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Kentucky's Resource Center for Environmental Sustainability

KPPC - Kentucky Pollution Prevention Center

Sustainable Water Consumption in Distilleries, Breweries, & Wineries

Mapping water use and identifying reduction opportunities for sustainable operations

April 23, 2020

KY Sustainable Spirits & Brewing Initiative

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Lissa McCracken

Executive Director, KPPC

KY Sustainable Spirits & Brewing Initiative

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Before We Start . . .

- ✓ Today's session is being recorded and will be available on the KPPC website (kppc.org).
- ✓ The conference line is muted.
- ✓ Questions will be addressed after each section as time allows.
- ✓ Please submit questions through the question window of your control panel.

KPPC is based at the University of Louisville J.B. Speed School of Engineering

Help KY businesses and industries develop environmentally sustainable, cost-saving solutions for improved efficiency

Free • Confidential • Non-regulatory

Kentucky Sustainable Spirits

Agenda Topics

- ✓ Water Bills
- ✓ Water Baselining and Benchmarking
- ✓ Adding Water to Sustainable Value Stream Map
- ✓ Management and Technologies
- ✓ Q&A
- ✓ Wrap-up and Adjourn

27 KDA Members Making Hand Sanitizer

Production - 630,000 Fifths

Wilderness Trail	Hartfield & Co
Heaven Hill	Jeptha Creed Distillery
Wild Turkey	Casey Jones Distillery
Alltech	Old Pogue Distillery
Brown-Forman	James E. Pepper Distillery
Beam Suntory	O.Z. Tyler Distillery
Neeley Family Distillery	Dueling Grounds Distillery
Kentucky Artisan Distillery	Bluegrass Distillery
Michter's	AMBRABev
Louisville Distilling Co	B. Bird Distillery
MB Roland Distillery	Barrel House Distillery
Boundary Oak Distillery	Second Sight Spirits
New Riff Distillery	Preservation Distillery
Rabbit Hole Distillery	

Source:
Kentucky Distillers Association (KDA)

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Water Bills, Baselining, and Benchmarking

Samantha Gordon, CEM
Senior Engineer, KPPC

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Water Bills

- Good place to start at any point in your journey
- Understand what you are consuming
- Look at your water bills regularly
  - Consumption
  - Charge per gallon
  - Wastewater or sewer
  - Miscellaneous fees
  - Total costs

Louisville Water Company
550 South Third Street
Louisville, KY 40202-1839

Account # 1234567890 | Bill Date: 04/22/15
Account Name: Water, Tap
Account Due by 05/13/15: $523.21 | Amount Due after 05/13/15: $531.52

Section A

To avoid late charges:
- Make payment at least seven business days prior to the due date
- Pay at any Fifth Third Bank at least five business days prior to the due date.

AMOUNT PAID
Pay online at LouisvilleWater.com

TAP WATER
550 SOUTH THIRD ST
LOUISVILLE KY 40202-1839

LOUISVILLE WATER COMPANY
PO BOX 32460
LOUISVILLE KY 40232-2460

900002000000050513800000000

Louisville Water Company (502) 583-6610 | **Metropolitan Sewer District (502) 587-0603**

Account Number: 1234567890 **Account Name:** Water, Tap **Bill Date:** 04/22/15

ACCOUNT SUMMARY

Previous Balance	$0.00
Corrections	$0.00
Payments Received	$0.00
Adjustments	$40.21

TOTAL STATEMENT CHARGES

AMOUNT DUE BY 05/13/15	**$523.21**
AMOUNT DUE AFTER 05/13/15	**$531.52**

Section B

Miscellaneous

Section C

Item	Amount
Payment Arrangement for Extensions	$231.17
TOTAL MISCELLANEOUS CHARGES	**$231.17**

Adjustments

Item	Amount
Late Charge MSD Wastewater	$5.41
Late Charge Water	$4.37
Late Charge MSD Stormwater	$0.43
Service Activation Fee - Small/Medium Meter	$30.00
TOTAL ADJUSTMENT CHARGES	**$40.21**

SERVICE ADDRESS: 550 SOUTH THIRD ST

Water Statement

Service from 02/13 to 04/21 = 67 days of usage

Meter # 900001007 Reading from 387 to 400 = 13 x 1,000 Gallons
Meter # 900004932 Reading from 106 to 106 = 0 x 1,000 Gallons
Total Water Usage = 13,000 Gallons

Section D

Item	Amount
Water Domestic Service Charge 67 Days @ $0.32942	$22.07
Water Irrigation Service Charge 67 Days @ $0.30411	$20.38
Water Consumption Charge 6.0 @ $2.41	$14.46
Water Consumption Charge 7.0 @ $2.56	$20.02
TOTAL WATER CHARGES	**$76.93**

