

# Be The Change

## Sustainability in Practice



**Luke Truman** (NE Environmental Finance Center):  
Moderator

**Kathy Black** (NHDES Sustainable Craft Beverage):  
New England Technical Assistance

**Matthew Steinberg** (Exhibit A Brewing):  
Northeast Grainshed Alliance

**Joel Mahaffey** (Foundation Brewing):  
Using Nitrogen and Cutting Back on CO2

**Ben Chambers** (Newport Craft):  
“Greening Up” Your Taproom



# Who Are We?



## CONNECTICUT

Connie Mendolia

## MAINE

Luke Truman, Martha Sheils & Peter Cooke

## MASSACHUSETTS

Rob Vandenabeele & Dr. Vesela Veleva

## NEW HAMPSHIRE

Kathy Black

## RHODE ISLAND

Michele McCaughey & Andy Bray

## EPA REGION 1

Rob Guillemain



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# Why Should You Care?



**We can help you to ...**

- **Improve sustainability**
- **Increase profitability**
- **Empower employees**
- **Protect supply chain**
- **Create safer work environment**
- **Enhance your image**

**For FREE!**

# Technical Assistance: Helping You Row Your Boat

- Energy Efficiency
- Water Conservation
- Reduce Air Pollution
- Use Less Toxic Chemicals
- Waste Reduction
- Wastewater Management
- Benchmarking
- Case Studies & More





# Coming Soon! Regional Recognition Program



## Throwback Brewery

Right from their start in 2011, sustainability has been a core value of Throwback Brewery in North Hampton, New Hampshire. This woman-owned brewery, restaurant and farm is the first brewery to be recognized in the New Hampshire Sustainable Craft Beverage Recognition Program for its strong sustainability initiatives. From implementing sustainable water and energy management practices to installing a 48-kw grid-tied solar array, the Throwback owners have taken on some big projects. But they have also prioritized less glamorous but equally important projects, such as upgrading the refrigeration systems, side streaming spent grains and brewery wastewater, and composting. Because of this work, Throwback Brewery is being recognized by the New Hampshire Sustainable Craft Beverage Program.

## Appolo Vineyards

This veteran owned business, established in



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# For Assistance Contact

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# Be The Change...



**Exhibit 'A'**  
Brewing Company



**60**  
**Square Feet**  
**of local**  
**farmland**

At Exhibit 'A' Brewing, we have calculated that on average, for every case of our beer you purchase, you are participating in supporting 60 square feet of local grain farmland. Now that's something to drink to!





# Why Local Malt

- A desire to migrate our Supply Chain toward local
  - Fresher and Better Malt
    - Grain from Europe requires 4300 miles of travel over a few months
    - Grain from our local farmers requires 400 miles or less.
  - Feedback Loop
    - Your brewery can have a voice regarding the malt quality, grain variety, and where it comes from.
    - Know your farmer and your maltster.
  - Reliability
    - Chaotic times bring with it unstable pricing and risk of low inventories.
      - Your local malthouse may be able to offer more stable pricing and a more reliable source
      - Local delivery – Local trucking company or Valley Malt’s own All Electric Van



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# NORTHEAST GRAINSHED ALLIANCE

The Northeast Grainshed Alliance is a diverse stakeholder-driven partnership, connecting grain-related businesses and organizations in the Northeast. We are a growing number of grain growers, processors, producers, organizations, institutions, researchers, & the public; all key components of a regional grain supply chain.

The Northeast Grainshed Alliance pledges to connect and strengthen regional farms, mills, and malhouses with craft food and beverages.

## Our Vision

- is a Northeast grain-growing region with its own infrastructure and identity, in which people understand the benefits of growing and eating local grains, and products made with local grains are mainstream and accessible to all.

## Our Mission

- is to increase demand for Northeast grains by:
- (1) Building a cohesive network that enhances collaboration between local growers, processors, and makers; and (2) Increasing awareness and understanding of the value of regional grains by unifying the Northeast grains network under a single brand, with a coordinated communications and policy advocacy strategy.





