

Introduction to Sustainability

What is Sustainability?

Sustainability is the act of meeting our current needs without compromising those of future generations.

Why be Sustainable?

Without the willingness to manage the resources it takes to create beer and reduce the amount of waste created we only continue to harm the environment and deplete critical resources we depend on to sustain life.

What does this mean?

The production of beer requires lots of energy, raw materials and in return creates lots of wasteful by-products. By reducing the amount of waste in the brewing process and looking for more efficient ways to manufacture beer you can decrease your reliance on non-renewable energy and decrease the negative impact the process has on our environment.



Brewery Operations & Water Usage

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Not all chemicals are bad. Without chemicals such as hydrogen and oxygen, for example, there would be no way to make water, a vital ingredient in beer.

- Dave Barry

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Brewery Operations & Water Usage

Brewhouse Water

- Audit recipes for best water usage rates / Keep diligent records
- Over sparging can lead to excess high strength wastewater creation
- Brewhouse vessel rinse water can constitute 23-40% additional volume beyond recipe

CIP / SIP and Water Reuse

- Rinse water can be reused
- Used cleaning chemicals can be used for pre-rinsing tanks
- CIP Sets can offer additional chemical and water savings

Washdown Water

- Sweep / Squeegee vs. Spray
- Don't walk away from running water
- Use washdown spray nozzles
 - Washdown nozzles use 75% less water than an open hoses

Packaging Water

 Consolidating packaging runs can conserve up to 20% of water and chemical usage

Water Wise Tips

- . Water waste is behavioral
- 2. Use sub-meters
- 3. Engineer Solutions
- 4. Reduce single use cooling water or collect it
- 5. Verify CIP rinsing with pH strips
- 6. Utilize timed burst rinsers

Water Usage Per Process

(See B.A. Benchmarks 2014-2018 at end for context)

Drake's 9.3 bbls water/bbl pkg.



Raw Materials & Product Handling

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This is grain, which any fool can eat, but for which the lord has intended a more divine form of consumption. Let us give praise to our maker and glory to His bounty by learning about beer. -Friar Tuck

Raw Materials & Product Handling

Raw Materials

- Order full pallets to reduce shipping charges
- Maintain lean inventories
- Make inventory clearance beers (don't let the grain die in vain)

Closed-Loop Supply Chains

- Work with vendors that allow you to return shipping materials
- This reduces waste and can keep cost of goods down
 - Drake's maintains a closed loop system with their glass and aluminum suppliers

Reusable Transport Materials

- Replace wooden pallets with plastic for onsite transport
- Use large rubber bands for containing empty kegs in pallets
- Replace single use plastic wrap with woven pallets wraps
 - With a \$5,000 investment we replaced 290,000ft² of plastic wrap and 16,000lbs of pallet wood.
 - The \$5K was received through a county grant
 - That saved us \$12,634 in 2019/2020





Process Waste Management & Disposal

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Give a man a beer, waste an hour. Teach a man to brew, and waste a lifetime!

Process Waste Generation Flow



Process Waste Management & Disposal

Malt & Spent Grain

- This can be side streamed to farmers for feed
 - Can be stored in buckets, totes, trailers, silos

Brewhouse Waste

- High in BOD and TSS
 - Can incur surcharges from waste municipality or local treatment plant
 - Can be hauled off and converted to biogas

Fermentation and Filtration Waste

- Can be side steamed for supplemental animal feed
 - Contains desirable vitamins and minerals

Packaging Waste

- Potentially high in BOD and low in pH
 - No suitable side stream source found



Side Streaming of Process Waste at Drake's

Spent Grain

- Spent grain is conveyed to separate trailers from each brewhouse
- Grain is picked up 2-3 times per week and scheduled with farmer

Solids Waste Sidestream System (SWSS)

- Yeast and trub is diverted to our 4,800 gallon SWSS tank prior to dry hopping beer
- Before filtration the thickest part of the cone (yeast & hops) is transferred out of the fermentor to SWSS Tank
- Centrifuge discharges are routed to SWSS tank
- When filtration is complete the tank cone is pumped over with 50-100 gallons of water and then pushed into the SWSS tank

SWSS Tank Findings

- Diverting solids has decreased water used to wash yeast and hops down the drain by 90%
- This has decreased our TSS levels in our cellar by roughly 80%, saving at minimum \$1,000 / month on wastewater bills
- We sidestream approximately 15,000 gallons of per month to our farm partner



Spent Grain Trailer

Mobile Solids Collection Tote

SWSS our "Octo-tank"

Carbon Dioxide Conservation

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I'm seein' the road that I travel. A road paved with heartaches and tears. I'm seein' the past that I've wasted. While watchin' bubbles in my beer.