Wastewater Statement

Service from 02/13 to 04/21 = 67 days of usage

Total Water Consumption = 13 x 1,000 Gallons
Total Sewer Volume = 13,000 Gallons

Section E

Item	Amount
EPA Consent Decree Surcharge 67 Days X $0.32611	$21.98
Wastewater Service Charge 67 Days X $0.40175	$26.92
Wastewater Volume Charge 10.0 CONS @ $3.34	$43.42
TOTAL WASTEWATER CHARGES	**$92.32**

Drainage Statement

Service from 02/13 to 04/22 = 68 days of usage

Section F

Item	Amount
Drainage Charge	$17.17
TOTAL DRAINAGE CHARGES	**$17.17**

Miscellaneous

Section C

Item	Amount
Water Service Deposit	$50.00
Water Service Line Coverage BI-Monthly	$12.98
TOTAL MISCELLANEOUS CHARGES	**$62.98**

Introducing LINK, our new Customer Care Portal! Managing your account is easy: receive bill electronically, pay by AuoPay, update info & view usage. Sign-up today @ LouisvilleWater.com.

Baselining

- Track the data
  - Spreadsheets
  - ENERGY STAR Portfolio Manager
  - Online platform
- Look at trends
- Understand what a “typical” month looks like to identify and investigate anomalies
- Use for goal setting purposes

Benchmarking

- Compare your facility energy and water use to one or more other facilities
- Use as a guide and not ranking
- “When performance is measured, performance improves”
  - Beverage Industry Environmental Roundtable (BIER)

BIER Study

- Data collected from 2013, 2015, and 2017
  - Electricity, natural gas, other power sources, water, production
  - Averaged to compile benchmarks
- Approximately 1,651 facilities participated
  - Global
  - Diverse facility and beverage types
- Breweries, wineries, distilleries, and bottling

BEVERAGE INDUSTRY ENVIRONMENTAL ROUNDTABLE

https://www.bieroundtable.com/work/benchmarking/

BIER Ratios

$$\textbf{Energy Use Ratio (EUR)} = \frac{\text{Energy Required}}{\text{Liter of Production}} = \frac{\text{MJ}}{\text{L}}$$

$$\textbf{GHG Emissions Ratio} = \frac{\text{GHG Emissions}}{\text{Liter of Production}} = \frac{\text{g } CO_2e}{\text{L}}$$

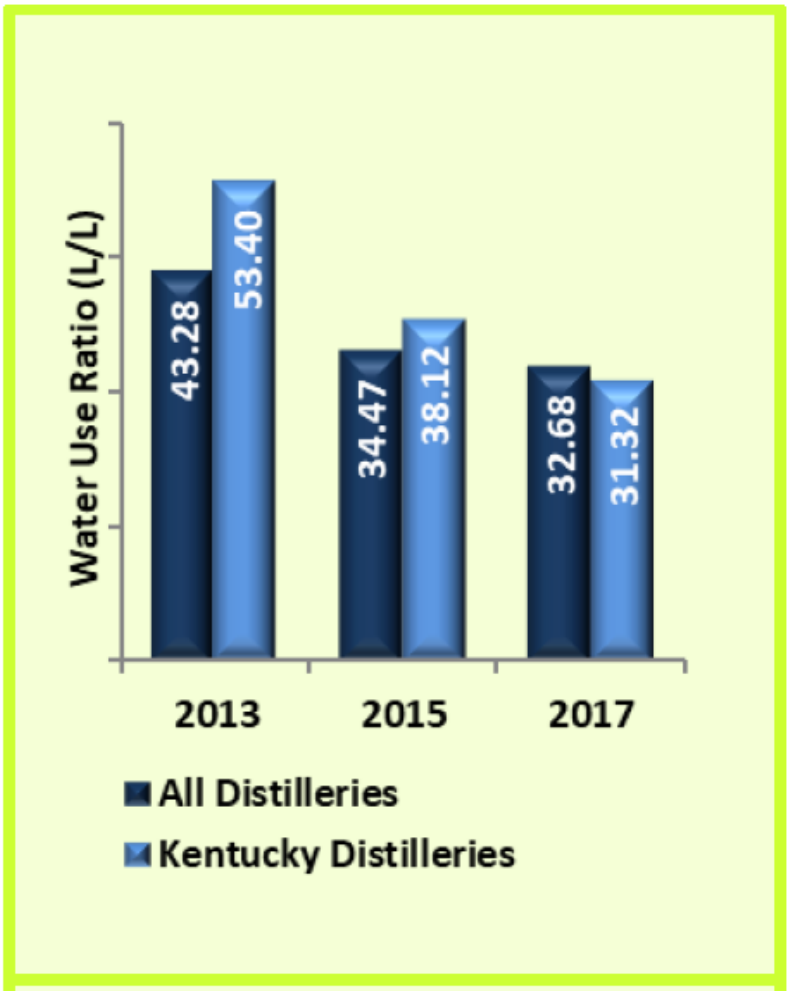
$$\textbf{Water Use Ratio} = \frac{\text{Water Required}}{\text{Liter of Production}} = \frac{\text{L}}{\text{L}}$$