# Fair Share for Farmers!





# Fair Share for Farmer is essential to our success

## 6-pack without local grain

- \$0.04 to the farmer
- Requires commitment to certain variety that may not fulfill the needs of the farmer, maltster or the brewer
- Breeds Monoculture if we all use the same malt
- Loss of use of vital farmland in the Northeast

## 6-pack Using Local Grain

- \$0.54 to the farmer
- Allows for creative variety choice to fit the needs of the farmer and the brewer
- Saves local farmland
- Allows brewers to use unique ingredients that may otherwise not be available





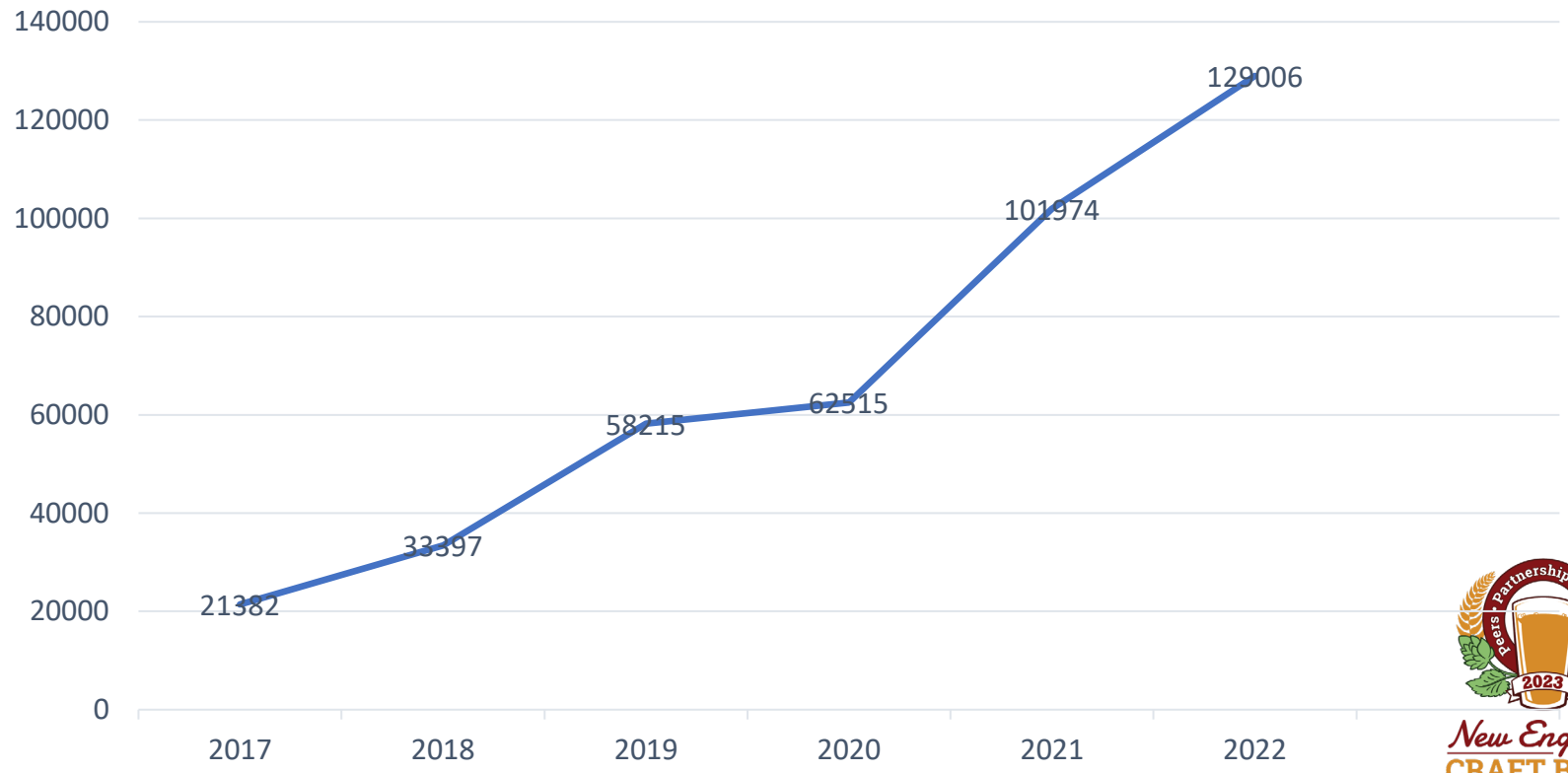
# Exhibit 'A' Brewing's Commitment and Impact

