Before we get started…

Join at: **www.menti.com**

Use code: **3108 1754**

What kinds of energy-saving opportunities are you pursuing?

JANUARY 25, 2024

Energy-saving Opportunities in the Food & Beverage Processing Sector

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Senior Manager, Consulting Services
Goldfin Consulting

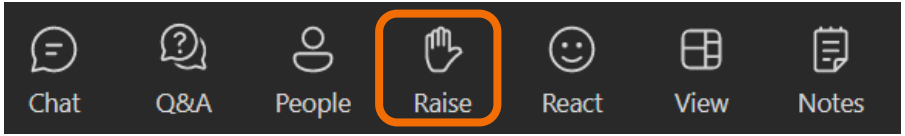
Bruce Taylor
President
Enviro-Stewards

Today's Agenda

1. Identifying Energy-saving Opportunities
2. Common Opportunities in the Food & Beverage Sector
3. Answering your Questions

Participate in the discussion!

Raise hand or use the chat or Q&A to comment or ask questions.



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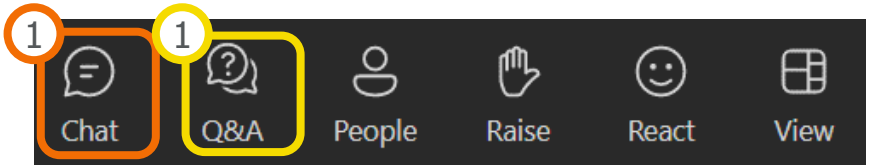
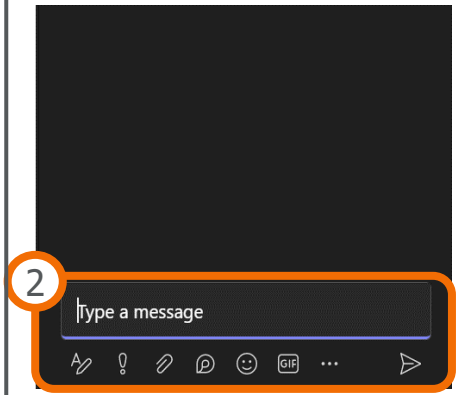
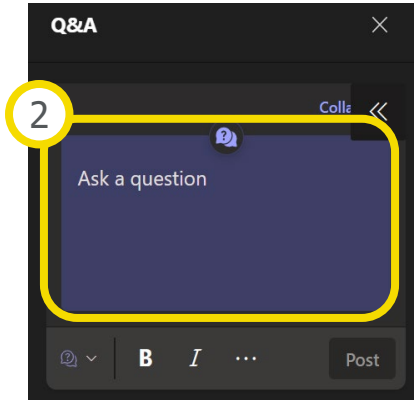






Follow along in your workbook

Have the workbook open or printed out

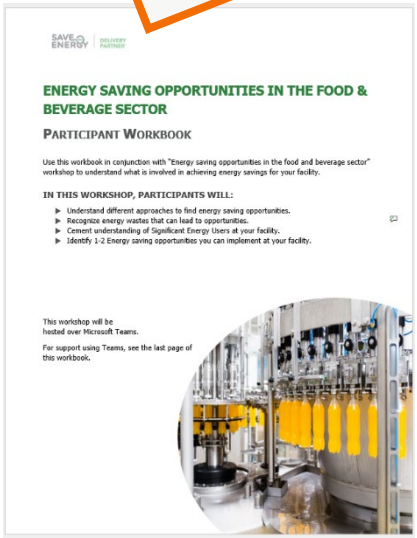
We will be using the Participant Workbook to summarize and reinforce key points and record your key take-aways.

Where to find the workbook:

- In the chat

Watch for this icon to help follow along

Pg. 1


ENERGY SAVING OPPORTUNITIES IN THE FOOD & BEVERAGE SECTOR

PARTICIPANT WORKBOOK

Use this workbook in conjunction with "Energy saving opportunities in the food and beverage sector" workshop to understand what is involved in achieving energy savings for your facility.

