Sustainable Distilleries & Wineries

December 7, 2020

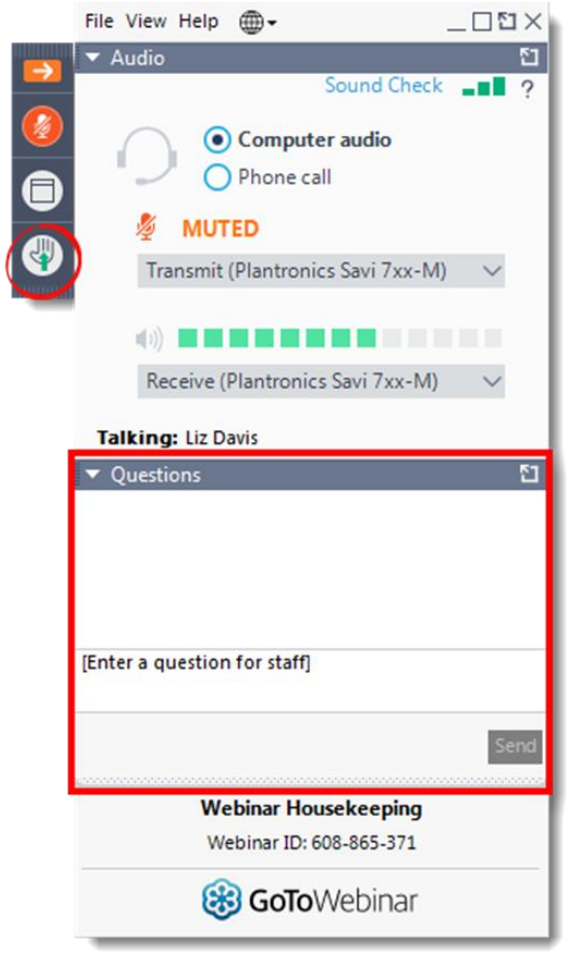
EPA
United States
Environmental Protection
Agency

Agenda

10:30-10:40	Welcome • Lissa McCracken, Facilitator, KPPC • Pam Swingle, EPA Region 4
10:40-11:00	TN Green Spirits Initiative • Mark Valencia, TN Dept of Environment & Conservation
11:00-11:25	KY Sustainable Spirits & Brewing Initiative • Robyn Whitted, KY Dept for Environmental Protection • Mark Toda, KPPC • Samantha Gordon, KPPC
11:25-11:45	DE Wineries Initiative • Dr. Keith Goossen, University of Delaware • Adrian Mobilia, Salted Vines Winery
11:45-Noon	Q&A, Wrap-up & Adjourn • Christina Bitten, EPA Region 4

Webinar Housekeeping

- To submit a question:
  - Type your question into the Questions box in the Control Panel.
- Please contact Meredith.Outterson@erg.com if you are having technical issues with the webinar.
- Session is being recorded.



Tennessee Sustainable Spirits Program

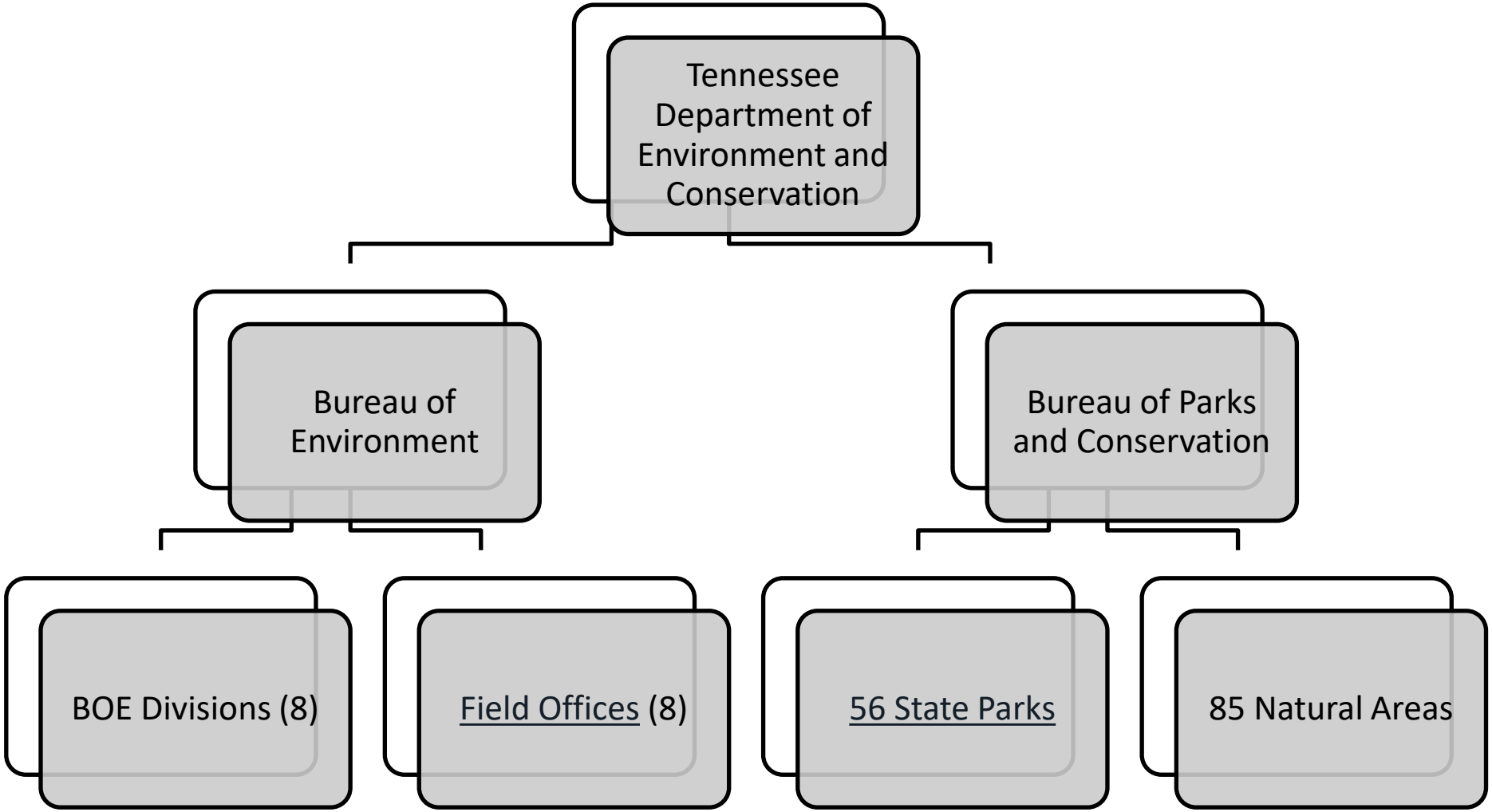
Mark Valencia, Office of Policy and Sustainable Practices, 12/07/2020

TDEC Mission Statement

TDEC exists to enhance the quality of life for citizens of Tennessee and to be stewards of our natural environment through:

- **PROTECTING** and **IMPROVING** the quality of Tennessee's air, land, and water through a responsible regulatory system;
- **PROTECTING** and **PROMOTING** human health and safety;
- **CONSERVING** and **PROMOTING** natural, cultural and historic resources, and
- **PROVIDING** a variety of quality outdoor recreational experiences.

TDEC Organization



Bureau of Parks and Conservation

TENNESSEE
State Parks

- 56 state parks representing natural, archaeological, and historical site of significance
- 85 state natural areas
- Natural Areas Programs restore and protect plants, animals, and natural communities
- Local Parks and Recreation Programs support community access to green spaces and outdoor activities

Bureau of Environment

- Chief environmental and natural resource regulatory agency in Tennessee
- Delegated responsibility from U.S. EPA to regulate sources of:
  - Air pollution
  - Solid and hazardous waste
  - Radiological health issues
  - Underground storage tanks
  - Water pollution, water supply & groundwater
- Grants and loans
- Environmental education, energy programming, and sustainability
- Whites Creek Deposting Event

The Office of Policy and Sustainable Practices

We enhance TDEC's capacity to conduct short and long term environmental policy research and analysis, promote a culture of environmental sustainability, provide technical guidance to business, industry, and other public entities to promote environmental stewardship, implement departmental strategic planning initiatives, and perform Title VI and Environmental Justice functions in an effort to better conserve Tennessee's natural resources and to fulfill the Department's mission and vision.

Sustainable Practices

- **Business Team**
  - Get Food Smart TN
  - Governor's Environmental Stewardship Awards
  - Tennessee Green Star Partnership
  - Tennessee Materials Marketplace
  - Clean Tennessee Energy Grants
  - Tennessee Sustainable Spirits
- **Community Team**
  - Tennessee Environmental Education Initiative
  - Tennessee Radon Program
  - Unwanted Household Pharmaceutical Program
  - Tire Environmental Act Program
- **State Government/Institution Team**
  - Tennessee Higher Education Initiative
  - Sustainable State Government

Tennessee Sustainable Spirits Overview

Tennessee Sustainable Spirits is a voluntary program that assists wineries and wine growers, breweries, and distilleries in increasing sustainability by promoting best practices, providing technical assistance, and developing relationships.

Benefits

- Benefits to Membership:
  - Unique Branding
  - Website Recognition
  - Articles
  - Technical Assistance
  - New Member Recognition Event and Press Release
  - Online Resources

MEMBER

Promotional Items

Membership

- Membership may be obtained by fulfilling a range of sustainability requirements:
  - Water Conservation
  - Reduced air/water pollution
  - Increased waste reduction
  - Expanded community involvement compared to current industry standards for the spirits industry.