## TOTAL ACRES 220 since 2017

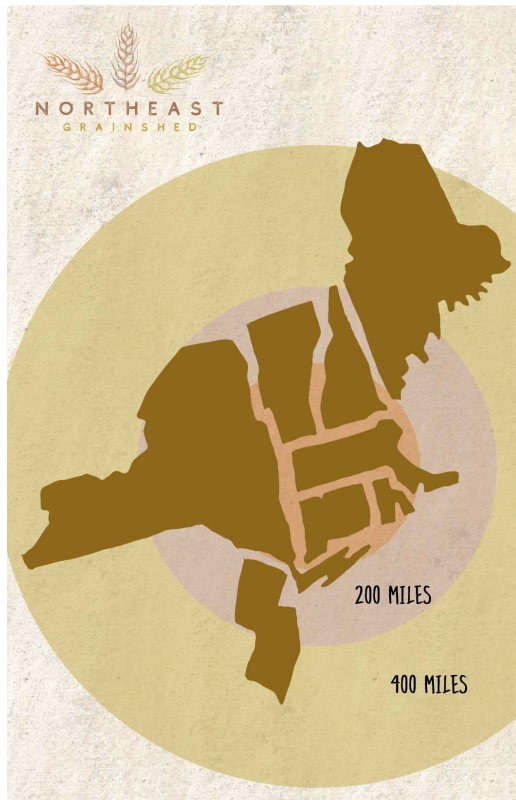
### TOTAL Local Malts purchased

- **2017 – 21,382 lbs**
- **2018 – 33,397 lbs**
- **2019 – 58,215 lbs**
- **2020 – 62,515 lbs**
- **2021 – 101,974 lbs**
- **2022 – 129,006 lbs**

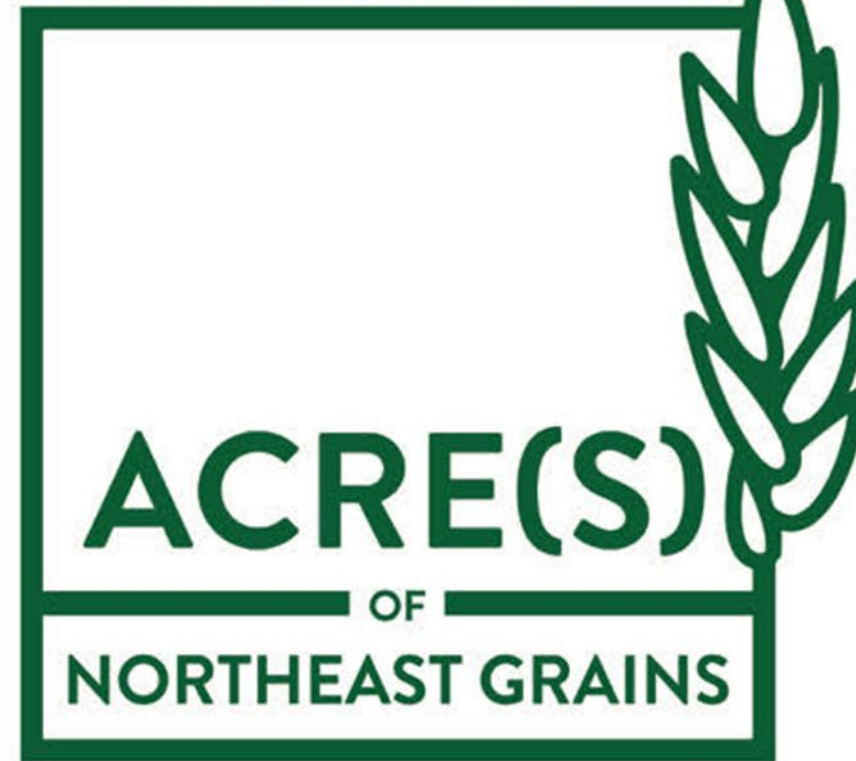
Total Local Malts Purchased (lbs)



