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Green Brewing: Part Two

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greenbrewing

part two

by Mellie Pullman
photos by Annalou Vincent

What's all the hype about being “green?”

Being green is all around us, a common catch phrase that has taken on a myriad of meanings. Are you green if you recycle, buy ingredients from local farmers, and use organic malts in your beer? Yes, yes, and yes. But, for many craft breweries it means far more than that.

In part one of our Green Brewing series, we started our journey down the rabbit-hole of beer production and the environment with a discussion about energy use and gas recovery. We took a glimpse into specific breweries in the region and studied how they address their energy demand and how they control their carbon dioxide and nitrogen release, depending on size, location, and other factors.

Continuing in part two, we follow the theme of sustainability by examining the “greenness” of commonly used brewing ingredients, containers, and ancillary packaging in the beer supply chain. We look at how brewing companies at the forefront of sustainability initiatives are pushing the envelope to reduce the damaging effects of commodity-based agricultural practices and waste of natural resources.

Water Use Beer is nearly 90 percent water, making simple H₂O arguably the most important ingredient. However, it is also usually the most wasted. Inefficient operations consume as much as 20 gallons of water for each gallon of beer produced, so the race is on to become the brewery with the least amount of water waste. New Belgium comes in at 3.9 gallons and Full Sail at 3.45 gallons of waste-water for each gallon of beer produced. These breweries are able to increase their efficiency and reduce waste by reusing sanitation water for bottle and truck washing and heat exchangers. They have also redesigned systems to use less water for functions like

bottle and keg washing by employing low emission sprayers. Xeriscaping, a type of outdoor landscaping that reduces the need for supplemental irrigation, also helps reduce water usage.

Reducing wastewater doesn't just keep the Greenies at bay. The financial benefits of avoiding fees most municipalities charge for brewing waste water appeal to fiscally savvy business owners as well. Large craft breweries like Sierra Nevada, New Belgium, and Full Sail have invested in systems designed to remove organic content through separation and composting, or aerobic treatment. Methane produced by anaerobic digestion also powers the boilers at Sierra Nevada and New Belgium.

Waste and Packaging The by-products of brewing (spent grain, hops, and yeast) typically find their way to the feeding troughs of dairy and beef cows. Worst case scenario, brewers pay farmers to pick up these products, but in many cases, like the organic dairies that purchase Hopworks Urban Brewery's organic spent grains, the farmer actually pays the brewer for the product. Also, most brewpubs use vegetable oil in their restaurant fryers. Sierra Nevada's Taproom and Hopworks' brewpub give the grease a second life as biodiesel for delivery vans or as fuel to heat brew kettles.

In 2008, Alaskan Brewing Company went even further than re-purposing their spent grain and actually figured out a way to increase the mash efficiency of their grain.

They became the first U.S. brewery to pioneer the use of a mash filter press. In addition to using one million less gallons of water a year to brew the same amount of beer, the filter also reduces grain usage by six percent. “The unique design of the mash filter press reduces the moisture content in the spent grains, which further reduces the energy required to dry the spent grain... and results in a savings of 65,000 gallons of diesel fuel each year,” says Alaskan.

The Really Big Wasters, however, are packaging materials like paper, cardboard, glass, stretch wrap, plastic strapping, construction materials, pallets, and hop burlap. In order to minimize the impact of packaging waste on the environment, many of the leading green breweries are taking steps to measure and monitor recycling or re-purposing rates for these products.

Glass and cardboard make up the bulk of recycled materials for a typical brewery. The main packaging-reduction focus of the greenest brewers includes purchasing recycled paper and cardboard or glass with high recycled content. Most breweries

feel saddled by the demand for one-way containers (bottles you can't practically refill the way you can a growler) and even the greenest-hearted breweries feel that shifting to a returnable bottle is beyond their abilities due to the need for far-reaching distribution. Luckily for breweries in the Northwest, Portland's Owens-Illinois glass plant has high recycled glass content (about 50 percent compared to 10 percent content in other non-bottle deposit plant locations). Out-of-region-sustainability focused breweries like New Belgium purchase their 22-ounce bottles from Portland for higher recycled content, though they do incur higher transportation costs.