Application Process

- Submit Application
- Submit Utility Data and Production Data
- Submit Checklist
- OPSP Review Application, Data, and Checklist
- TDEC Internal Compliance Check
- On-Site Visit
- Sustainability Report
- Acceptance

Checklist

RESET

Sustainable Spirits Member Checklist

APPLICANT NAME:

To be considered a Tennessee Sustainable Spirits facility, the operation must complete 25 of the check boxes from the following lists.

Checklist items are a combination of operational- and facility-specific practices or equipment, some items may not be applicable to your facility. In that case, please make a note so that your membership status is not affected.

TDEC has identified several low- to no-cost sustainability measures that facilities can implement to directly enhance and increase operational sustainability. Since these measures are low cost, with exception of potentially requiring recycling, TDEC has established these measures as prerequisites (*) for participation in the program.

Water

Reducing water consumption, protecting water resources, and reusing water can help lower costs, reduce ecological impact, and create a healthier workplace.

- ☐ Low Flow Toilets
- ☐ Groundwater Monitoring (annual testing of water quality, metering, and/or water levels)
- ☐ Faucet Aerators/Sensors
- ☐ Water Reuse (reusing final rinse water for initial rinse on fermenters, reusing heated chill water for preheated water, etc.)
- ☐ **Quarterly Leak Checks* (documented review of water systems for leaks on at least a quarterly basis)**
- ☐ Reduced Water Usage Ratio from previous year.
- ☐ Cooling System Water Recycle (Heat Transfer)
- ☐ Effluent Meets Water Quality Standards
- ☐ Rainwater Capture (whether for storm water management or sustainable water sourcing)
- ☐ Storm Water Management
  - ○ Pervious Pavement
  - ○ Detention Basin
  - ○ Spill Kit/Containment System

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TN Department of Environment & Conservation

- ○ Storm Water Management Plan
- ○ Native Landscaping

Air

Both ambient and indoor air quality can have impacts on the environment and human health. By reducing air emissions within your facility, you are playing a role in improving air quality.

- ☐ CO2 Reuse
- ☐ Scrubbers
- ☐ Combustion Alternative (different from traditional direct fire)
- ☐ Radon Detection/Mitigation
- ☐ Volatile Organic Compound (VOC) Reduction – furniture, paint, flooring, etc.
- ☐ Alternatively Powered Equipment
  - ○ What kind?
- ☐ Reduction in Transportation – Locally Sourcing

Waste

Sustainably managing materials through minimizing resource consumption, maximizing reuse, adopting diversion strategies and recycling can reduce impacts to land resources and environment.

- ☐ **Recycling* (any type of landfill diversion effort that has a beneficial use for the materials listed below)**
  - ○ Glass
  - ○ Wood
  - ○ Plastic
  - ○ Cardboard/Paper
  - ○ Metal
- ☐ Composting
- ☐ Spent Grain/Pomace Use
- ☐ Alternative Packaging Material
- ☐ Management of Product Not Meeting Specifications
- ☐ Packaging Take back
- ☐ Packaging Reduction
- ☐ Waste reduction, diversion, and/or recycling education

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Checklist

Energy

Similar to water conservation, reducing energy consumption and implementing alternative energy sources can reduce utility costs and improve air quality.

- ☐ Alternative Energy
- ☐ Electric Vehicle Charging
- ☐ Completed Energy Audit
- ☐ Energy Star Appliances
- ☐ Efficient Lighting
- ☐ Efficient HVAC (> 15 SEER)
- ☐ Geothermal
- ☐ Efficient Cooling
- ☐ **Occupancy Sensors/Signage* (sensors designed to shut off lighting when rooms are not in use or signage reminding the importance of turning off the lights)**
- ☐ Efficient Insulation

Sourcing

Sourcing local ingredients, packaging, materials, and equipment can reduce the amount of greenhouse gases emitted from transportation.

- ☐ 50% Locally Sourced Ingredients – other than water for at least one product
- ☐ 50% Locally Sourced Packaging Material (within 500 miles)

Community

Conducting community engagement through educational opportunities and/or clean ups to improve the local environment, allows an organization to have a positive social and environmental impact on their surroundings.

- ☐ Outreach – by supporting sustainability in your community by attending and/or participating in events that support and provide education on sustainability topics.
- ☐ Steam clean-ups / roadside or community litter pick up / or other beautification activity
- ☐ Community Garden / composting / beehives
- ☐ Give Back Programs - which give back to the community – either through financial support, volunteering, or other actions that support surrounding areas.
- ☐ **Charitable Contributions* (any donation of money, goods and services, or time to the community)**
- ☐ Venue Opportunities – providing a free space for community organizations to meet.

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Maintenance

Regularly scheduled and performed maintenance extends operational life and capacity of equipment, therefore reducing emissions associated with operating these various pieces of equipment and reduces lifecycle environmental costs by decreasing the regularity with which these systems need to be replaced. Routine maintenance also helps in identifying fluid leaks from broken equipment sooner.

- ☐ Material Handling – Forklift, Pallet Jack…
- ☐ Green Cleaning – Non Production
- ☐ Delivery Vehicles
- ☐ HVAC
- ☐ Steam System
- ☐ Manufacturing/Packaging

Please use this additional space to describe any sustainability projects you are interested in implementing at your facility and would like more information on.

TN Department of Environment & Conservation

TN Department of Environment & Conservation

Next Steps for TNSS

- Increase membership
- Seek additional feedback from members and stakeholders
- Additional resources for members
- Resources for Homebrewers
- Resources for consumers
- Student Internship Partnership with MTSU
- Develop value stream mapping program for members

Our Pilot Program

- 4 Pilot Members
  - Jackalope Brewing
  - Keg Springs Winery
  - Short Mountain Distilling
  - Life is Brewing – Mantra
- New Members
  - Tennessee Distilling
  - East Nashville Beer Works
- As a pilot:
  - Submitted application, checklist, and data
  - Participated in site visit
  - Received sustainability report and acceptance letter
  - Participated in a face-to-face interview to discuss thoughts on pilot program and provide any feedback
- Pilot feedback and internal reviews shaped todays program and will continue to in the future

Jackalope Brewing Company

Sustainable Practices:

- Spent Grain Donated to Farmers
- Energy Efficiency Controls and Insulation
- Equipment Maintenance Plans

JACKALOPE
BREWING COMPANY
NASHVILLE, TENNESSEE

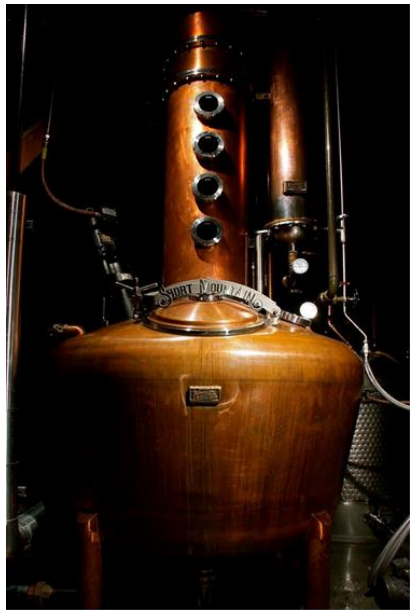
Keg Springs Winery

Sustainable Practices:

- Rooftop Solar Photovoltaic System
- On-site composting
- Packaging Reduction

Keg Springs Winery
Hampshire, TN

Short Mountain Distillery



Sustainable Practices:

- Locally Sourced Ingredients
- Low Flow Toilets and Faucet Aerators
- Recycling

SHORT MOUNTAIN DISTILLERY

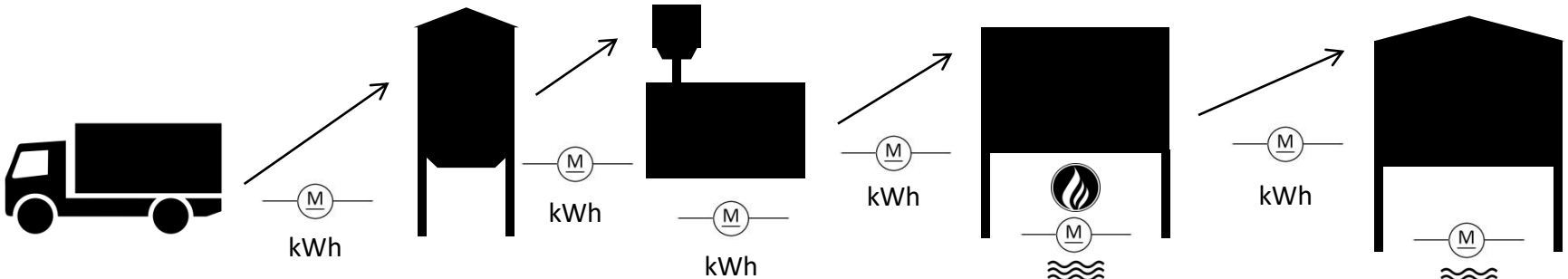
Life is Brewing - Mantra

Sustainable Practices:

- Water reuse and thermal reuse in brewing process
- Pick up for a pint
- Maintenance Staff

LIFE IS BREWING

Value Stream Mapping



Delivery

Grain Storage

Milling

Mashing

Lautering

Questions?

Mark Valencia
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(615) 253-5239

Tennessee is home to world class whisky, wine, beer, and other fine spirits.
The craft spirit producer's connection to people, land, and resources is a
relationship in which sustainability plays a vital role.

