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

Sustainable Water Consumption for Spirits, Brewing and Wine Making
April 23, 2020
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

<table>
<thead>
<tr>
<th>Wilderness Trail</th>
<th>Hartfield &amp; Co</th>
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<tbody>
<tr>
<td>Heaven Hill</td>
<td>Jeptha Creed Distillery</td>
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<td>Wild Turkey</td>
<td>Casey Jones Distillery</td>
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<td>Alltech</td>
<td>Old Pogue Distillery</td>
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<td>Brown-Forman</td>
<td>James E. Pepper Distillery</td>
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<td>Beam Suntory</td>
<td>O.Z. Tyler Distillery</td>
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<td>Neeley Family Distillery</td>
<td>Dueling Grounds Distillery</td>
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<td>Kentucky Artisan Distillery</td>
<td>Bluegrass Distillery</td>
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<td>Michter’s</td>
<td>AMBRABev</td>
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<td>Louisville Distilling Co</td>
<td>B. Bird Distillery</td>
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<td>MB Roland Distillery</td>
<td>Barrel House Distillery</td>
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<td>Boundary Oak Distillery</td>
<td>Second Sight Spirits</td>
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<td>New Riff Distillery</td>
<td>Preservation Distillery</td>
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<td>Rabbit Hole Distillery</td>
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Source: Kentucky Distillers Association (KDA)
Poll Question

Water Bills, Baselining, and Benchmarking

Samantha Gordon, CEM
Senior Engineer, KPPC
Poll Question

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
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

[Link to BIER study](https://www.bieroundtable.com/work/benchmarking/)
BIER Ratios

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

\[
\text{GHG Emissions Ratio} = \frac{\text{GHG Emissions}}{\text{Liter of Production}} = \frac{\text{g CO}_2\text{e}}{\text{L}}
\]

\[
\text{Water Use Ratio} = \frac{\text{Water Required}}{\text{Liter of Production}} = \frac{\text{L}}{\text{L}}
\]

BIER Study Results

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

<table>
<thead>
<tr>
<th>Beverage Industry Environmental Roundtable (BIER) Benchmarks</th>
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<tbody>
<tr>
<td>Averaged from 2013, 2015, 2017 energy, water, and emissions surveys</td>
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<tr>
<td>Brewery</td>
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<tr>
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<td>1.17</td>
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<tr>
<td>Distillery</td>
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<tr>
<td>Winery</td>
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<td>Bottling (All)</td>
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</table>
BIER Study Results in Kentucky Distilleries


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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Sustainable Value
Stream Mapping - Water

Mark Toda, CEM
Senior Engineer, KPPC

J.B. SPEED SCHOOL OF ENGINEERING
**BIER Process Boundary**

- **Agriculture** → **Beverage Production Operations** → **Distribution**
- Glass Supply

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

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**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

<table>
<thead>
<tr>
<th>Item</th>
<th>Location</th>
<th>Flow (Gal per minute)</th>
<th>Operating Time (Minutes/day)</th>
<th>Flow per Day (Gal per day)</th>
<th>Comments</th>
</tr>
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<tbody>
<tr>
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</tbody>
</table>
**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

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

**Poll Question**
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.

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

Management & Technologies

Mark Toda, CEM
Senior Engineer, KPPC
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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502-852-1987

Wrap-up

Lissa McCracken
Executive Director
KPPC
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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502-852-3485  502-852-1987

Thank you!

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