

Please Enjoy Sustainably:
New Ideas for Olde Saratoga Brewing Co.

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Abstract

The brewing of beer is an extremely resource-intensive process. Between importation of ingredients, the many phases of the brewing process, and distribution of the final product, the brewing industry demands significant energy and resource input. As the craft brewing industry swells, many craft brewers across the nation are attempting to mitigate their environmental impact. This paper investigates current sustainability practices and efficiency measures in craft breweries large and small, and uses the findings to inform an action research plan for Olde Saratoga Brewing Company. We inform Olde Saratoga of existing environmental initiatives and recommend feasible strategies for them to reduce energy and resource use. Our suggestions

INTRODUCTION

Purpose Statement

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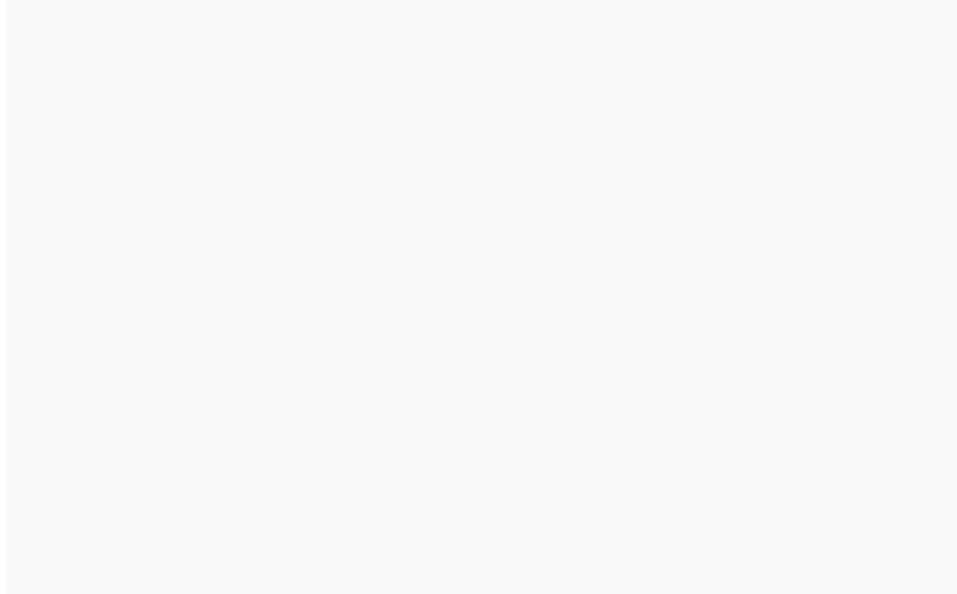


Table 1. Uses and sources of electricity in the brewing sector (Olajire, 2012)

On top of the energy inputs that occur to produce the beer, acquiring ingredients often requires importation of goods from around the world. Grains and hops have become very specialized with the growth of the craft brewing movement, and different regions offer distinct flavor elements to the craft brewer.

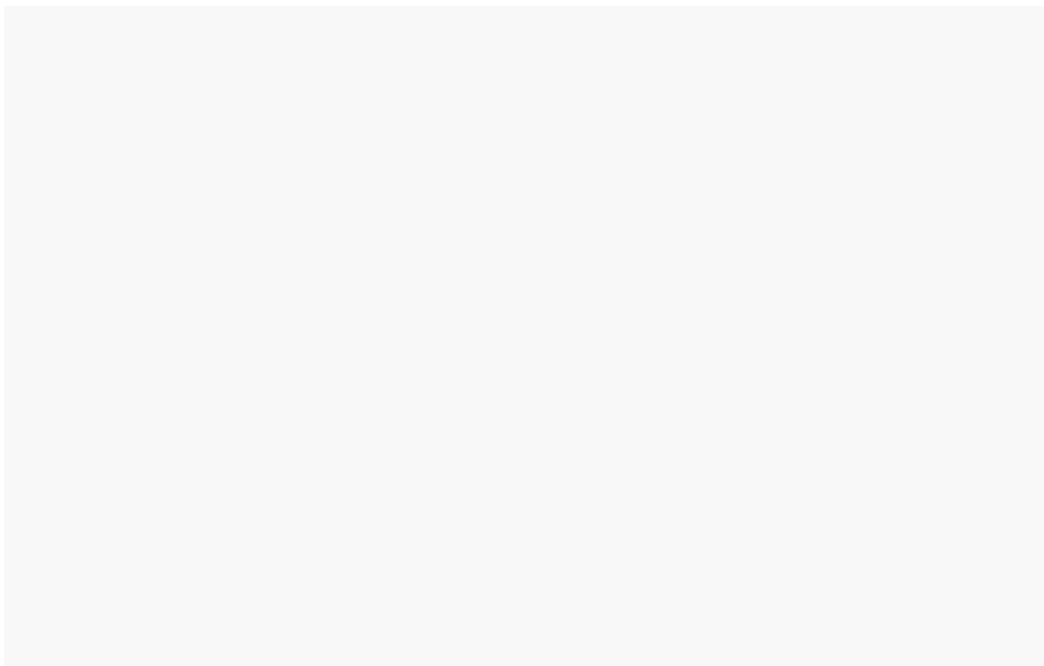


Figure 3. Major trends in the greater brewing industry.

announced a 133% rise in amount of microbreweries in the state, from 40 in 2011 to 93 in 2014 (Office of Governor Andrew M. Cuomo, 2014).