# Northeast Grainshed Alliance



THIS MALT ORDER IS  
DIRECTLY SUPPORTING



*Thank you!* Valley Malt

# SQFT PROJECT



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# Using Nitrogen in Brewing Operations - Cutting Back on CO2

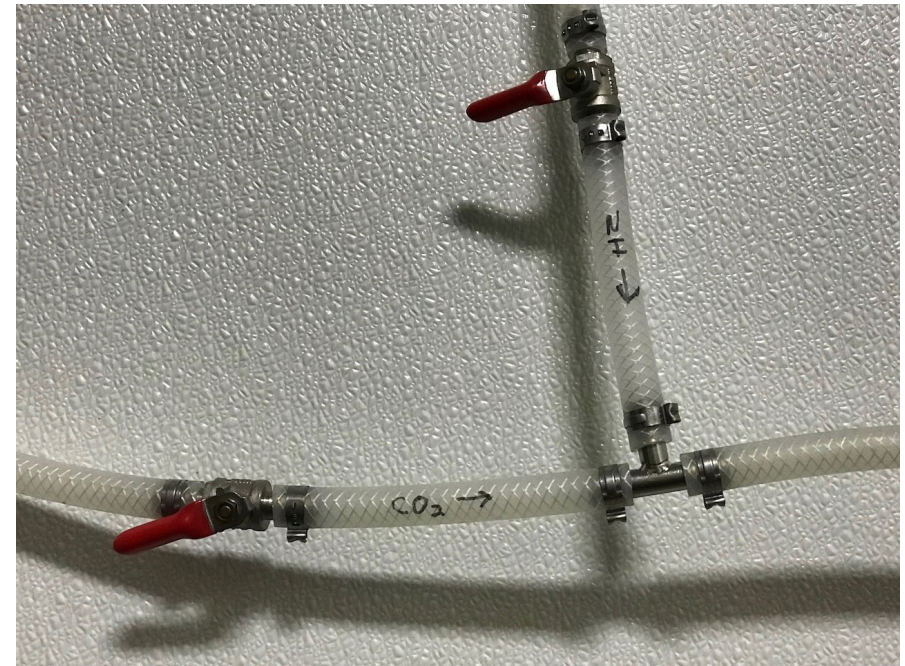
Joel Mahaffey  
Foundation Brewing Company



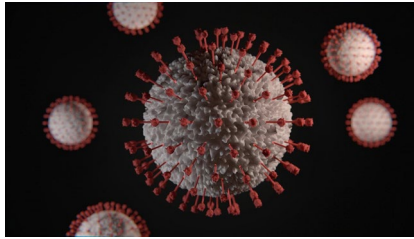


# Why should you reduce CO2 at your brewery?

- Reduction in brewing operations Scope 3 carbon emissions (CO<sub>2</sub>)
- Mitigate supply chain issues
- Cost savings



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**CARBON DIOXIDE**  
**EMPTY**  
**CYLINDERS**