BIER Study Results

- Ratios have decreased over the 3 year period
  - Efficiency plays a large role
- Correlation between larger production facilities and lower ratios

Beverage Industry Environmental Roundtable (BIER) Benchmarks			
Averaged from 2013, 2015, 2017 energy, water, and emissions surveys			
	Energy Use Ratio (MJ/L)	GHG Emissions Ratio (g CO_2e/L)	Water Use Ratio ($L_{water}/L_{production}$)
Brewery	1.17	97.63	3.49
Distillery	13.32	738.40	36.81
Winery	1.71	118.31	3.92
Bottling (All)	0.41	37.12	1.93

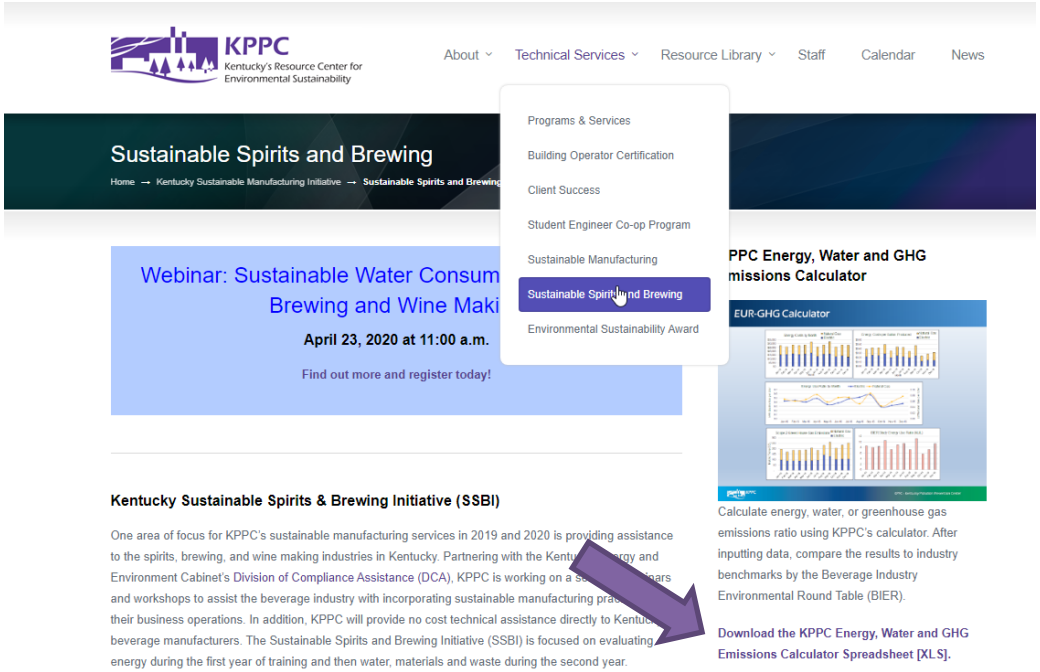
BIER Study Results in Kentucky Distilleries



https://kybourbon.com/wp-content/uploads/2019/05/2018-KDA-External-Summary.pdf

KPPC SSBI Calculator

- Find it on the KPPC website
- Improvements:
  - Added water benchmarking
  - Updated figures
- Demo



http://kppc.org/ssb

Questions

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Senior Engineer, KPPC

Sustainable Value Stream Mapping - Water

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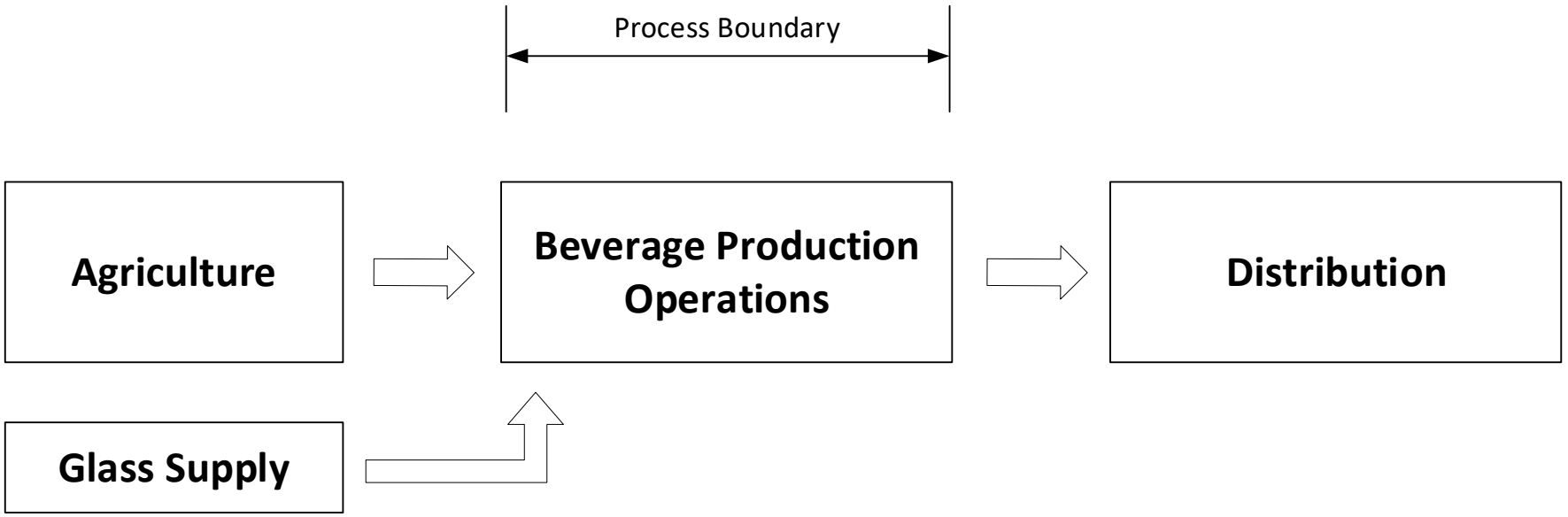
BIER Process Boundary