Sustainability in Craft Brewing

Thermal regulation, waste and effluent generation, and distribution methods have been labeled as key categories to be assessed in the ecological overhaul of a brewery (Olajire, 2012). Olajire (2012) portrays the multifaceted environmental concerns of breweries and applies

consciousness grows and sustainability becomes an essential component of craft brewing business models (Kleban and Nickerson, 2011).

METHODS

The purpose of this study was to perform case studies informing sustainability 0.2 (i) S(orm2s) -0.2(si)

To learn about the environmental movement within craft breweries nationwide, we conducted extensive research of existing literature on the topic and obtained archival data from the websites of organizations

between breweries. We also grouped efforts of local breweries into different subsets of sustainable practices. Analysis was conducted to determine the most widespread sustainability initiatives in the breweries we analyzed. The purpose of this was to help us better understand the practices of the general movement and assess the practices of local breweries in a broader context. Survey data was placed into a separate Excel spreadsheet for statistical analysis.

Survey responses show that consumers are most enthusiastic about purchasing craft beer from a local brewery, and/or a brewery that uses local ingredients. A brewery's commitment to sustainable pract

Energy efficiency is a large topic in existing literature pertaining to the environmental challenges of the brewing industry. With so many phases in the brewing process, different pieces of equipment, and such a large energy demand, there are countless measures that can be taken to address the efficiency of the different elements of the process. Refrigeration, cooling, and motor systems are central targets for electrical efficiency. Olajire (2012) and Galitsky, et al. (2003) review many different methods for optimizing equipment efficiency.

Many breweries identify distribution as the greatest energy cost in the production and sale of beer. Sierra Nevada has their own distribution fleet that is partially fueled by their restaurants used vegetable oil, and they are developing a second location in Asheville, North Carolina to avoid coast-to-coast distribution (Sierra Nevada, 2012). Uinta runs their one distribution vehicle on biodiesel, and have started canning as opposed to bottling which enables them to carry 50% more product per shipment and cut CO₂ emissions. They can carry 2000 cases of cans as opposed to 1300 cases of bottles (S. Kufinec, personal communication, March 3, 2014). Brewery Ommegang transports their product across the country via railroad and hope

Belgium is installing water sub-meters so that they will be able to identify areas of waste in the production process, and has set specific goals for water reduction (New Belgium, 2013).

Many of the breweries we spoke with were interested in CO₂ reclamation. With no way to capture it, they are forced to release it and purchase packaged CO₂. Paradox, the smallest brewing operation we interviewed, invests \$600 - \$700 monthly in CO₂, with an annual production of only 2500 barrels (P. Mrocka, personal communication, March 2, 2014). Steve Kuflinec from Uinta reported that the technology to capture, scrub, and reuse CO₂ is only affordable for annual production near 300,000 barrels (Personal communication, March 3, 2014).

Craft Brew Alliance and Sierra Nevada received incentives and rebates from their utility

and the first certified non-GMO brewery. Early on, the organic label was detrimental. People thought it would taste like dirt, but with certain demographics it has proven successful (C. Theisen, personal communication, April 1, 2014).

NYS Hop Farmers

Given the consumers' value for local ingredients, we investigated the availability of New York grown hops, speaking with Laura Ten Eyck and Steve Miller. Laura and her husband Dietrich Gehring grow hops on their family's Indian Ladder Farms. Laura is also conducting research in hopes of publishing a book on growing hops in the northeast. Steve Miller is the New York Hop Industry Specialist on the staff of the Madison County Cornell Cooperative Extension.

Funding his position through grants and Ommegang's contributions, Steve Miller works closely with growers across the state. With a close eye on all corners of the hops industry in New York, Steve has a very optimistic perspective. He cites the booming craft beer movement as the catalyst for the resurgence of state-grown hops. Ten years ago, there were roughly 30 breweries in the state. Now there are over 140. Five years ago, there were only a handful of hop growers in New York, and now there are well over a hundred. At least 60 breweries are buying hops from local growers, and at least 60 hop farms are selling to local breweries. Steve attributes some of the growth to the Farm Brewery legislation, which requires licensed farm brewers to purchase a certain percentage of their ingredients from New York growers. Furthermore, there are now many more farmers planting barley, six new malt houses, three new companies with

There is not much documented information on hop production available. Farms have been operating for a hundred years in the Northwest, and the specifics of the trade are deeply ingrained in these farmers and not easily accessible. The success of hop strains differ according to their location, and research is still being conducted for New York specific strain results. Pest solutions are regionally specific, so existent literature on the topic is hard to apply to the Northeast. To combat the lack of information, the Northeast Hops Alliance offers integrated pest management, plant disease control, variety trials, and also provides a network to communicate issues and solutions for Northeast hops farmers (S. Miller, personal communication, March 26, 2014; L. Ten Eyck, personal communication, March 24, 2014).