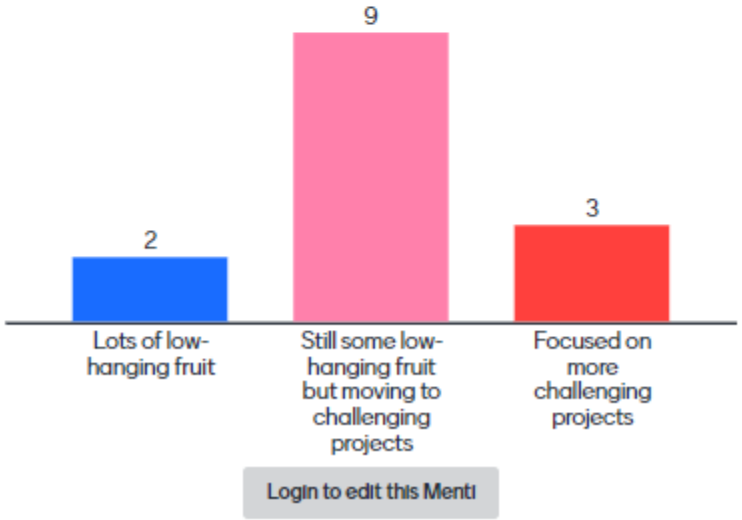
IN THIS WORKSHOP, PARTICIPANTS WILL:

- Understand different approaches to find energy saving opportunities.
- Recognize energy wastes that can lead to opportunities.
- Cement understanding of Significant Energy Users at your facility.
- Identify 1-2 Energy saving opportunities you can implement at your facility.

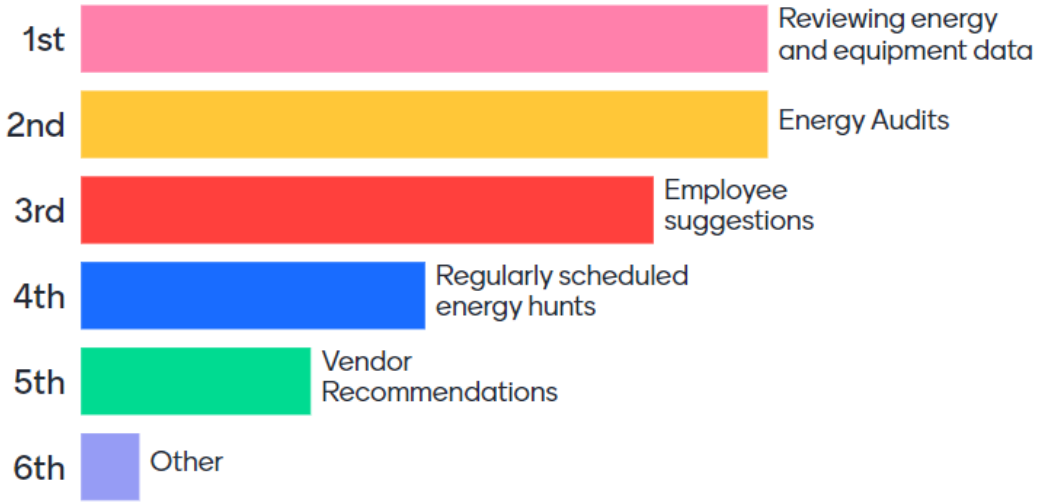
This workshop will be hosted over Microsoft Teams.

For support using Teams, see the last page of this workbook.

What kinds of energy-saving opportunities are you pursuing?



What do you do to find opportunities?



