



Brewery Case Study



Reducing CO₂ Usage at Kent Falls Brewing Company

Connecticut has over 100 operating breweries. The growth in this industry is a welcome addition to CT's economy. The brewing process however comes with potential environmental impacts. This case study focuses on one specific issue, the use of carbon dioxide (CO₂). While CO₂ is essential for manufacturing beer and is used throughout the brewery, it is a source of pollution and health and safety concerns. This study looks at CO₂ used for purging oxygen from tanks. It is an example of how implementing best management practices can help reduce the amount of CO₂ used for this activity, save time and lower business costs.

The Issue

In the brewing industry, how long a tank is purged is often done by estimation; this results in waste from using more CO₂ than needed and costs money.

The Challenge

CO₂ is essential for producing and serving beer. It is used in a variety of brewery and taproom operations, including carbonating beer, purging oxygen from tanks, lines, cans, kegs and bottles, pressurizing tanks and kegs, and dispensing beer in draft systems.

Greenhouse gas emissions (GHG) are released from its use, overuse, system leaks and sourcing. It is a byproduct of industrial

processes, such as ethanol fermentation, ammonia production, fertilizer manufacturing and natural gas processing plants. Connecticut breweries rely on regional suppliers for CO₂, who obtain it from facilities in the Midwest, southern states like Louisiana and

The Brewery



Kent Falls Brewing Company, a local craft brewery located in Kent, CT.

Texas, and the West. Long-distance trucking with diesel-powered vehicles contributes to air pollution. CO₂ is stored in high-pressure cylinders that could explode or cause physical injury; health and safety precautions must be taken. It is also heavier than air and can build up within a brewery, leading to unsafe working conditions.

In recent years, breweries have encountered difficulties with purchasing CO₂. A CO₂ shortage has led to increased costs, price volatility and supply uncertainties, impacting production.

Brite tanks (also known as conditioning or packaging tanks) are the primary vessels that are flushed with CO₂. Oxygen must be removed from the brite tank to prevent oxidation, which drastically reduces the shelf-life of beer. Brite tanks are purged to remove oxygen after sanitizing and before filling with beer for packaging. The key is knowing when the oxygen is sufficiently removed. For smaller breweries with fewer resources, the amount of CO₂ needed and how long a tank needs to be purged is often done by estimation and guesswork; this is inefficient and results in waste from using more CO₂ than needed. It also costs time and money.

Technology is available to help optimize CO₂ usage. Breweries can invest in sensors, monitoring, and control systems to identify oxygen levels and provide real time information to eliminate the guesswork.

Kent Falls Brewing Company's best practice was to purge brite tanks of oxygen by running CO₂ at low pounds per square inch (psi) overnight, slowly bleeding oxygen out of the tank. They wanted a more accurate way of determining how much oxygen was left in the tank and to maximize time efficiency and minimize CO₂ usage.

The Brewery

Kent Falls Brewing Company is a small craft brewery that produces approximately 2000 barrels of beer a year (bbl). They began operations in 2015 as the first farm brewery in Connecticut. Beer is canned and bottled on-site for distribution and available on tap in their tasting room.

Environmental sustainability guides every element of Kent Falls Brewing, from sourcing local grains and hops to using solar energy to power brewery equipment. They've earned recognition as an environmental leader through the [BetterBev](#) program and continue to look for opportunities to further reduce pollution. Reducing CO₂ is their latest action to brew more sustainably, reduce GHG emissions and save money. They have documented the results of this project to share with other breweries so they too can reduce CO₂ usage.

Actions Taken

The brewery identified a vendor that provides equipment to manage CO₂ usage. They chose the BrewOps Purge, a smart sensor that monitors oxygen levels. This equipment

fit their needs and budget and was seamlessly integrated into their cellaring process while purging the tank.