Sustainable Spirits Initiative

A Brief Overview

By

Robyn Whitted
KY EXCEL Program Coordinator and Pollution Prevention Specialist

Kentucky Division of Compliance Assistance

Environmental Assistance Branch

History of the Initiative

https://eec.ky.gov/Environmental-Protection/Compliance-Assistance/Pages/sustainable-spirits.aspx

- Started in 2011
- Collaboration
  - Kentucky Division of Compliance Assistance (DCA)
  - Kentucky Distillers' Association
- Objective
  - To help Distilleries and Breweries
  - Bring Members of Industry Together
  - Discuss and Share Experiences
    - About Current Environmental Issues
    - Aspire to Shape Future Opportunities

2012 Sustainable Spirits Summit
Woodford Reserve Distillery

Sustainable Spirits Summit

https://eec.ky.gov/Environmental-Protection/Compliance-Assistance/Pages/sustainable-spirits.aspx

Sustainable Spirits Initiative

Sustainable Spirits Sun

https://eec.ky.gov/Environmental-Protection/Compliance-Assistance/Pages/sustair

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-spirits.aspx

BROWN-FORMAN

Copper & Kings
ESTABLISHED
AMERICAN BRANDY

ANGEL'S ENVY
KENTUCKY STRAIGHT
BOURBON WHISKEY
FINISHED IN PORT WINE BARRELS

ESTD OLD 1870
FORESTER
DISTILLING CO.

Sustainable Spirits Summit

https://eec.ky.gov/Environmental-Protection/Compliance-Assistance/Pages/sustainable-spirits.aspx

- Attendees
  - Distilleries
  - Breweries
  - Wineries
  - Government
  - Universities
  - Private Sector
- Marketing and Recruitment
  - Industry Associations
  - Cabinet Communications Team
  - Other Government Entities
  - Private Sector

2017 Sustainable Spirits Summit
Copper & Kings

Sustainable Spirits Summit

https://eec.ky.gov/Environmental-Protection/Compliance-Assistance/Pages/sustainable-spirits.aspx

Lessons Learned

- Do not be afraid of new ideas
- Ensure familiarity with host location
- Facilitating discussion
- Be open minded to feedback

2018 Sustainable Spirits Summit
Angel's Envy Distillery

Sustainable Spirits Initiative

Beyond the Summit

https://eec.ky.gov/Environmental-Protection/Compliance-Assistance/Pages/sustainable-spirits.aspx

Success Stories

Collaborative document shared with visitors along Kentucky's Bourbon Trail

Sustainable Spirits Initiative

Beyond the Summit

https://eec.ky.gov/Environmental-Protection/Compliance-Assistance/Pages/sustainable-spirits.aspx

Site Visits and Technical Assistance

2012 DCA Site Visit
Woodford Reserve Distillery

2018 Litter Pickup
Four Roses Distillery

2012 DCA Site Visit
West Sixth Brewery

Sustainable Spirits Initiative

Beyond the Summit

https://eec.ky.gov/Environmental-Protection/Compliance-Assistance/Pages/sustainable-spirits.aspx

KY EXCEL Member Recruitment

2018 KY EXCEL Field Trip
Maker's Mark Distillery

"The Maker's 46 Cellar" is an environmentally friendly storage warehouse built into the hillside and has a green roof. Its design helps reduce energy costs.

ls
s over 684 acres and plans
r property while constantly

entire area and nesting boxes for purple martins, owls, kestrels, bluebirds and ducks were placed throughout the Natural Water Sanctuary and the shores of Bourbon Lake.

Sustainable Spirits Initiative

Beyond the Summit

https://eec.ky.gov/Environmental-Protection/Compliance-Assistance/Pages/sustainable-spirits.aspx

Events

- Roundtables
- Workshops
- Webinars

2019 Sustainable Spirits Workshop
Goodwood Brewery

Sustainable Spirits Initiative

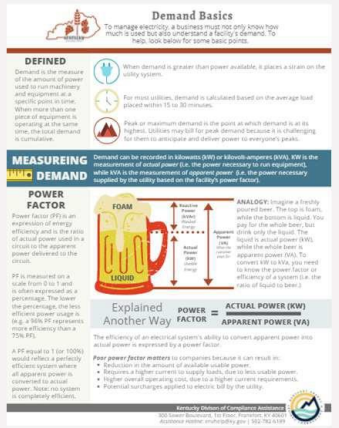
Beyond the Summit

https://eec.ky.gov/Environmental-Protection/Compliance-Assistance/Pages/sustainable-spirits.aspx

Tools and Resources

Best Management Practice Guides

Introductory Videos



Infographics

Questions?