Significantly more water is used in agriculture and glass-making than in beverage production operations

Water Efficiency and WUR

- Distillery WUR range – 9 to 63 L/L in 2010 (KY average 31 L/L).
- Water use decreased 4% from 2013-2017. Increased production led to an 8% decrease in WUR.
- Diageo improved water efficiency by 19% from 2007 to 2013.
- Bacardi improved WUR by 40% from 2006 to 2012.
- Brown Forman's goal to reduce WUR by 30% by 2023.

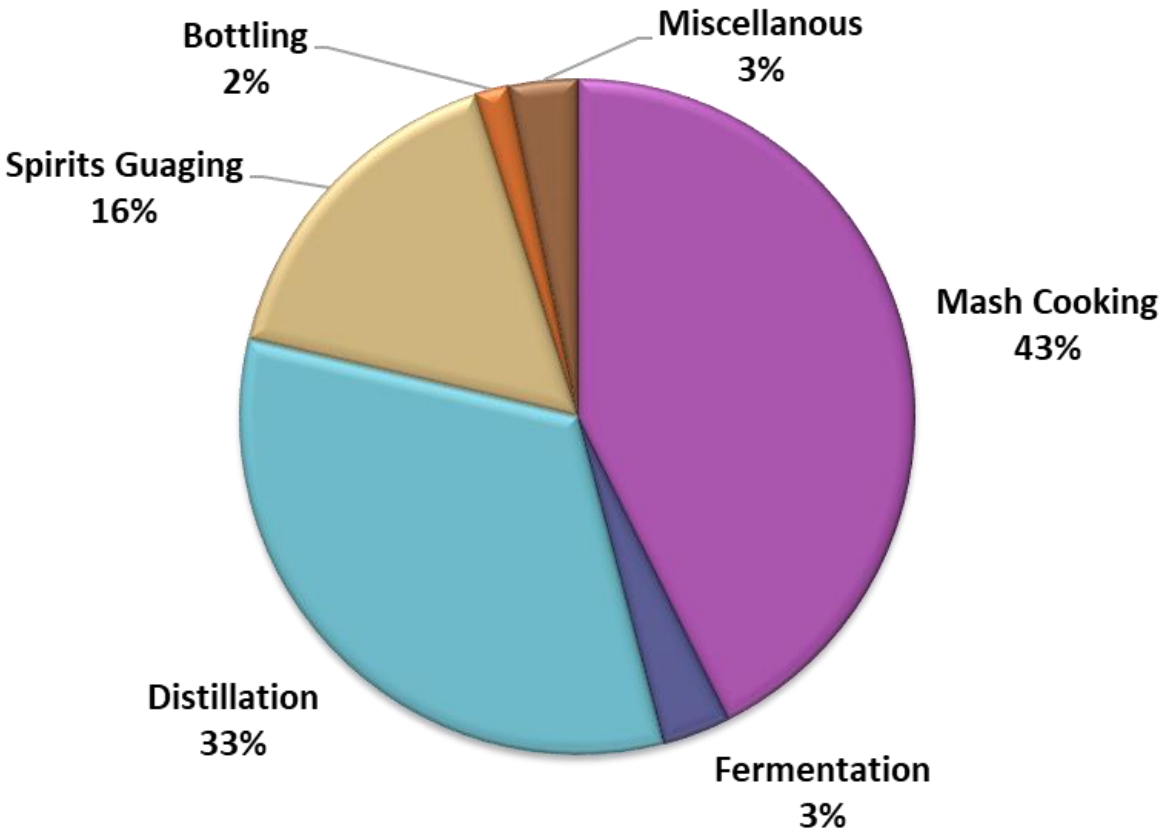
Assessing Facility Water Use

- Gather information
- Establish water use baseline
- Inventory water using equipment & map processes
- Create a facility water balance