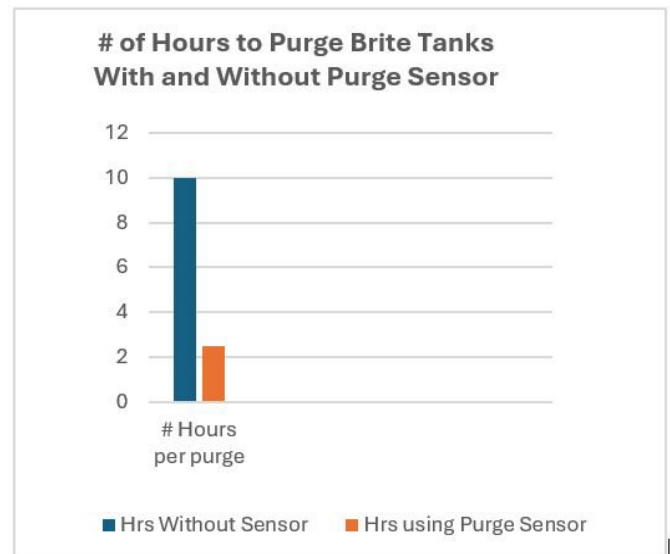
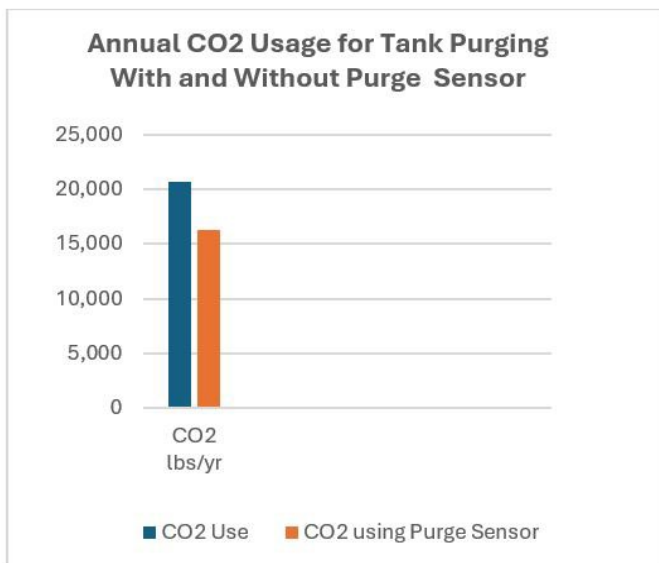
Utilizing the wireless, in-line BrewOps Purge allows them to watch oxygen levels in the tank drop in real-time, get notified when the tank achieves the targeted level, and end the purge without continuing to waste CO₂. They can precisely monitor CO₂ and avoid over-purging. Spunding valves were also utilized to capture CO₂ during fermentation so less additional CO₂ is needed for carbonation. They invested approximately \$5,000 in a Brew Ops Purge, a BrewOps Rinse and spunding valves. There is also a monthly software fee to access the BrewOps user portal.

Results / Conclusions

The project was a success! Investing in reasonably priced sensor equipment helped the brewery reduce CO₂ usage, save time and money.

Kent Falls Brewing company estimated monthly usage of CO₂ to be approximately 10.35 pounds per bbl before beginning the project. They saw immediate results upon installing the purge sensor and were able to reduce monthly CO₂ usage to approximately 8.16 pounds per bbl.

- Annual reduction of CO₂ for 2000 bbl brewery: 4,320 lbs
- Annual cost savings: \$1,400.00
- Reduction in purge time: 5.5 – 7.5 hours per tank



Regarding the results of the BrewOps purge, the brewery owner summed it up by stating, “We anticipated a reduction in CO₂ usage, but did not anticipate how much time we could also save by adding this equipment. This was a positive result. The CO₂

purge sensor gave us hard data to understand how to purge our tanks of oxygen using the least amount of CO₂ and in a significantly shorter amount of time. Our previous process was a slow purge lasting 8-10 hours overnight. With the sensor, we reduced our purge times to approximately 2.5 hours and achieved a known result.”

The spunding valves also proved to be beneficial. They regulate and maintain consistent pressure inside a fermenter by venting excess CO₂, allowing natural carbonation to build up. This improves fermentation control, reduces CO₂ costs, and increases safety by preventing overpressure.

Next Steps

Kent Falls Brewing Company, an environmental leader in the industry, believes in continuous improvement. Their long-term goal is to install a system to recapture and reuse CO₂ produced through fermentations and eliminate the need to purchase CO₂. The purge sensor and spunding valves enabled them to reduce the total amount of CO₂ needed for production, making this long-term goal more feasible.

[For More Information, visit CT DEEP's Sustainable Breweries \(ct.gov\) webpage.](#)

Find out more about the [BetterBev program](#)

Disclaimer:

Vendors, products, and services listed in this case study are provided as a source of information and are neither approved nor endorsed by CT DEEP. You should fully investigate any vendor performance claims before investing in such product or service.

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