Division of Compliance Assistance
Environmental Assistance Branch

ENVHelp@ky.gov
502-782-6189

KPPC
Kentucky's Resource Center for Environmental Sustainability

KPPC - Kentucky Pollution Prevention Center

Sustainability Tools for Distilleries and Breweries

Samantha Gordon, CEM
Senior Engineer, KPPC

Mark Toda, CEM
Senior Engineer, KPPC

UofL J.B. SPEED SCHOOL OF ENGINEERING

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

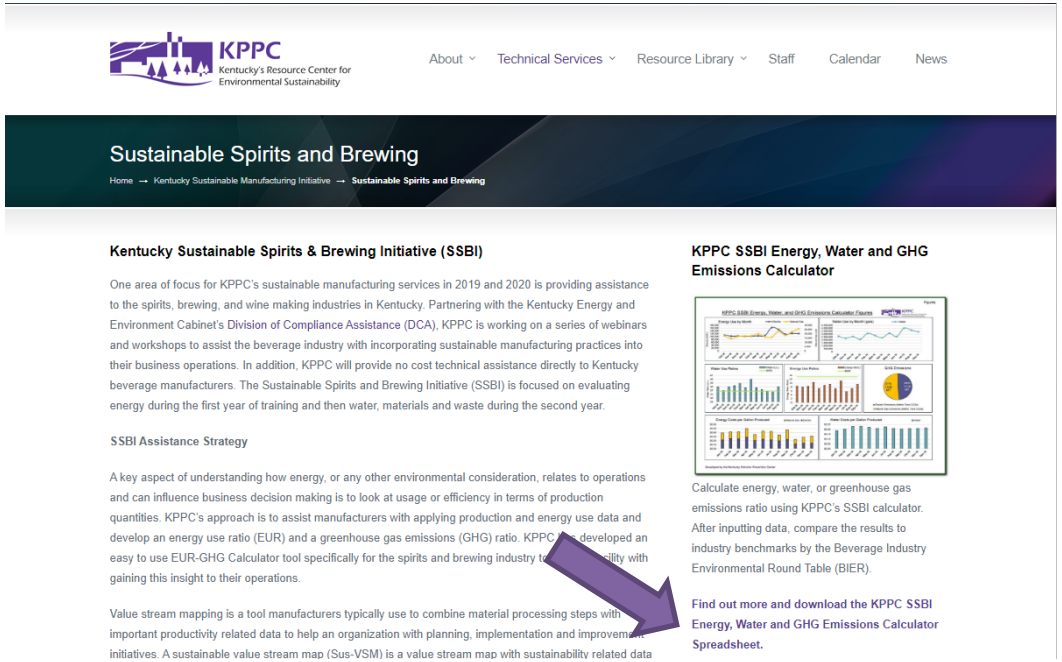
Free • Confidential • Non-regulatory

Tools

- KPPC SSBI Calculator
- Sustainable Value Stream Map
- Water Balance

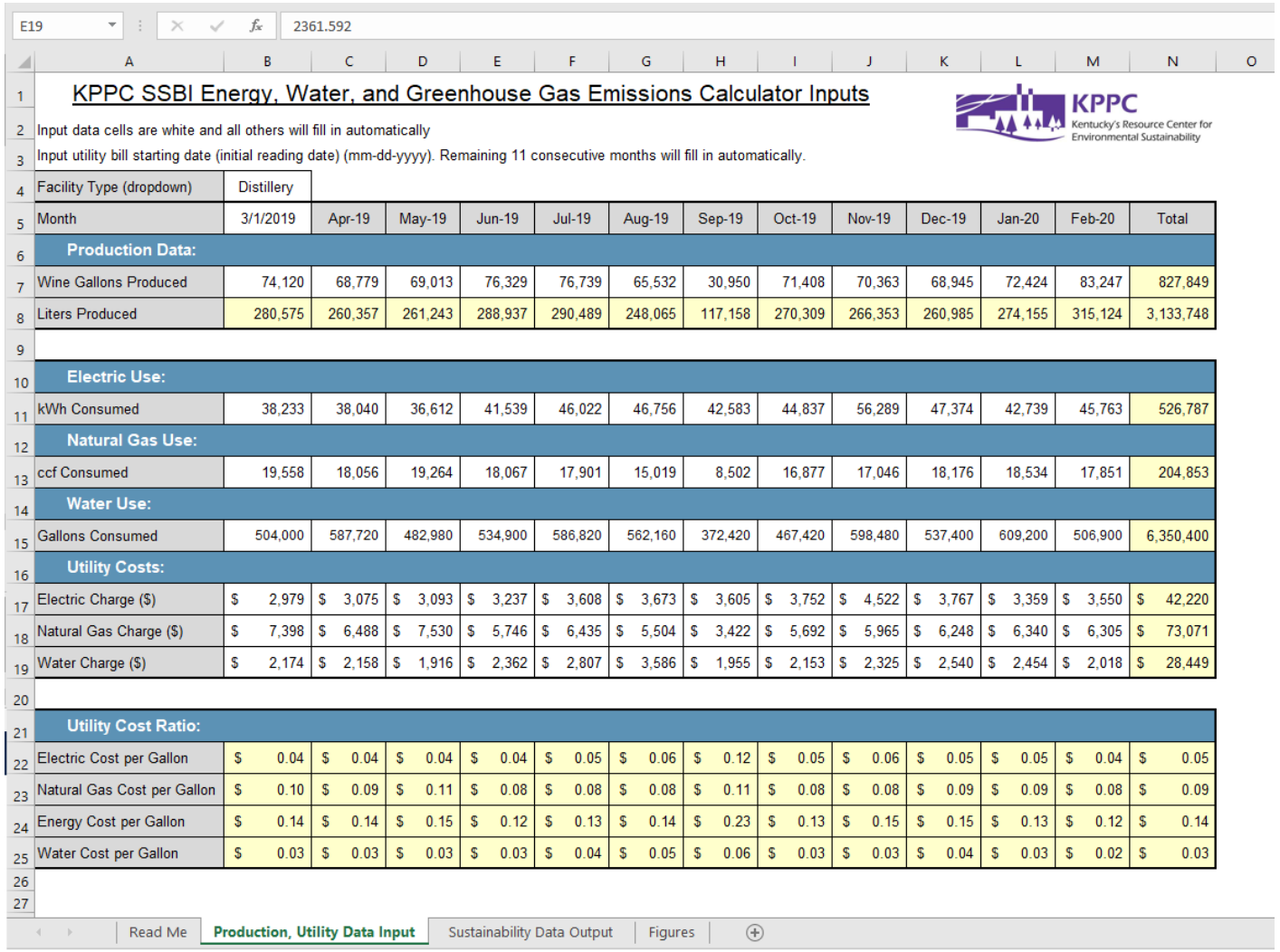
KPPC SSBI Calculator

Find it on the KPPC website



http://kppc.org/ssb

SSBI Calculator



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KPPC SSBI Energy, Water, and Greenhouse Gas Emissions Calculator Inputs

KPPC Kentucky's Resource Center for Environmental Sustainability

Input data cells are white and all others will fill in automatically

Input utility bill starting date (initial reading date) (mm-dd-yyyy). Remaining 11 consecutive months will fill in automatically.

Facility Type (dropdown)	Distillery												
Month	3/1/2019	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Total
Production Data:													
Wine Gallons Produced	74,120	68,779	69,013	76,329	76,739	65,532	30,950	71,408	70,363	68,945	72,424	83,247	827,849
Liters Produced	280,575	260,357	261,243	288,937	290,489	248,065	117,158	270,309	266,353	260,985	274,155	315,124	3,133,748
Electric Use:													
kWh Consumed	38,233	38,040	36,612	41,539	46,022	46,756	42,583	44,837	56,289	47,374	42,739	45,763	526,787
Natural Gas Use:													
ccf Consumed	19,558	18,056	19,264	18,067	17,901	15,019	8,502	16,877	17,046	18,176	18,534	17,851	204,853
Water Use:													
Gallons Consumed	504,000	587,720	482,980	534,900	586,820	562,160	372,420	467,420	598,480	537,400	609,200	506,900	6,350,400
Utility Costs:													
Electric Charge ($)	$ 2,979	$ 3,075	$ 3,093	$ 3,237	$ 3,608	$ 3,673	$ 3,605	$ 3,752	$ 4,522	$ 3,767	$ 3,359	$ 3,550	$ 42,220
Natural Gas Charge ($)	$ 7,398	$ 6,488	$ 7,530	$ 5,746	$ 6,435	$ 5,504	$ 3,422	$ 5,692	$ 5,965	$ 6,248	$ 6,340	$ 6,305	$ 73,071
Water Charge ($)	$ 2,174	$ 2,158	$ 1,916	$ 2,362	$ 2,807	$ 3,586	$ 1,955	$ 2,153	$ 2,325	$ 2,540	$ 2,454	$ 2,018	$ 28,449
Utility Cost Ratio:													
Electric Cost per Gallon	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.05	$ 0.06	$ 0.12	$ 0.05	$ 0.06	$ 0.05	$ 0.05	$ 0.04	$ 0.05
Natural Gas Cost per Gallon	$ 0.10	$ 0.09	$ 0.11	$ 0.08	$ 0.08	$ 0.08	$ 0.11	$ 0.08	$ 0.08	$ 0.09	$ 0.09	$ 0.08	$ 0.09
Energy Cost per Gallon	$ 0.14	$ 0.14	$ 0.15	$ 0.12	$ 0.13	$ 0.14	$ 0.23	$ 0.13	$ 0.15	$ 0.15	$ 0.13	$ 0.12	$ 0.14
Water Cost per Gallon	$ 0.03	$ 0.03	$ 0.03	$ 0.03	$ 0.04	$ 0.05	$ 0.06	$ 0.03	$ 0.03	$ 0.04	$ 0.03	$ 0.02	$ 0.03

Read Me | **Production, Utility Data Input** | Sustainability Data Output | Figures

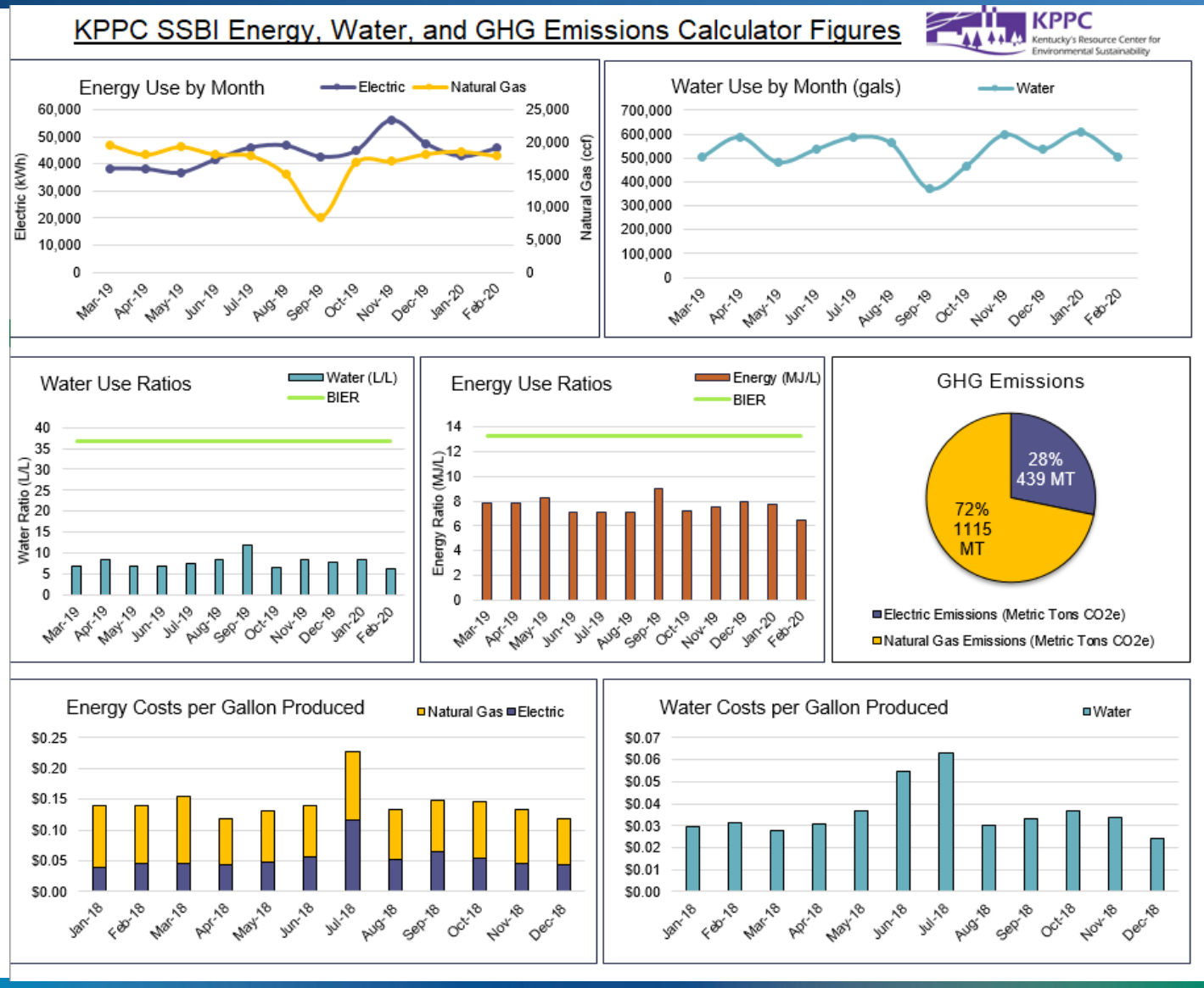
SSBI Calculator

KPPC SSBI Energy, Water, and Greenhouse Gas Emissions Calculator

KPPC Kentucky's Resource Center for Environmental Sustainability

Sustainability Data	Month												Annual	Avg.
Month	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20		
Energy														
Electric Use (MMbtu)	130	130	125	142	157	160	145	153	192	162	146	156	1,797	
Natural Gas Use (MMbtu)	1,995	1,842	1,965	1,843	1,826	1,532	867	1,721	1,739	1,854	1,890	1,821	20,895	
Total Energy Use (MMbtu)	2,125	1,972	2,090	1,985	1,983	1,692	1,012	1,874	1,931	2,016	2,036	1,977	22,692	
Energy Use Ratios														
Electric Use per Liter (kWh/L)	0.14	0.15	0.14	0.14	0.16	0.19	0.36	0.17	0.21	0.18	0.16	0.15		0.17
Natural Gas Use per Liter (ccf/L)	0.07	0.07	0.07	0.06	0.06	0.06	0.07	0.06	0.06	0.07	0.07	0.06		0.07
Total Energy Use per Liter (MJ/L) [BIER]	7.85	7.84	8.28	7.12	7.07	7.07	8.97	7.18	7.51	8.00	7.69	6.50		7.50
Water Use Ratios														
Water Use per Liter Produced (L/L) [BIER]	6.8	8.5	7.0	7.0	7.6	8.6	12.0	6.5	8.5	7.8	8.4	6.1		7.67
Greenhouse Gas Emissions														
Electric Emissions (Metric Tons CO_2e)	32	32	30	35	38	39	35	37	47	39	36	38	439	
Natural Gas Emissions (Metric Tons CO_2e)	106	98	105	98	97	82	46	92	93	99	101	97	1,115	
Total Emissions (Metric Tons CO_2e)	138	130	135	133	136	121	82	129	140	138	136	135	1,554	
Greenhouse Gas Emissions Ratios														
Electric Emissions Ratio (g CO_2e/L)	113	122	117	120	132	157	303	138	176	151	130	121	1,779	148
Natural Gas Emissions Ratio (g CO_2e/L)	379	378	401	340	335	330	395	340	348	379	368	308	4,303	359
Total Emissions Ratio (g CO_2e/L) [BIER]	493	499	518	460	467	487	698	478	524	530	498	429		496