Practices to Identify Opportunities

Data Analysis

- Energy Baseline Models
- Interval Data Analysis
- Benchmarking

Site Searches

- Energy Audit
- Energy Hunt

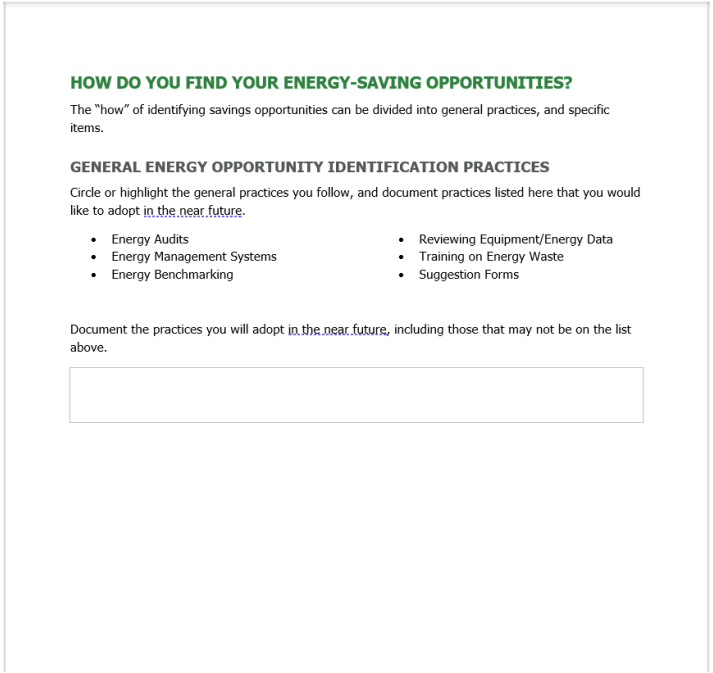
Employee-facing Strategies

- Energy Training Sessions
- Suggestion Box
- Reviewing Capital Plans

How do you Find your Energy-saving Opportunities

Pg. 3

- Turn to page 3 of your workbook
- Take some time to identify strategies you currently use at your facility and future strategies you would like to implement



HOW DO YOU FIND YOUR ENERGY-SAVING OPPORTUNITIES?

The "how" of identifying savings opportunities can be divided into general practices, and specific items.

GENERAL ENERGY OPPORTUNITY IDENTIFICATION PRACTICES

Circle or highlight the general practices you follow, and document practices listed here that you would like to adopt in the near future.

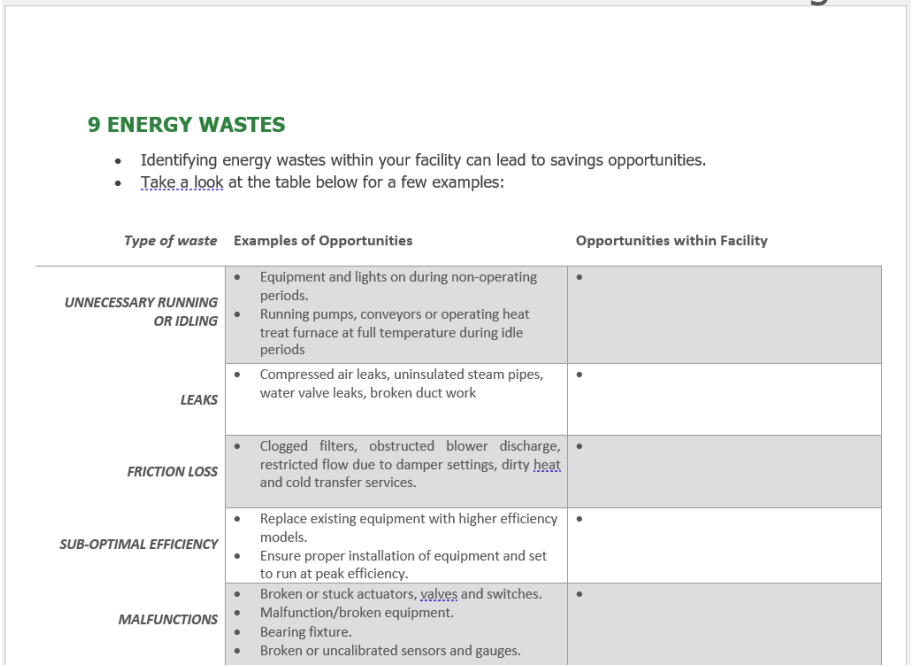
- Energy Audits
- Energy Management Systems
- Energy Benchmarking
- Reviewing Equipment/Energy Data
- Training on Energy Waste
- Suggestion Forms

Document the practices you will adopt in the near future, including those that may not be on the list above.