- Willie Nelson

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Carbon Dioxide Conservation

Use it to your advantage

- Capping beer at terminal for 1 day can help build pressure for yeast drops (free Co2)
 - Ensure tank has Pressure Relief Valve (PRV) at all times!
- Capping beer after dry-hopping can help pre-carbonate the beer (free Co2)
 - Ensure tank has Pressure Relief Valve (PRV) at all times. Bleed excess gas if necessary
- Pumping beer from fermentor to brite in a closed loop "balanced" system conserves Co2
 - Preferred over the "Blow & Go", "Feed & Bleed", "Push & Gush" method
- CIP Under Pressure BBT's can be cleaned & sanitized while in a Co2 pressurized state
 - This can significantly decrease tank turn time and almost eliminate the need for purging
 - EXTREME CAUTION should be taken when performing this procedure!

What about using Co2 from fermenting beer?

- Co2 from fermentation can still contain large amounts of Oxygen as its scrubbed from the KO aeration process and by being purged from the headspace of the vessel.
- Co2 from fermentation isn't pure and can contain various hydrocarbons, water and potentially yeast and bacteria

Carbon Dioxide Conservation at Drake's

(See B.A. Benchmarks 2014-2018 at end for context) Drake's used 8.62 lbs/bbls pkg. prior to 2020 and now uses 6.10 lbs/bbl pkg. (29% reduction)

- Capping beer at terminal yields us around 3-5 PSI which is enough to push yeast out of the cone prior to dry-hopping
- Capping beer after dry-hopping yields us around 7-10 PSI which eliminates the need to pressurize the tank prior to cold crashing
 - This also aides in keeping volatile hop aromatics from escaping during secondary fermentation due to hop creep and yields us an additional 0.50vol/co2
- We increased carbonation efficiency from 55% using in-tank forced carbonation techniques to 94% by using in-line carbonation
 - In-line carbonation also prevents scrubbing aromatics and volatile hop compounds from your beer



Energy Consumption & Efficiency

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Milk is for babies. When you grow up you have to drink beer. - Arnold Schwarzenegger

Energy Consumption and Efficiency

- Electricity is cheaper during the early hours of the day as most breweries are on time-of-use plans
 - Shifting high power usage to before 4pm can have significant savings
 - Peak pricing can be up to 40% more than off-peak pricing per kWh
 - Don't tower the power and stagger equipment loading
 - Meters are read in 15 min. snapshots and peak demand charges are calculated here
- Utilize the power controls of Variable Frequency Drives (VFD)
 - Conserve power by not always running at 100%
- Turn power off to equipment at the end of the day
 - This can also provided extended life to sensitive electrical components
- Convert fluorescent bulb fixtures to LED
 - LED lights offer many benefits over fluorescent lighting
 - Utilize lighting dimmers and motion sensors throughout all buildings
- Harness natural light in production and public spaces whenever possible





Brewery Taprooms & Events

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A good local pub has much in common with a church, except that a pub is warmer, and there's more conversation.

- William Blake

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Brewery Taproom & Events

Serve your beer in glassware - Not Trash

- Commercial dishwashers are very energy and water efficient
- Glassware can be used used infinitely... until broken

What about alternatives to glassware?

- PLA (Polylactic Acid) #7 "Corn", "Plant-Based", "Greenware" Cups
 - These are only compostable in special facilities (check with your municipality)
 - They also require proper sorting into "Organics" or "Compost" only containers
 - These will contaminate the RECYCLE stream if placed in there
 - They will also not biodegrade on their own in the landfill
 - \circ \quad Without proper sorting these are an empty gesture
- PET (Polyethylene Terephthalate) #1 "Plastic" Cups
 - The most recyclable plastic
 - Will contaminate "organics" streams and will not be "recycled" in a landfill
- PS (Polystyrene) #6 "Red", "Solo" Cups
 - Not typically "Curbside" recyclable
 - Synonymous with trash
 - $\circ \qquad \text{Leave these in your past} \\$



Brewery Taproom & Events

Serving Food?