SSBI Calculator



Highlights

- Create a baseline
- Benchmark against BIER or internally
- Economies of scale

KPPC Calculator Results

	Energy Use Ratio (MJ/L)	Emissions Ratio (g CO2e/L)	Water Use Ratio (L/L)
Distillery A			
Distillery B			
Distillery C			
Brewery A			
Brewery B			

BIER Benchmarks

Beverage Industry Environmental Roundtable (BIER) Benchmarks			
Averaged from 2013, 2015, 2017 energy, water, and emissions surveys			
	Energy Use Ratio (EUR) (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

Motors by Process Step

Grain Unload

	hp	kW	lf	df	hr	kWh
C102	2	1.5			2	3
BE 102	3	2.2			2	4
Total Electric Demand (kW)		**4**				
Electric Usage Per Cook (kWh)		**7**				

Mill / Cook

	hp	kW	lf	df	hr	kWh
Milling						
C111	1	1			4	3
B101 Dust	10	7			4	30
C104	15	11			4	45
C105	15	11			4	45
BE 101	3	2			4	9
HM 101	150	112			4	448
B102	125	93			4	373
Cooking						
AG 201	30	22			7	157
AG 305	0.33	0			7	2
CH1	60 Ton	72			2	144
CH2	100 Ton	86			2	172
Total Electric Demand (kW)		**419**				
Electric Usage Per Cook (kWh)		**1,426**				

Fermentation

	hp	kW	lf	df	hr	kWh
P708 Cool	?					0
P709 Cool	?					0
						0
CH1	60 Ton	71.9			0.5	36
CH2	100 Ton	86			0.5	43
Total Electric Demand (kW)		**158**				
Electric Usage Per Cook (kWh)		**79**				

Distillation

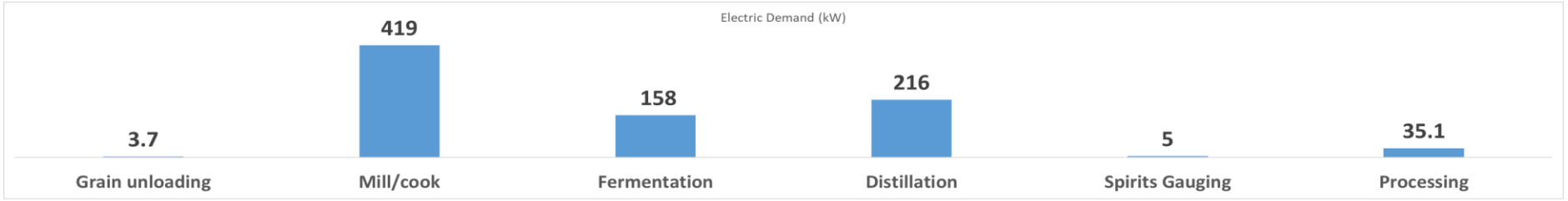
	hp	kW	lf	df	hr	kWh
P303	25	19			2	37
AG 501	7.5	6			24	134
P501 Beer Well	20	15			12	179
P505 H/T	2	1			12	18
P502 Stllg	8	6			12	67
AG 401	2	1			12	18
AG406	2	1			12	18
P403	2	1			12	13
P404 H/T	10	7			12	90
CH1	60 Ton	72			4	288
CH2	100 Ton	86			4	344
Total Electric Demand (kW)		**216**				
Electric Usage Per Cook (kWh)		**1,206**				

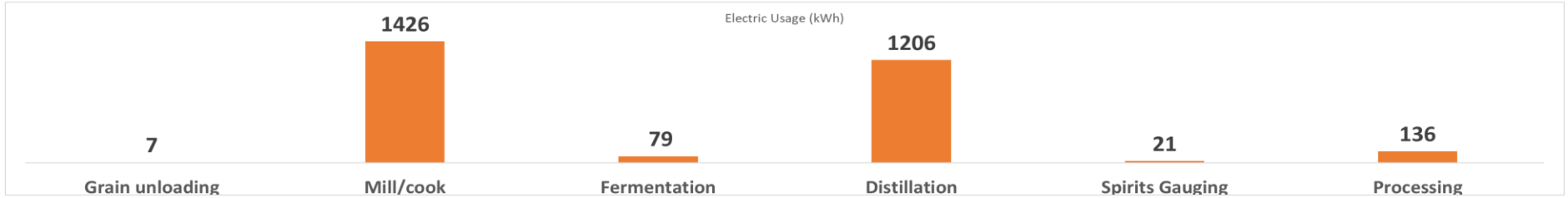
Spirits Guaging

	hp	kW	lf	df	hr	kWh
P503	1	1			4	3
P506	3	2			4	9
P507	3	2			4	9
Total Electric Demand (kW)		**5**				
Electric Usage Per Cook (kWh)		**21**				

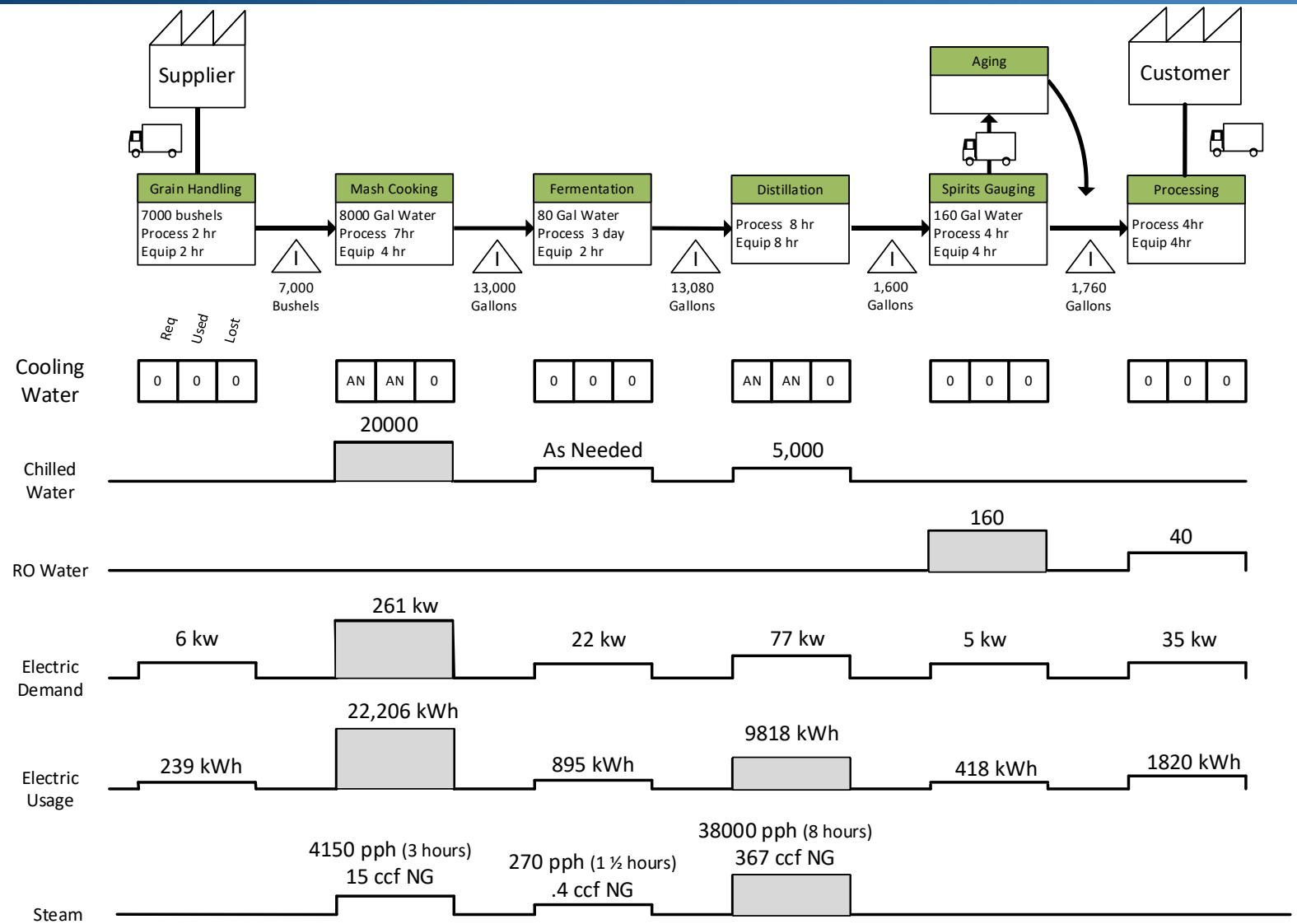
Processing

	hp	kW	lf	df	hr	kWh
P707	3	2.2			4	9
P504 R/O	3	2.2			2	4
P702 Port	5	3.7			4	15
P703 Filter	5	3.7			4	15
P704 Proc	5	3.7			4	15
P707 Dump	1	1			4	3
P701 Bourbon	5	4			4	15
P705 Bot	5	4			4	15
P706 Bot	5	4			4	15
10 Convey	10	7			4	30
Total Electric Demand (kW)		**35**				
Electric Usage Per Cook (kWh)		**136**				