Ingredients Operations aside, any brewer who's serious about sustainability will take into account the upstream impact of ingredients and supplies. A life cycle analysis of brewpubs conducted

by Green Seal (a national environmental certification organization) concluded that food purchasing represents the single largest source of environmental impact for food service operations, but few broad and credible life cycle analyses have been attempted for beer. New Belgium Brewing Company, however, has made an effort by working with the Climate Conservancy to calculate the carbon footprint of a six-pack of Fat Tire Amber Ale. Production of barley was found to be the third largest source of greenhouse gas emissions (12.6%), after production of glass (21.6%) and downstream impacts at the retail level (28.1%).

Beyond climate, other sustainability concerns associated with agriculture include safe working conditions and fair labor practice, conservation of soil and water resources, protection of wildlife habitat, nutrient management (to prevent fertilizers from contaminating surface and ground water), and pest management (to limit the use and negative impact of

Sourcing direct-seed barley would reduce associated greenhouse gas emissions by over 80%



The Rogue hop farm on the Willamette River, Oregon.

FullSailBrewery

Currently the 9th largest craft brewery in the U.S., Full Sail Brewing Company has not only won multiple awards for their stable of beers, but have been recognized with a wide array of sustainability-related awards. From “Best Green Companies to Work for” to Oregon “BEST” Practices for Sustainability, Full Sail's reputation for environmentally sound policy is well-known in the beer industry.

Perched on the edge of the Columbia River Gorge in Hood River, this employee-owned company attracts workers who are socially and environmentally conscious. In addition to base-line sustainability practices (i.e., purchasing wind power, reducing water use, sending spent grains and yeast to dairy cows, and using 100 percent recycled cardboard packaging), Full Sail has also addressed issues related to employees and transportation.

By shifting to four 10-hour work shifts, the brewery reduces power and water consumption by 20 percent. They also combine delivery schedules of support materials with incoming and outgoing beer deliveries to reduce shipping by 25 percent. Full Sail invests in the latest energy-saving technologies wherever possible, from new lighting in the plant, to highly efficient air compressors, glycol chillers, and hot water recovery systems. And, Full Sail currently leads the craft brewery pack with the smallest amount of water used per gallon of beer (3.45 gallons). With this green reputation, Jamie Emmerson, Full Sail's brewmaster, also wants to steer clear of greenwashing (which means to paint a misleading picture of environmental sustainability practices), “It's more like walking the walk” and “doing the right thing when nobody's looking.”



Jamie Emmerson

photo provided by New Belgium (right page).



insecticides, herbicides, and fungicides which pose threats to human health and the environment).

Nearly all commercially-used hops in the U.S. are grown in the Northwest (about 30,600 acres in Washington, 6,400 acres in Oregon, and 3,900 in Idaho). Hops are susceptible to a variety of insect pests, mildew, and diseases, making them difficult to grow organically. Even organic hops may be treated with compounds containing sulfur, copper, and other ingredients that pose threats to the health of both humans and the environment. Recently, organic hops have been in short supply, often carrying a hefty price tag, and are not currently required in production of certified organic beers. An alternative, if the hops in question can be traced back to the farm that produced them, is to ask whether the grower is using innovative strategies to reduce pesticide risks such as those identified by the Integrated Plant Protection Center at Oregon State University.

The Northwest is also a major producer of barley (with about 900,000 acres in Montana, 570,000 acres in Idaho, and 235,000 acres in Washington). While a variety of pesticides may be used by conventional barley growers, the major environmental concerns arise from tillage (plowing) and use of soil amendments such as nitrogen. Organic growers, banned from using synthetic herbicides, often rely on tillage for weed control. Unfortunately, the disturbance resulting from tillage leads to the release of nitrogen and carbon from the soil. Tillage also leaves soil vulnerable to wind and water erosion—a particular concern in the hilly Palouse region of the inland Northwest.