- Try and implement reusable plates and utensils whenever possible
- Plant based (PLA) cups and utensils are available
 - Ensure a proper waste stream for these items is available
- Serve food in compostable tray and cup instead of single use items
- Find a vendor to take your fry oil for alternative biofuels
- Create organics program for all food scraps

Having Events?

- Offer keepsake glassware or Aluminum party cups
- Use Biodegradable, Seeded or tabless wristbands for entry
- Creating a plan to make it a trash free event & include proper signage and waste sorting stations

Create Waste Stations

- Use visual signage to let your customers know which stream the products you serve go into
- Utilize images and color coding



Create Visual and Color Coded Waste Sorting Signage











FOOD SCRAPS

ALAMEDA COUNTY

COMPOSTABLE CUPS





PAPER

DRAKE'S BREWING

FACE COVERINGS & GLOVES

CANDY WRAPPERS

ALAMEDA COUNTY



CONDIMENT PACKETS

Calt Ada TATO CHIPS

MYLAR BAGS

DRAKE'S BREWING



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RecyclingRulesAC.org





ALL PLASTICS #1-7 PLASTIC CONTAINERS





Carbon Footprint Offsetting & Reduction

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There are worse ways to die than warm and drunk.

Carbon Footprint Offsetting vs Reduction

Carbon Offsetting can be defined as the mitigation of carbon footprints through the development of alternative projects such as solar, wind, tidal energy, reforestation or afforestation. Through this you can continue to emit carbon and buy into programs to "offset" it. Carbon reduction involves actively decreasing the amount of carbon that is created through your process. This means taking measures to increase production efficiency, reduce energy consumption and capture Co2 for reuse.



Sorting Waste into the Proper Place

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Always do sober what you said you would do drunk. It will teach you to keep your mouth shut.

- Ernest Hemingway

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Sorting Waste into the Proper Place

Organics

Any material that is biodegradable and comes from either a plant or an animal.

Recycle

A material that can be broken down into its most basic properties and reused.

Garbage

Any substance which is not biodegradable, recyclable and of no further use.

Other

Any items that require special consideration due their hazardous properties.

Sorting Waste into the Proper Place

Identify the waste you generate and find the best stream for it

Only send it to the landfill as a last resort





Our largest waste volume items are cardboard and plastic film. We are now able to bale them and sell to a recycler for profit. This also reduces our waste bin size and pick-up frequency for further savings.

Demonstrate Sustainability Through Actions

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Alcohol, the cause and solution to all of life's problems.

Demonstrate Sustainability Through Actions

- Create a company Statement of Sustainability
 - Share it and hold yourself to it
- Set Goals
 - Make these attainable. Little wins are still a big step forward!
- Encourage employee participation
 - You'll accomplish more with employee / employer buy-in
- Be transparent with yourself, employees and your customers
 - It's ok to acknowledge what you are good at and where you could be better
- Don't be afraid to ask for help Offer it if you have it
 - Success in sustainability is a win for everyone. You don't need to hide it like your award-winning smoked white stout IPA chili sour beer recipe

Drake's Brewing Co. Statement of Sustainability

"Sustainability at Drake's is oriented towards long-term success and our future. This means active responsibility and acting responsibly. We are mindful of our resources, from natural to financial, and we take an active responsibility in creating an environment that emphasizes equity, employee growth, and a shared social responsibility to our local communities."





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Beer, it's the best damn drink in the world.

- Jack Nicholson

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Resources for Change

- Brewers Association (BA)
- Master Brewers Association of the Americas (MBAA)
- GHG Protocol (Emissions Calculator)
- Talk to your local wastewater municipality
 - They can offer insight and resources, if you have a pre-treatment permit (you want to make friends with these people)
- East Bay Municipal Utility District (EBMUD)
 - They can take excess high strength wastewater
 - They have rebate programs for water saving fixes and smart meters / sub-meters
- Check with you local municipality about programs
 - City of San Leandro offers free recycling bins
- Check with you county for resources (Stop Waste Alameda County)
 - We've received over \$5,500 from them in grants for waste sorting and reusable items
- Dive into your PGE bills you can do some great energy auditing yourself here
- Talk to your neighboring breweries They may have already found a solution to your problem





Show's Over You Made It! Now let's make a difference!

Contact me: Hal@DrakesBrewing.com

YOU

@beer_can_gardens for the plants photos Dublin USD Vocational Program for K9 Crunchies @thebountifulbag for the bag photos Brewer's Association for benchmark statistics CREDITS: This presentation template was created by Slidesgo, including icons by Flaticon, infographics & images by Freepik

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