Nine Energy Wastes Review

Pg. 4

- Turn to page 4 of your workbook
- Think about where those energy waste may be occurring in your facility



9 ENERGY WASTES

- Identifying energy wastes within your facility can lead to savings opportunities.
- Take a look at the table below for a few examples:

Type of waste	Examples of Opportunities	Opportunities within Facility
UNNECESSARY RUNNING OR IDLING	• Equipment and lights on during non-operating periods. • Running pumps, conveyors or operating heat treat furnace at full temperature during idle periods	•
LEAKS	• Compressed air leaks, uninsulated steam pipes, water valve leaks, broken duct work	•
FRICTION LOSS	• Clogged filters, obstructed blower discharge, restricted flow due to damper settings, dirty heat and cold transfer services.	•
SUB-OPTIMAL EFFICIENCY	• Replace existing equipment with higher efficiency models. • Ensure proper installation of equipment and set to run at peak efficiency.	•
MALFUNCTIONS	• Broken or stuck actuators, valves and switches. • Malfunction/broken equipment. • Bearing fixture. • Broken or uncalibrated sensors and gauges.	•

Nine Energy Wastes

Unnecessary Running or Idling

Leaks

Friction Loss

Sub-optimal Efficiency

Malfunctions

System Imbalance

Misapplication

Underutilization

Traditional Lean Waste

Energy Waste Examples

Unnecessary Running or Idling
Keeping ovens on when there is no product in the oven

Sub-optimal Efficiency
Poor sequencing of chillers (e.g., the least efficient chiller is the baseload chiller)

Misapplication
Using compressed air for cleaning or personal cooling

Energy Waste Examples

Leaks
Leaks in wash water systems, refrigerant leaks

Malfunctions
Broken seals on refrigerant doors

Underutilization
Oven space not fully utilized

Energy Waste Examples

Friction Loss
Product build-up on pipe interiors

Traditional Lean Waste
Product waste

System Imbalance

System imbalance occurs when the work being provided (heating, cooling, other) does not match the level required.

System Imbalance Examples

- Chiller set-points not optimized and not responsive to outdoor conditions
- Pumps oversized
- Process temperatures too high

Mentimeter

Where might unnecessary running be occurring in your site?

7 responses

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Mentimeter

What are your three largest energy users?

Ventilation	Dewatering	Transport	Crushing	Grinding	Lighting	Compressed Air	Other
0	0	0	0	0	0	0	0

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Common SEU's in Food & Beverage Facilities

Pg. 6

- Refrigeration/Freezing
- Ovens/Baking
- Mixers/Grinders
- Cleaning systems
- Pumps & Fans
- Compressed Air
- Other

Bruce Taylor, President, Enviro-Stewards Inc.

Purpose:

- Identify Practical Affordable Measures to Conserve Energy

Process:

- Holistic Project Approach
- Relevant Case Studies
- Question & Answer

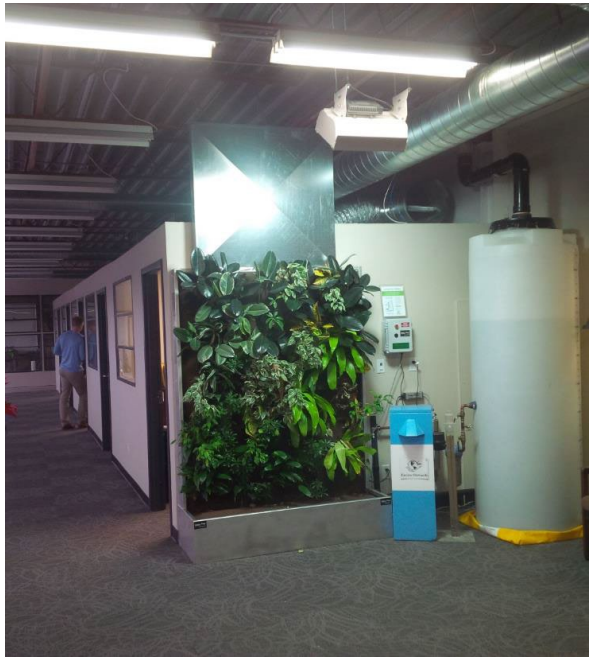
Payoff:

- Higher Margin, Smaller Footprints, and Brand Stewardship

Walk the Walk

Footprint: Operations (Scope 1&2), Supply Chain (Scope 3)