**25%**

## 2020 CO<sub>2</sub> Supply Challenges



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# Historical/Ongoing CO<sub>2</sub> Reduction Efforts

- Fermentation Spunding
- Checking for tank leaks upon pressurization
- Regimented SOPs for tank purging

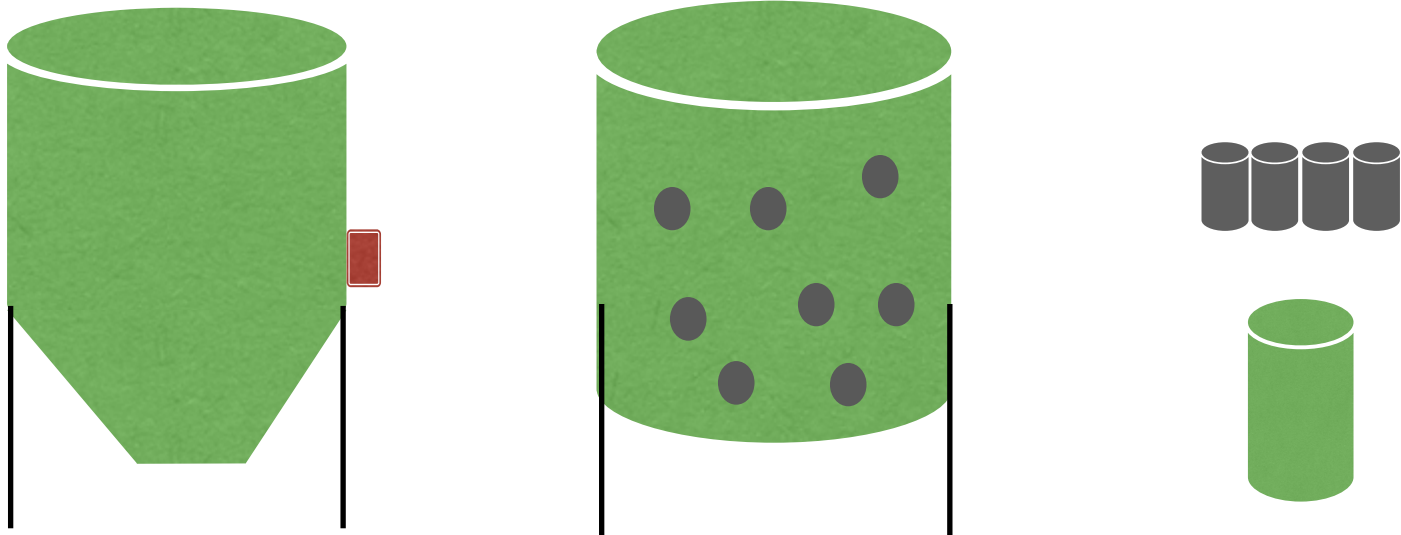





Spunding valve on a FV  
1-3°P from FG or post  
dry-hop





# Mapping CO<sub>2</sub> Mitigation



-  CO<sub>2</sub> capture end of fermentation
-  N<sub>2</sub> replaces CO<sub>2</sub> for purge & push
-  CO<sub>2</sub> purchased



# CO<sub>2</sub> and N<sub>2</sub> at a brewery

Both gases at high purity are used to mitigate oxidation in beer production

Both gases are odorless, noncombustible, and liquefiable

Nitrogen (N<sub>2</sub>) already makes up 78% of our atmosphere, making it more affordable and accessible

Carbon dioxide (CO<sub>2</sub>) is a greenhouse gas, comparatively expensive and vulnerable to supply chain challenges



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# **Location, Location**

*Where does your gas come from?*

CO<sub>2</sub>

- NY ≈ 400 miles
- VA ≈ 650 miles
- Canada ≈ 300 miles

N<sub>2</sub>

- Kittery, ME ≈ 60 miles
- Roughly 50% less \$/pound

# CO<sub>2</sub> and N<sub>2</sub> do not act the same

	Molecular Weight	Density (kg.m <sup>3</sup> )
Air	29	1.205
CO <sub>2</sub>	44.01	1.842
N <sub>2</sub>	28.02	1.165



