Allagash CO2 Recovery

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Problem Statement

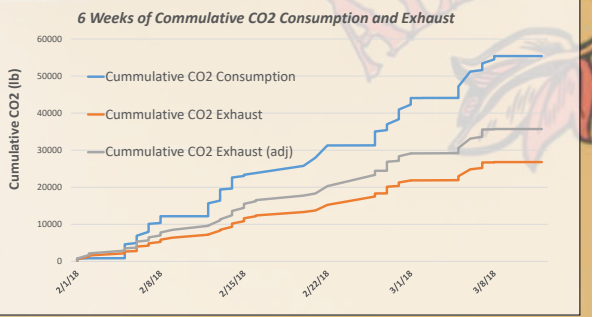
Allagash produces CO2 during the beer fermentation process and would like to reduce these emissions to zero.

Importance to Allagash

Allagash is committed to environmental and social responsibility in its local community. Reducing CO2 emissions supports their overall goals of reducing waste and using less resources. Allagash currently purchases approximately 300 tonnes of CO2 per year mainly for beer carbonation, from an ethanol plant in western New York. CO2 recovery has been implemented at large scale breweries and the technology is now being introduced into the craft brewery space. Our analysis will help Allagash better understand feasible pathways for CO2 recovery from the fermentation process to be used for carbonation.

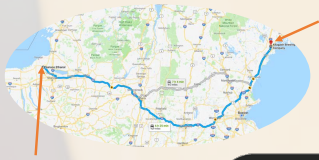
How Allagash Produces and Consumes CO2

Most CO2 is generated through the beer fermentation process. A central exhaust line connects 75% of the fermentation tanks, allowing that volume of CO2 to be recovered. Based on the current production, Allagash consumes CO2 at a rate double that of the exhaust. Even if they connected the rest of the fermentation tanks to the exhaust line, it would still only cover ~65% of the total CO2 consumption. A majority of this consumption is from the beer carbonation process which results in the CO2 being released into the atmosphere when the keg/bottle/can is opened.



Challenges

- Financial analysis showed a negative NPV for quotes provided by two recovery system suppliers
- Financial challenges can be overcome if CO2 produced meets approximately 85% of the CO2 consumption requirement
- A case study of Maui Brewing Company indicated positive financial results when the CO2 purchase cost is higher
- In terms of impact, CO2 recovery will reduce only the CO2 emissions due to transportation of purchased CO2



Allagash Brewery

428 miles per trip
21 two-ways trips per year
6.4 miles per gallon
10.16 kg CO2e per gallon

Ethanol Plant in NY which Produces CO2 as a by-product

CO2 Offset Alternatives and Lifecycle Assessment

Window Dressers
INSULATING WINDOW INSERTS

~ 10 windows per house

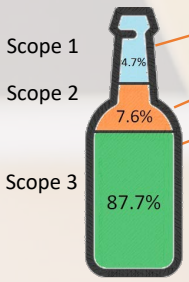
5 to 10 years of duration for an insert

Fuel for heating reduction of 150 gallons/year

Energy bill savings of $270/year

Average cost for a window between $20-$45

Investment in window inserts creates between $277 and $317 of value per year



- Natural Gas 7.86 Tonnes CO2e per year
- Fugitive 525.71 Tonnes CO2e per year
- *Vehicle Fleet 165.96 Tonnes CO2e per year**
- *Electricity 1,131.57 Tonnes CO2e per year**
- *Corporate Transportation 45.26 Tonnes CO2e per year**
- CO2 Purchases 301.36 Tonnes CO2e per year
- Customer Use 29.34 Tonnes CO2e per year
- *Malt 875.08 Tonnes CO2e per year**
- *Retail 1,101.39 Tonnes CO2e per year**
- *Distribution 1,885.95 Tonnes CO2e per year**
- *Barley 2,549.80 Tonnes CO2e per year**
- *Glass 6,291.52 Tonnes CO2e per year**

* Estimates based on the LCA done by New Belgium Brewery. Source: New Belgium Brewery 2017 Sustainability Report

Recommendations & Future Analysis

Immediate: Focus on CO2 offsets. Develop strategy to close CO2 production/consumption gap. Open negotiation dialogue with CO2 recovery system suppliers.

Intermediate: Improve production processes to reduce CO2 consumption. Small capital projects that will increase CO2 recovery.

Long-Term: Install CO2 recovery system. Explore business opportunities to sell excess CO2 to other local breweries.

Future Analysis:

- Complete exhaust vs. consumption analysis following any major production, forecast or capital improvement changes
- CO2 recovery becomes financially feasible based on current analysis if it can cover 85% of CO2 consumption with exhaust from fermentation
- Continuous monitoring assists with assessing the impact of potential offsets on net CO2 emissions