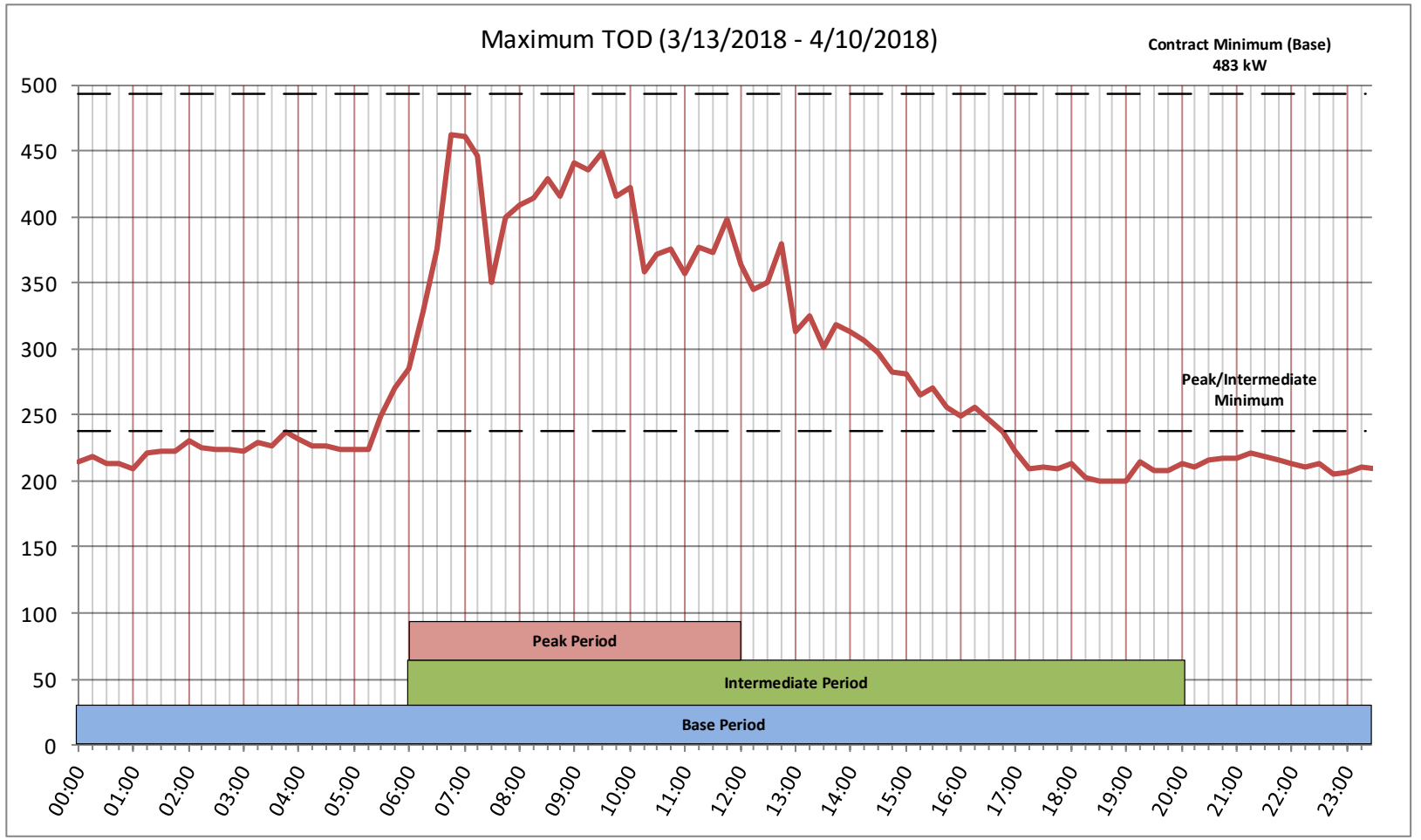




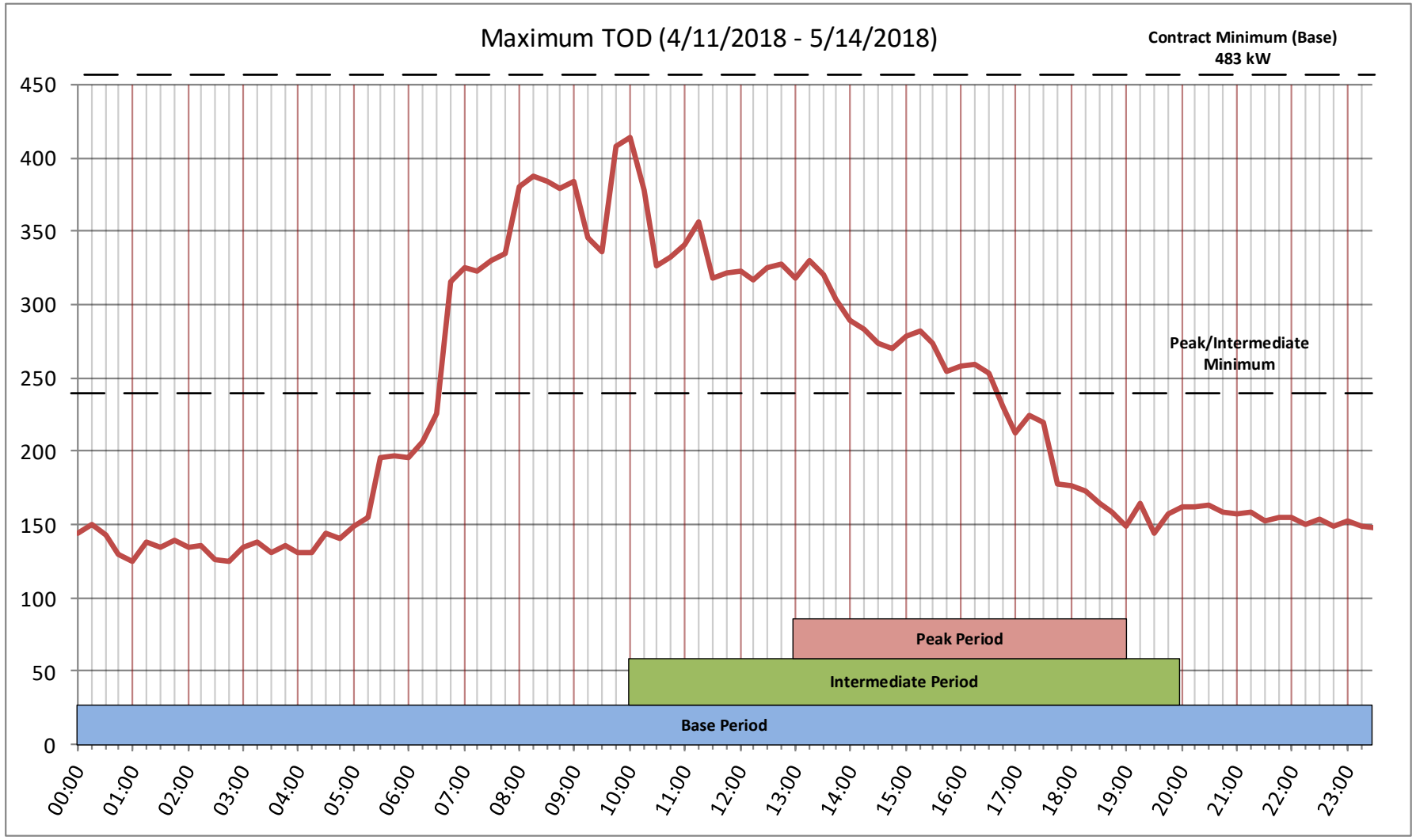
Sustainable Value Stream Map - Distillery



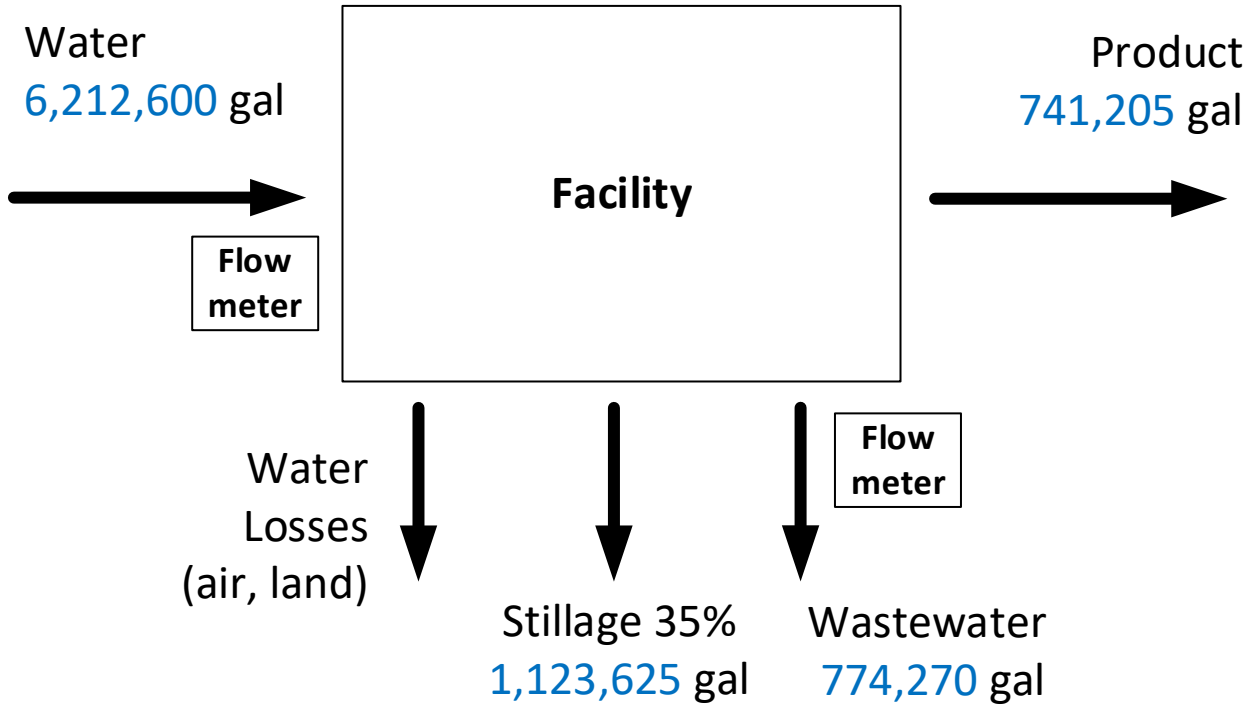
Electric Demand Interval Analysis - Winter