Water Use Inventory

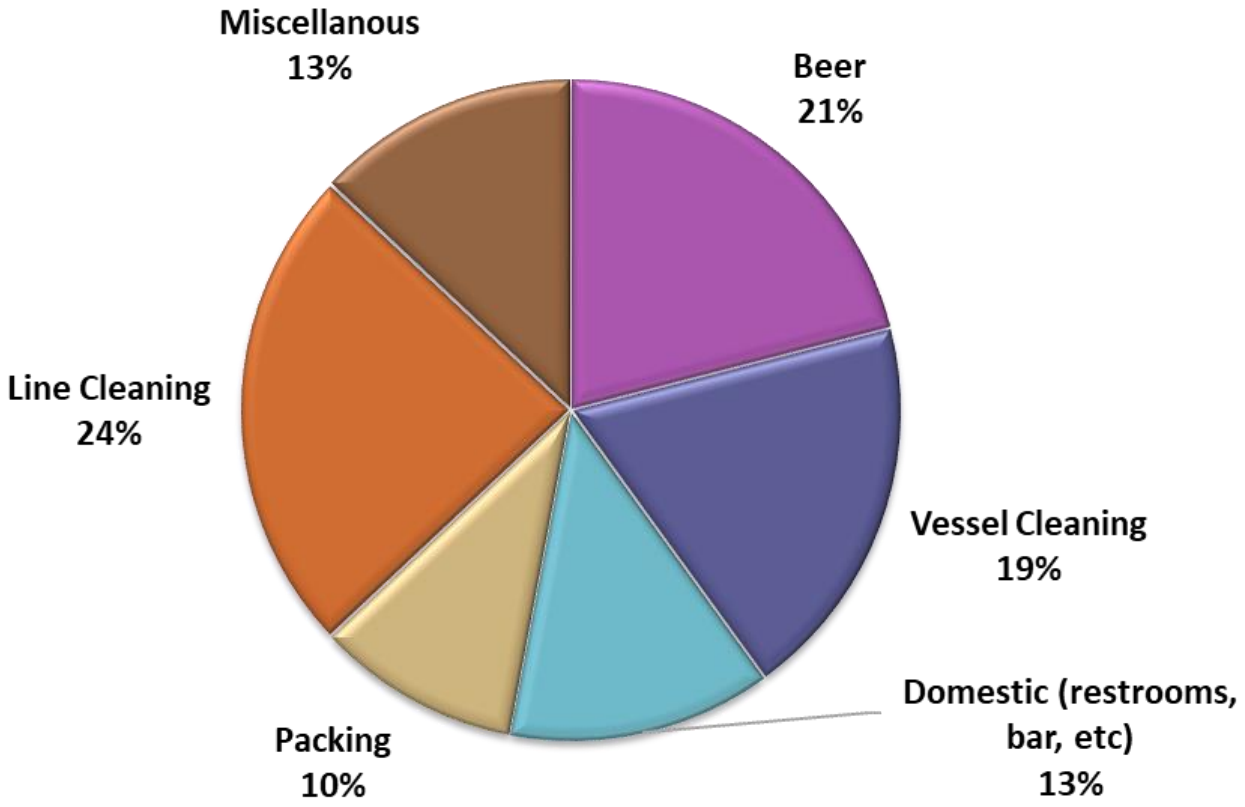
Water Use Inventory					
Item	Location	Flow (Gal per minute)	Operating Time (Minutes/day)	Flow per Day (Gal per day)	Comments
				Calculated	
				Calculated	
				Calculated	
				Calculated	
				Calculated	
				Calculated	

Water Balance - Distillery



Not actuals, for illustration

Water Balance - Brewery



Not actuals, for illustration

Lean and Water

- Water Gemba Walks
- Water Balance
- Value Stream Mapping
- Waste Elimination Culture
- Total Productive Maintenance

Lean and Water Toolkit, U.S. Environmental Protection Agency
https://www.epa.gov/sites/production/files/2013-10/documents/lean-water-toolkit.pdf