# Tank Purging

- It is a dynamic situation:
  - N<sub>2</sub> is ~3% lighter than air
  - Less layering of gas and more dilution of oxygen
    - “Purging to Purity” takes a lot of gas
  - Tank Geometry
  - Gas Flow rate
- Proceed by analyzing results

# Validation

O<sub>2</sub> dive sensor used for  
BBT tank purging

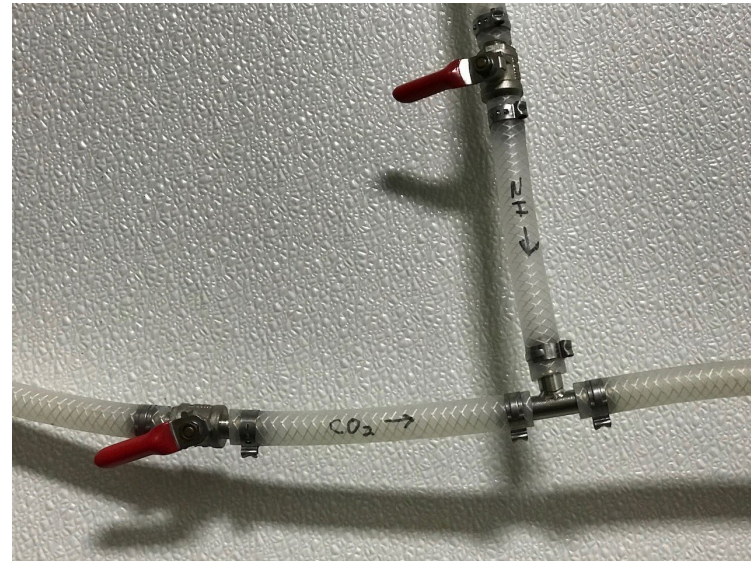
*Pictured: Oxygen Detector by  
FORENSICS, have also used  
OxyCheq brand*





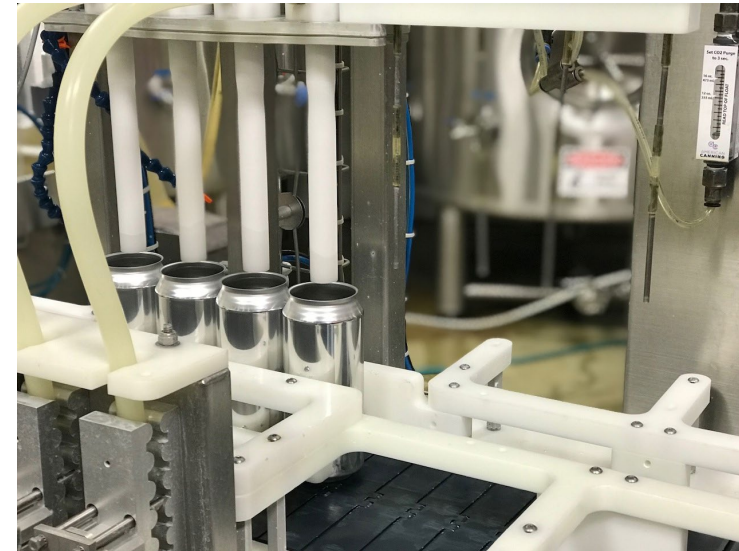
# Packaging Tank Push

- Tanks purged with N<sub>2</sub> before carbonation
- Key Qualifiers:
  - TPO
  - CO<sub>2</sub> stability in Tank and Package
  - Sensory
- NOTE: Package over 2 days = no measurable carbonation loss, YMMV



# Canning Line

- Split incoming gas manifold
  - CO<sub>2</sub>: Can purge
- Key Qualifiers:
  - TPO
  - Sensory