Electric Demand Interval Analysis - Summer



Water Balance



Water Losses	=	Water Supply	-	Waste water	-	Product water	-	Stillage
3,573,625	=	6,212,600	–	774,270	–	741,205	–	1,123,625

Water Loss Calculation

Facility Type (dropdown)	Distillery												
Month	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19	Total
Production Data:													
Wine Gallons Produced	741,205	687,793	690,134	763,296	767,393	655,320	309,504	714,084	703,636	689,453	724,244	832,479	8,278,541
Water Use:													
Gallons Consumed	6,212,600	5,115,600	6,840,200	6,206,400	5,936,100	4,014,700	4,966,500	6,317,800	5,672,800	6,426,200	5,363,000	6,019,500	69,091,400
Wastewater Use:													
Gallons Discharged	774,270	1,725,150	1,180,169	1,445,170	894,410	1,137,263	821,034	1,271,736	598,102	1,075,958	555,881	498,931	11,978,074
Stillage:													
Gallons Discharged	1,123,500	1,123,500	1,123,500	1,123,500	1,123,500	1,123,500	1,123,500	1,123,500	1,123,500	1,123,500	1,123,500	1,123,500	13,482,000
Water Loss = Water - Product - Wastewater - Stillage													
Gallons lost	3,573,625	1,579,157	3,846,397	2,874,434	3,150,797	1,098,617	2,712,462	3,208,480	3,247,562	3,537,289	2,959,375	3,564,590	35,352,785
Pecentage of water use	57.5	30.9	56.2	46.3	53.1	27.4	54.6	50.8	57.2	55.0	55.2	59.2	603

Questions

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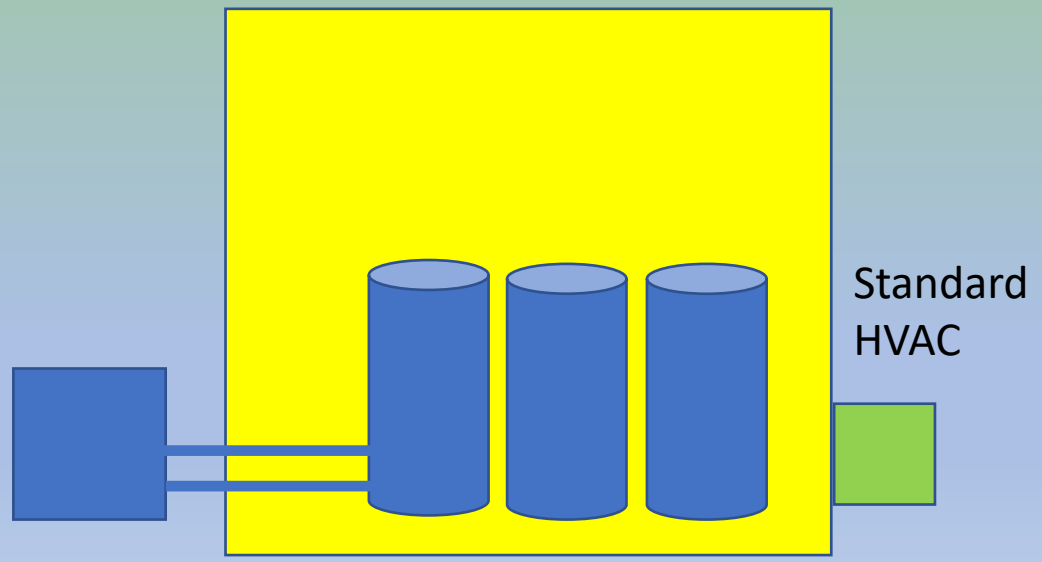
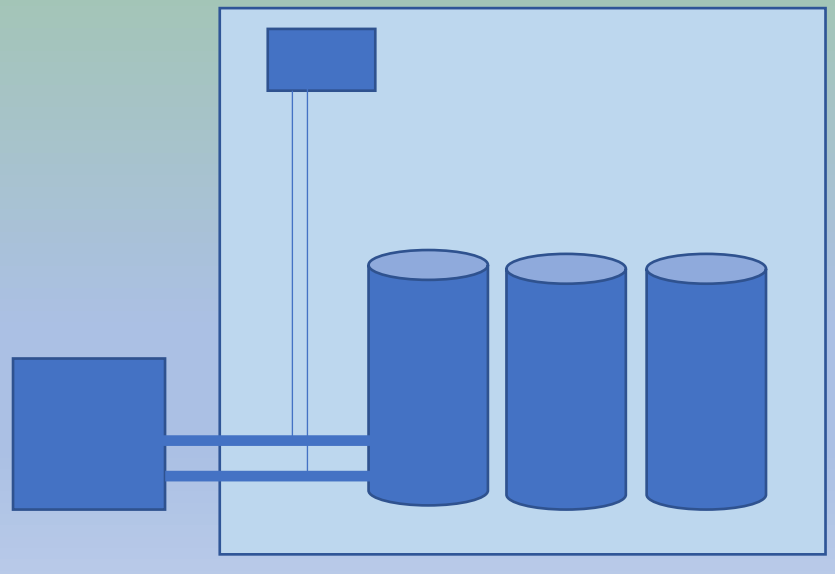
Energy Use and Savings Opportunities in Micro-Wineries

Two similar micro-wineries were audited, plant 1 had the chilled fermentation tanks in a standard room controlled to room temperature by the HVAC system, while plant 2 had the tanks in a room also chilled by the chiller with evaporator fan units:

Plant type 1: chilled fermentation tanks in room-temperature room



Plant type 2: chilled fermentation tanks in chilled room



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Energy Use and Savings Opportunities in Micro-Wineries

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Two similar micro-wineries were audited, plant 1 had the chilled fermentation tanks in a standard room controlled to room temperature by the HVAC system, while plant 2 had the tanks in a room also chilled by the chiller with evaporator fan units:

	total electric	HVAC space cooling	Chiller	Chiller circ pumps	Total cooling
plant 1, tanks in HVAC room	56,266 kWh/year	13,513 kWh/year	18,113 kWh/year	16,400 kWh/year	48,026 kWh/year
plant 2, tanks in chilled room	66,214 kWh/year[1]	6,000 kWh/year	13,802 kWh/year	19,350 kWh/year	43,752 kWh/year
	1: electric heat and "slushy" machines not included since not in plant 1				

Thus while plant 2 is slightly larger, at least based on comparable total electric consumption, total cooling consumption is lower (66 % vs. 85 %).

Thus it appears that plants with the tanks in a chilled room (~ 40-45 F) will consume ~ 19 % less overall electricity.