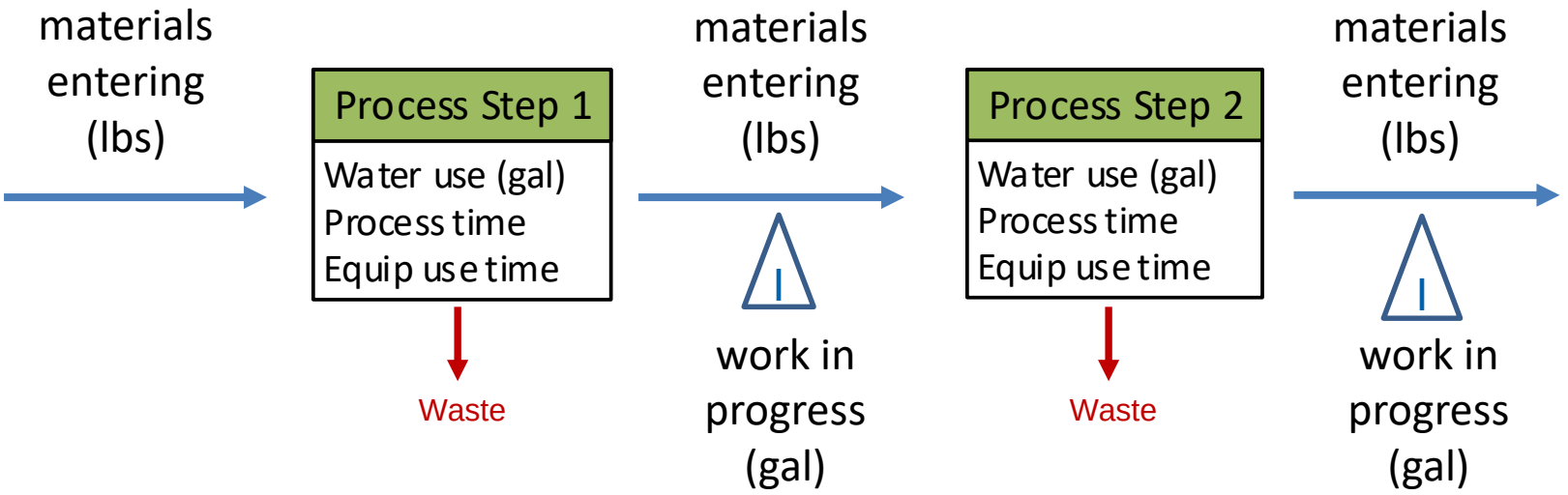
Water Waste

- Water waste – water used beyond the point of adding value to the customer *(non-value added water use)*
- Water waste leads to increased wastewater
- Water, energy, chemical and labor costs
- Exacerbates water scarcity concerns

Water Efficiency

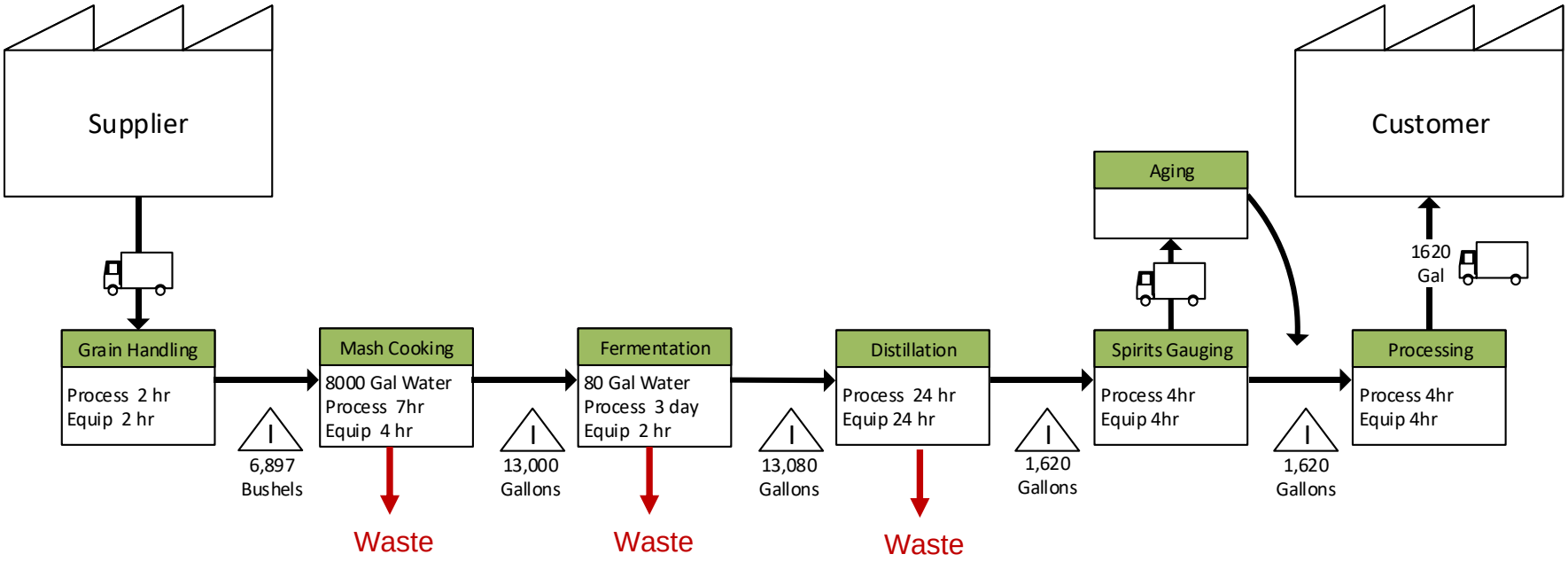
- Reduction in the amount of water used per unit of production
- Minimum amount of water needed to perform a task
- Product water use, process water use

