While framing and finishing were natural uses for the reclaimed wood, a tour through the brewery highlights their creative re-use of other materials like steel piping as bathroom fixtures and railings or old kegs as flower planters.

Every detail of HUB has been considered from a sustainability perspective: “From composting to rain barrels, and from pervious pavers to hand dryers, we made every effort to protect our future with a thoughtful alternative,” says Ettinger.

While many details are not so obvious to the public, much of the building has been made as green as possible to do its part in decreasing its carbon footprint, like re-roofing with a highly reflective and insulated membrane roof which saves on operating cooling equipment, and purchasing used brewery equipment (now on its third life). Finally, in addition to an all-organic beer line-up, the restaurant makes every effort to purchase organic food.

Ettinger acknowledges the challenges of actual sustainability practices versus green-washing, “I say speak softly and carry a big stick because anybody that digs into what we’re doing here is going to find out that we’re much more responsible (environmentally) than they ever thought.”
reduce consumption include cogeneration and preheating brewing water. The latter method is a no-brainer for most breweries since hot water is a byproduct of passing the hot wort through a heat exchange prior to fermentation. Cogeneration, the simultaneous production of electricity and thermal energy from the same fuel, is an option for some breweries depending on their location. Steamwhistle Brewing Company in Toronto uses a municipal steam line as their kettle heat source and to power their namesake steam whistle which blasts during certain times of the day.

Solar applications in breweries are also gaining momentum, even in the cloudier parts of the Northwest. From relatively straightforward solar thermal hot water systems to more advanced photovoltaic and fuel cell systems, there are a myriad of options available for breweries depending on their brewing cycle and other hot water needs, available sun, and financial/tax situation.

The Lucky Lab Brewery in Portland recently installed a solar thermal closed loop glycol system. “Brewpubs are the perfect match for solar thermal since they have consistent hot water demand for food preparation, brewing, and cleaning,” says Tim Ruch, solar contractor from Ra Energy. “And, with the available Oregon rebates and incentives, the system came in under $5,000 and pays for itself in four years.” Jonathan Cohen, a renewable energy consultant from ImagineEnergy in Portland cautions however, that solar thermal may not be a good way to go if the brewery is already provided with adequate hot water from current heat exchanger water recapture and has limited hot water needs: “Installing solar electric (photovoltaic panels) or just insulating the roof could provide more appropriate benefits.”

Sierra Nevada Brewing Co. in Chico, California made a significant commitment to solar energy with their installation of both a photovoltaic system (for electricity) and a 1.2 MW co-generation fuel cell power plant. The plant harvests both solar and waste heat and produces steam for boiling the wort, and electricity and heat for the brewery. Today, the complete solar system provides the majority of the brewery’s electrical needs and any surplus is sold to the California power grid.

Depending on the brewery’s location, size, and functions, additional energy may be required to heat, light, or cool the facility itself. Smaller breweries often choose not to heat the brewery since surplus heat is generated by the brewing equipment and fermenting tanks. New Belgium designed their brew house to incorporate natural lighting from windows and solar tubes. Where lighting is required, motion sensors eliminate unnecessary use.
Gas Recovery

For brewers turning over every stone in an attempt to reduce their carbon footprint, on-site gas production and recovery not only offer energy saving opportunities, but reduce dependency on outside deliveries. The most commonly used gases are Carbon Dioxide (CO2) and Nitrogen (N). CO2 is naturally generated during the brewing process, but most breweries make no attempt to capture it and instead purchase tanks of CO2 to carbonate, bottle, keg, or push beer into the pub. Brewpubs with “long draw systems” (significant distances between the serving tank and pub taps) require a mix of N and CO2 to prevent over-carbonation of the beer. The carbon footprint issues from gas canister purchasing come from two sources: the production and packaging of gas in canisters and the transportation issues surrounding gas canister delivery.

Alaskan Brewing Company in Juneau was one of the first breweries in the U.S. to install a CO2 reclamation system in 1998. The system captures the greenhouse gases produced during fermentation and distributes it for use in other areas of production. Not only does the CO2 reclamation system save time, money, and fossil fuels from having to ship the gas from Seattle to Juneau, but it ensures that Alaskan won’t have to purchase the gas from other fossil fuel-based sources. According to Alaskan, “This system saves approximately 800,000 pounds of CO2 from being released into the atmosphere each year.”

In addition to CO2 recovery systems, Green Air Supply in Tacoma, Washington offers a nitrogen generator system which serves the dual purpose of extracting Nitrogen from the air through pressure swing absorption and then mixing it with CO2 at a predefined ratio for each brewpub application. Owner Tom Hoare admits, “It’s hard to quantify all the energy savings, but the systems can be leased and end up saving tank deliveries, money, and time; plus, you waste a lot less beer by avoiding over-carbonation issues and pouring with an appropriate gas mix.” A number of Northwest brewpubs now use this system including Pike Brewing and Issaquah Brewhouse in Washington.

The Learning Curve

Northwest breweries typically benefit from watching sustainability leaders. As a relatively cooperative industry, breweries that have installed cutting-edge renewable systems or have gone through the process of purchasing sustainable supplies, offer candid stories and valuable information for others. Both Ra Energy and ImaginEnergy representatives stressed that their renewable energy companies share the same goals and values as breweries. Because of this shared vision, the brewing industry is well positioned to lead in sustainability practices and influence the rest of the food and beverage industry.

Mellie Pullman, a PSU professor and former brewer, spends her spare time recreating in Enterprise, Oregon where she can easily bike to Terminal Gravity from her cabin.