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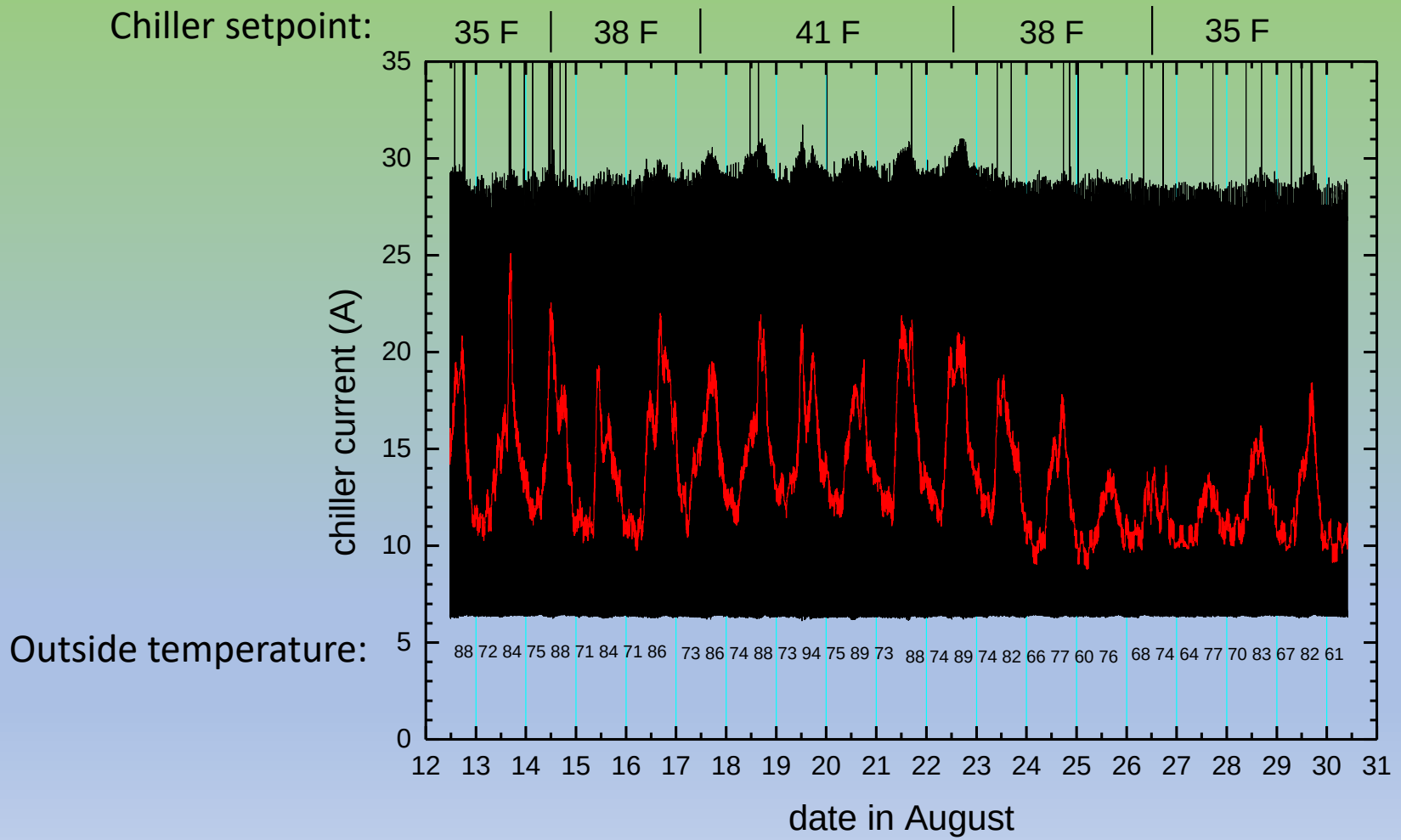
Energy Use and Savings Opportunities in Micro-Wineries

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

It was explored whether adjusting chiller temperature in plant 2 would result in lower energy consumption.



The experiment is made difficult due to the strong dependence of chiller power on outside temperature.

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Energy Use and Savings Opportunities in Micro-Wineries

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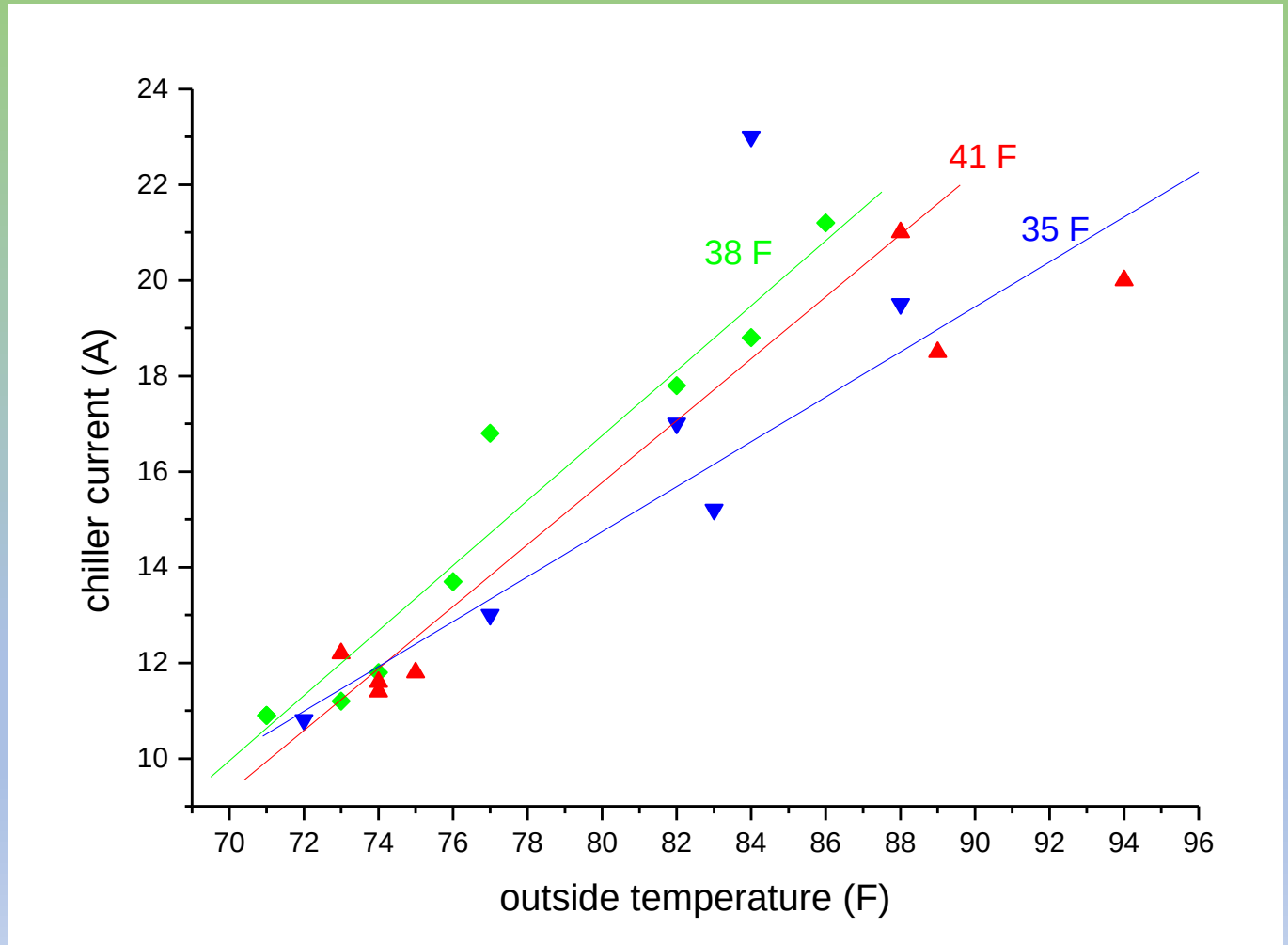

Chiller consumption normalized to outside temperature was actually lower for lowest chiller temperature.

It seems more likely that variations are within the noise and to 1st order it does not matter what the chiller set point is over the range tested.

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The chiller circulation pump consumes ~ 23 % of plant electric consumption. Since it serves variable loads (the fermentation room evaporators and the tanks themselves) it is an opportunity for a variable speed drive.

ASSESSMENT RECOMMENDATION #8
INSTALL A VARIABLE DRIVE ON THE CHILLER CIRCULATION PUMP

Annual Resource Savings			Annual Cost Savings	Implementation Costs	Simplified Payback Period
Electricity	12,820	kWh	$1,270	$3,040	2.39 years

15 % overall plant electric savings

Qty	Description	Rate	Total
1	Pump, 3/4HP 1 Phase Berkeley	512.36	512.36
1	15 Amp, 2-Pole, FAZ Series Din Rail Mount Circuit Breaker, 277/480V AC C-H FAZ-C15/2 MINIATURE	134.92	134.92
1	VFD Option 2HP 208-240V 3Phase includes: -VFD controller, 2HP 3PH 208-240V AC -Pressure transducer for pump (0-100PSI) -Fuse block,15Amp fuses, and fuse block covers	892.48	892.48
	Subtotal		1,539.76

Est. $1500 labor

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AR No.	Description	Electricity kWh	Propane MMBtu	Cost Savings $	Implementation Cost $	Payback Period years	
1	Replace interior and exterior photocell incandescent bulbs with LED	5,494	0	$544	$182	0.33	✓
2	Replace exterior timer bulbs with LED	1,301	0	$129	$165	1.28	✓
3	Replace office/bathroom fluorescent tubes with 15W LED	881	0	$87	$206	2.37	next
4	Switch AHUs to fan-auto	2,890	0	$286	$0	0.00	✓
5	Consolidate back slushy material each week and turn off	2,173	0	$215	$50	0.23	✓
6	Program all heat pumps for 67/58 winter and 72/78 summer occupied/unoccupied	1,186	0	$117	$0	0.00	✓
7	Install occupancy sensors for bathroom fan/light switches	1,359	0	$135	$650	4.81	✓
8	Install a variable drive on the chiller circulation pump	12,820	0	$1,270	$3,040	2.39	Can’t find installer
9	Replace patio fan heater with radiant heaters	0	14	$306	$850	2.78	✓
	Total Savings	**28,104**	**14**	**$3,089**	**$5,143**	**1.58**	
	Current Consumption	**84,920**	**77**	**$10,331**			
	% Reduction	**33%**	**18%**	**30%**			

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Energy Use and Savings Opportunities in Micro-Wineries

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Conclusions:

- Cooling costs dominate
- Placing fermentation tanks in room chilled by same chiller reduces electric consumption by 19 %
- It did not seem to matter adjusting chiller set point from 35 to 41 F
- Largest single consumer is chilled water circulation pump
  - 23 % of electric consumption
  - 15 % reduction in plant electric consumption possible with variable speed drive
  - Simple payback = 2.4 years
  - Offered as a chiller option, but difficult to find installer after-sale. message: chose the option when purchased.
- Recommendations implemented were lighting, HVAC, and retail operation-based
  - 18 % electric reduction
  - 18 % propane reduction

Adrian Mobilia

Owner and Operator,

Salted Vines

Vineyard & Winery

Questions

P2: Considering the Human Factor

January 25, 2021

10:30 am – Noon ET

Thank You!

- Please complete the post-webinar survey
- Today's session was recorded and will be available on the EPA website