Develop VSM



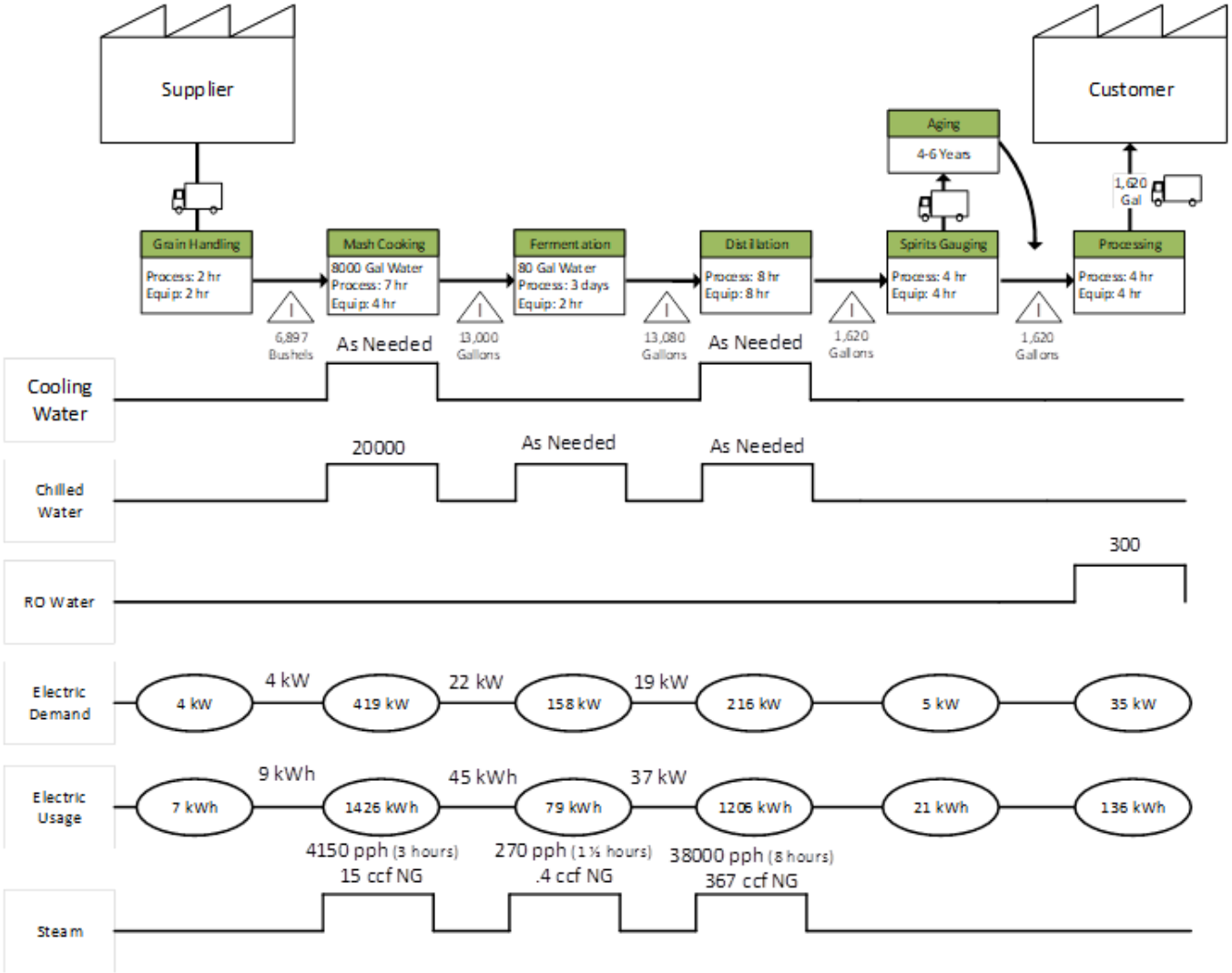
1. Identify all process steps from incoming material to final product.
2. Identify materials entering each step & work in progress (type and quantity).
3. Identify product water use, time for process step, equip use time.
4. Identify non-product water use & recirculating water use.