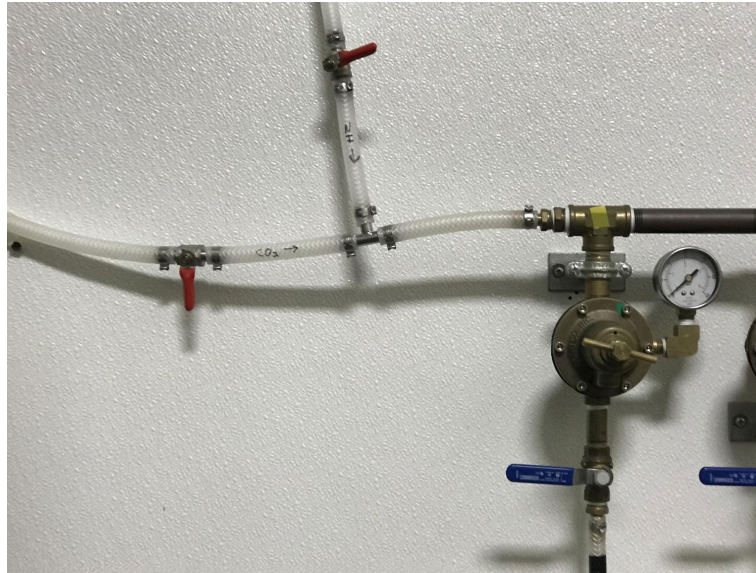
# Other Uses

- Keg Washer Filler
  - Potential challenges: Carbonation Stability in Keg
- Dry Hopping
- Fruiting
- Tank Rousing/Fining
- Draft service



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# Implementation



CO<sub>2</sub> regulators where N<sub>2</sub> is also used,  
have a switchover



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# Safety

- N<sub>2</sub> is odorless
- N<sub>2</sub> will vent if unused,
- O<sub>2</sub> sensor \$600 +/-



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Portable nitrogen tank,  
delivered/swapped bi-weekly

Note oxygen sensor to the  
left





Nitrogen is cold, runs through a passive vaporizer before feeding into the system





# Bulk CO<sub>2</sub> Storage



# Outcomes 2.25 years later...

- Seamless transition from CO<sub>2</sub> to N<sub>2</sub> (and back to CO<sub>2</sub> as needed) for tank purging and pushing beer
- Dissolved oxygen levels unchanged or improved
- 32% reduction in annual CO<sub>2</sub> use

(normalized per bbl production, 2022 compared to 2019-2021)

# "GREENING UP" YOUR TAPROOM

Building Sustainability Into Your Customer Facing Spaces



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# On-Site Sales

## Draft Beer Sustainability

- ❖ Pints
- ❖ Flights
- ❖ Leftover Beer
- ❖ 5% loss on average

## Single Use

- ❖ Pints – Compostable, Sili, Stainless
- ❖ Sample cups
- ❖ Straws
- ❖ Plastic vs biodegradable vs compostable



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# To Go Sales

- ❖ PakTech Recycling
  - ❖ Incentives
  - ❖ Upcycle Programs
- ❖ Label, Bag and Receipt Reminders
- ❖ Tray Recycling
- ❖ Growler vs. Crowlers
- ❖ Merch
- ❖ OOC Product



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# Guest Services

- ❖ Food Trucks, Restaurant and Caterers
  - ❖ Values in the Partnership
- ❖ Public Spaces
  - ❖ Parking
  - ❖ Alternative Transportation Incentives
  - ❖ Solid Waste Sorting with Composting
  - ❖ Signage
- ❖ Tours
  - ❖ Sustainability in your Story
- ❖ Events
  - ❖ Event Planning Starts with a Sustainability Plan



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# Social Media and Testimonials

- ❖ The Humble Brag
- ❖ Pictures Tell a Thousand Words
- ❖ Connect With Your Customers
- ❖ Get Certified



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# Questions?

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