Hop farms in the Northwest are 300-400 acres, while only half of New York hop farms exceed one acre. The big farms of the Northwest sell their product through merchants and brokers, while New York growers are in direct communication with breweries, which have very specific demands. Many large processing companies exist in the Northwest, and they also have advanced machinery that allow large-scale production. Hop pricing is affected by economies of scale, and the Northwest is able to produce hops for much cheaper (S. Miller, personal communication, March 26, 2014; L. Ten Eyck, personal communication, March 24, 2014).

New York hops are inevitably more expensive, but price isn't everything. Steve discussed some of New York's strengths, "I think the advantage that we have is that we've got over 130 breweries in this state and many of them are buying local hops, and one of the other things is because we are processing on a smaller scale, I think there's the possibility of growers being able to process better quality once we get everybody knowing what they're doing. . . . On a much smaller scale, I think you can keep an eye on the individual batches of hops better," (personal communication, March 26, 2014). He also told us, "It means something to consumers to know that those hops were grown five miles down the road," which coincides with our survey results (Tables 3 and 4) (S. Miller, personal communication, March 26, 2014). Laura identified another interesting point, stating that "some of the West Coast brewers are interested in what's going on in New York, because the New York hops can be the same variety of hop, but the variety in New York has different properties." New York varieties can have higher beta acids, which mean they provide more aroma (L. Ten Eyck, personal communication, March 24, 2014).

for any project will require approval from Mendocino (M. Oswald, personal communication, March 5, 2014).

Olde Saratoga is in a transitional period under the guidance of the newly appointed General Manager Max Oswald, previously the regional sales manager. Before Max's leadership, sustainability was not discussed, and efficiency was a topic unfortunately neglected. Max has been quick to assess the pillars of successful operation: safety, quality, and efficiency. Not overlooking the first two pillars, Max is excited to address efficiency throughout the brewery. He has communicated his goals and expectations with the entire staff, instigating fundamental change in the way the team operates. He's holding them to higher standards of accountability and is promoting pride, care, and efficiency. His passionate vision for reconditioning the operation of the brewery includes "utilizing machinery at its minimum energy-wise," (M. Oswald, personal communication, March 5, 2014).

Max understands that change starts with small steps. In addition to reforming the

factors. Enhanced efficiency will proportionally reduce energy consumption and utility fees, and even minor percentages of savings will accumulate over time.

Zero-Cost Strategies

The first step to improving efficiency is having a way of measuring it. Compile and track utility bills. Set reduction goals, and record progress. Compare utilities to previous monthly averages and set reduction goals. Share the results in the office, and celebrate successes. Savings can be difficult to predict, but they will be reflected in utility bills. Contact the wastewater treatment plant and inquire about ways to save on sewer bills. Retaining wastewater to reduce biochemical oxygen demand (BOD) might facilitate treatment and reduce charges.

Continue to promote energy savings through shutting off fixtures not in use and minimize unnecessary energy expenditures. This applies to everything: lights, equipment, hoses, forklifts, thermostats, refrigerators, etc. Energy saved is money saved, and it adds up.

Spend some time with the Brewers Association Sustainability Tools. They offer a comprehensive approach to sustainability in the brewery and specific information for different sectors. They include best practices and technical savings strategies that are beyond the scope of this project, with the added benefit of experience in the brewing industry. Reach out to other breweries, and see what they're doing to address sustainability. Staff education regarding energy conservation is equally important to promote pride in the brewery and instill a sense of environmental ethic.

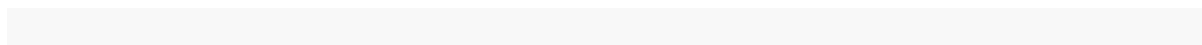
Refrigeration accounts for 30-40% of energy use (Galitsky, et al., 2003). Make sure doors are being shut, and check door seals. Only refrigerate to necessary temperatures, raising refrigeration temperature will greatly reduce energy needs. Three millimeters of scale on condensers can increase energy demand by 30% (Galitsky, et al., 2003). Clean evaporator and condenser coils, and maintain proper airflow to evaporators. Because refrigeration draws massive amounts of electricity, any improvements in refrigeration efficiency will entail proportionally sizeable reductions in energy expenditures. Drawing outdoor air during the winter can cut refrigeration costs drastically.

Assess the programmed result of the pasteurization process. Check current beer-out temperatures and consider whether they are unnecessarily low. Consider not pasteurizing kegs for taproom. Consider offering unpasteurized kegs or more casques for local distribution.

One case study showed annual savings.2 (e) 0;8.56 cm B. Cons onsonshe ons(667.68c ond c) 0.2 (ons)

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APPENDIX B: Interviews conducted

Person	Position	Company	Type
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