Develop VSM

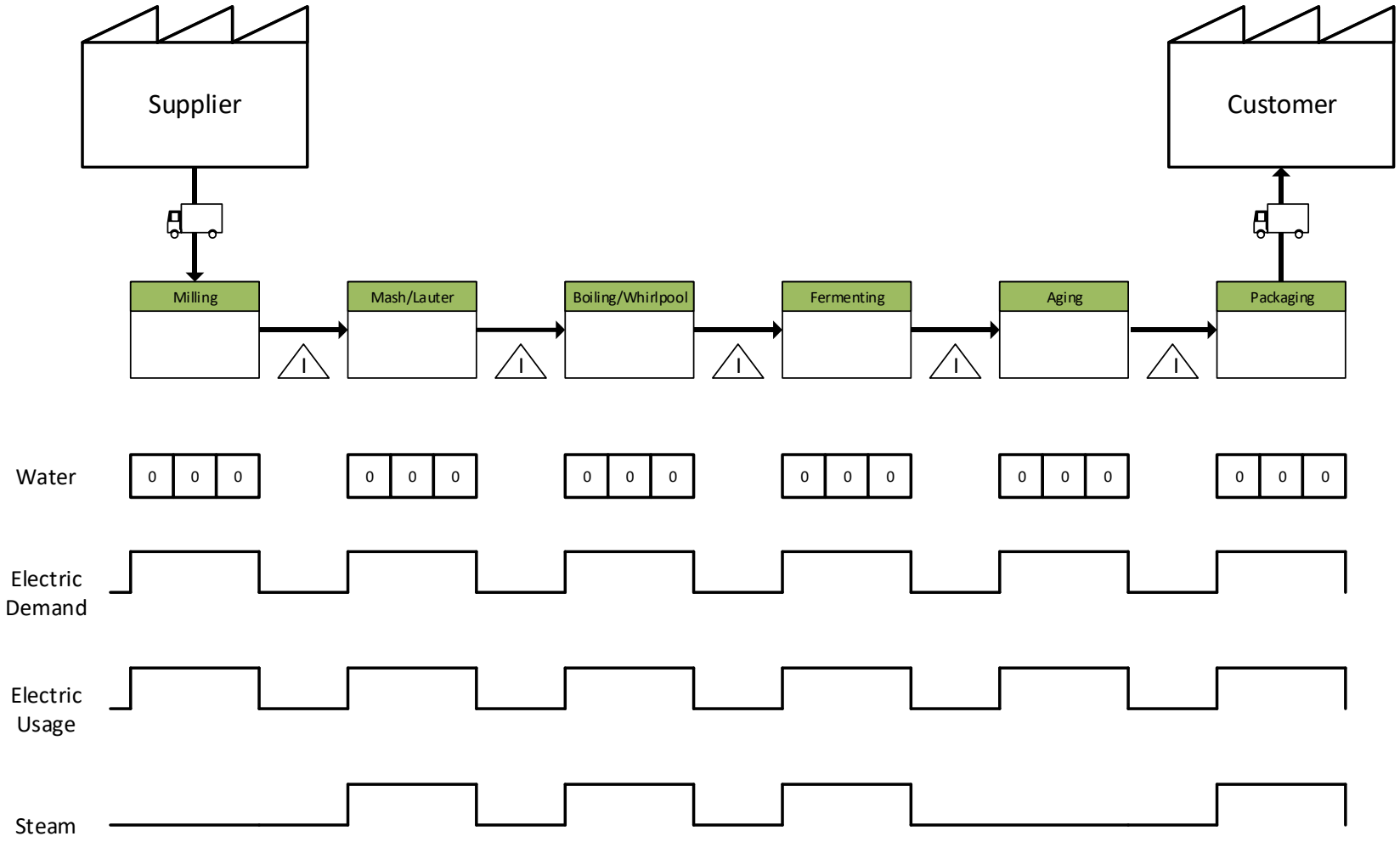


4. Add suppliers, customers.
5. Add aging step as appropriate.
6. Identify product water use, process times, equipment use times.
7. Select quantities per mash cooking cycle, etc.

Distillery Sus-VSM



Brewery Sus-VSM



Benefits of Adding Water to VSM

- Gain understanding of where water waste occurs
- Identify areas to reduce excess water use
- Develop efficiency implementation plans
- Quantify expected savings from improvements
- Create a culture of efficiency

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Management & Technologies

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Water Management Planning

- Water management team
- Water management policy
- Water efficiency performance objectives
- Goal tracking
- Incorporate in environmental management system

Water Saving Strategies

- Adjust water flow
- Modify existing equipment or install water saving devices
- More efficient equipment
- Reuse or recycle water
- Low water or waterless process

Water Best Management Practices - Breweries

- Utilize submetering
- Clean in place systems for brewery tanks
- Landscape design for reduced/proper watering
- Retrofit flush valve toilets with dual flush handles
- Replace pre-rinse spray valves

Brewers Association Water and Wastewater Treatment/Volume Reduction Manual
https://www.brewersassociation.org/attachments/0001/1517/Sustainability_-_Water_Wastewater.pdf

Marbel Distilling, Carbondale, Colorado

- Recapture 100% of process water
- Water Energy Thermal System
  - Hot water is captured and stored for use
  - Used for process heat, domestic hot water, space heat
  - Cool water used for process and space cooling

Solar Hot Water (Thermal)

- Preheat to boiler
- Cleaning
- Other processes

Action Items

- ✓ Baseline water use
- ✓ Complete WUR calculator (kppc.org/ssb)
- ✓ Develop water balance (utilize equipment inventory, Sus-VSM)
- ✓ Contact KPPC for assistance

Questions

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Wrap-up

Lissa McCracken

Executive Director

KPPC

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Reminders

- Please complete post-webinar survey.
- Today's session was recorded and will be available on the KPPC website (www.kppc.org/ssb).
- The sustainability calculator spreadsheet is available for download.
- Today's presentation is available upon request.

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Thank you!

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