An alternative, more sustainable barley growing strategy is a relatively new system called “direct-seed” or “no-till” farming, in which farmers use a drill to plant seeds and to inject a small amount of fertilizer into the stubble left from the previous crop. No-till farming has been estimated to reduce soil erosion by 90 percent, reducing sedimentation and chemical runoff to streams. The undisturbed soil is reported to hold up to 25 percent more water, and, as organic matter in the soil increases, it actually sequesters carbon from the atmosphere, ameliorating climate change. The New Belgium study estimated that sourcing direct-seed barley would reduce associated greenhouse gas emissions by over 80 percent—even without accounting for additional carbon sequestration. Direct-seed farmers may use some herbicides to control weeds, but more experienced farmers are finding they can drastically reduce or even eliminate the use of herbicides using crop rotations and other measures.

The level of production and the high quality of hops and barley from the Northwest make a strong argument for regional sourcing. Rogue Brewing has taken steps to localize its supply chain by raising its own Willamette, Perle, Sterling, Horizon and Centennial hops through a partnership with the 250 acre Alluvial Hops Farm. Rogue has also contracted 225 acres of barley with two local farmers from which it expects a yield of nearly 500,000 pounds.

There are also some interesting new ingredient possibilities in

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the works. Christian Krogstad, co-owner of House Spirits Distillery (makers of Aviation Gin and Medoyeff Vodka), is building a custom micro-malting facility in partnership with Zach Christiansen of Christiansen Farms near McMinnville. The first crop of barley has been harvested and they expect malt to be available to local microbreweries in 2010.

Shepherd's Grain, a group of 33 farmers based in eastern Washington, is also working on developing specialty malt products from direct-seed barley for Northwest brewers. Shepherd's Grain is already well-known for their wheat flour, which is featured in pizza dough at Hopworks Brewery, and also used by regional baked-goods-hotspots like Grand Central Baking and St. Honoré Boulangerie.

In order to truly be considered sustainable, the restaurants that most often associate with local breweries also have to consider healthy and humane treatment of farm animals, and source dairy and meat products raised without the use of hormone or antibiotic treatments. Both Zach Christiansen and the farmers of Shepherd's Grain are certified by Food Alliance (a national non-profit company that certifies production, processing, and distribution of sustainable food) for using socially and environmentally responsible agricultural practices. A wide variety of Food Alliance certified products, including Oregon Country Beef, Wilcox Farm eggs, Rogue Creamery cheeses, dried and canned beans, mushrooms, frozen berries, and fresh fruits and vegetables, are being utilized by area brewpubs like McMenamins and Hopworks.

Next Steps In a perfect world, every neighborhood would have their own brewery, and people drinking draft beer or purchasing small kegs or growlers to-go would eliminate packaging waste in the same way that carrying our own stylish reuseable totes to the grocery store is freeing space under our kitchen sinks. While some cities in the Northwest seem to be diligently pursuing this utopian ideal, bottled beer is still a major revenue generator for breweries and is often considered a necessity for economic sustainability, let alone the facilitation of a really good camping trip. Shifting from disposable or recyclable bottles back to the bygone days of returnables will require a major shift in paradigm for the entire beverage industry. Serious "green" beer drinkers might consider ways to avoid purchasing bottled products in lieu of returnable containers. This path not only reduces waste but also supports your local brewery and creates a much smaller transportation footprint (not to mention the fact that the need for a trip to the brewpub is a reason to pull yourself away from Facebook).

The more beer consumers and brewers insist on sustainable ingredients, the more their purchasing power can be used to create a lasting positive impact on the entire beer industry. Demand for sustainable and organic ingredients also creates opportunities for small and medium-sized local farms to thrive in a corporate-driven economic environment. Additionally, brewers who purchase ingredients from these fledgling enterprises will be able to differentiate themselves from others who continue to purchase from a limited number of non-organic malted grain and hops providers.

Despite the speed-bumps in the road to reducing their carbon footprints, more and more breweries are ramping up their efforts to provide sustainable and ecologically responsible products.

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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.

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