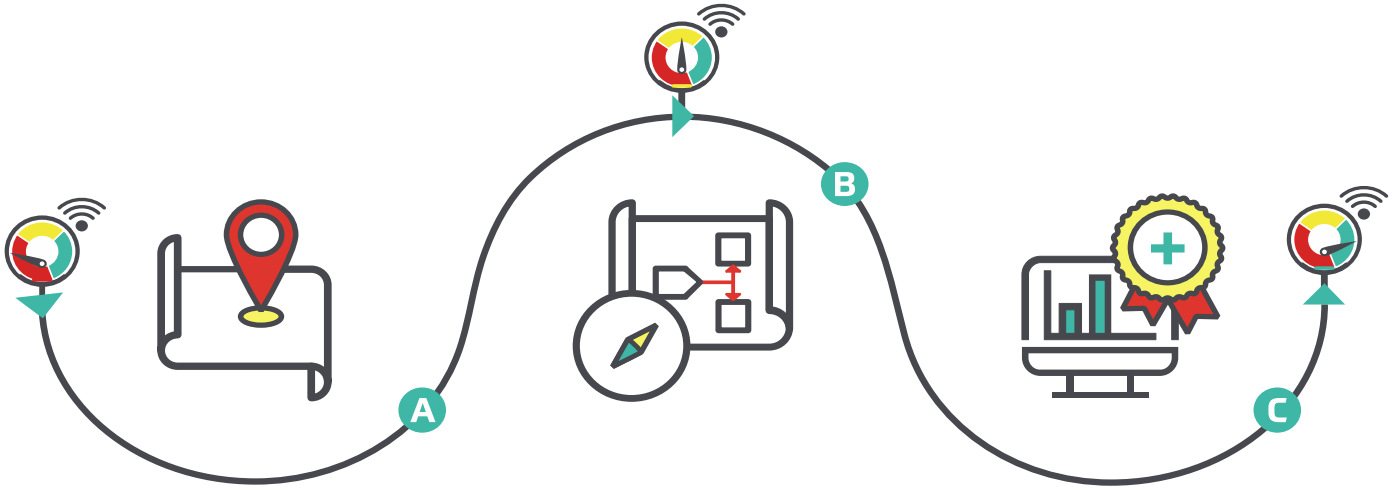
- 97% less outside air required
- 88% reduction in GHG/employee
- 0 L/yr tap water for living wall for 5 yrs
- May 2021 added affordable smart blue roof



Case Study: Maple Leaf Foods

- Envrio-Stewards completed energy, water and pollution prevention assessments at 35 facilities
- MLF reports 572 of the 1,300+ projects identified have been implemented (savings over $17 million to date)
- Worlds first major carbon neutral food company (while generating a net increase in profitability)

Energy Conservations Role in Decarbonization



A Baseline

Establish Starting points & targets

- Operations (Scope 1 & 2)
- Supply Chain (Scope 3)

B Conserve

- Implement quick wins & deep retrofits
- Decarbonize supply chain

C Replace

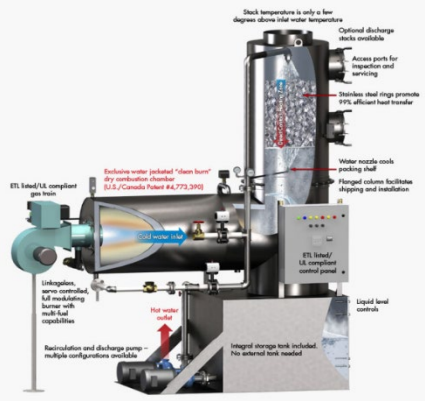
- Replace remaining consumption/emissions
- Select SDB-rich project(s)

Typical Avenues Explored in Food & Beverage Energy Conservation

1. Lighting (LED, occupancy, etc.)
2. HVAC (air balancing, heat recovery, dehumidification, etc.)
3. Compressed Air (variable speed drives, leaks, heat reuse, etc.)
4. Refrigeration (floating head pressure, free cooling, heat reuse, etc.)
5. CIP & Hot Water (reuse tanks, nozzle selection, preheating, etc.)

Heat Reuse Example

- 100% of electricity you buy eventually turns into heat
- Many facilities then pay to get rid of that heat (while they purchase heat somewhere else)



Direct Contact Water Heater: 97% Efficient

Preheat with refrigeration then heat: 2/3 less energy

Cooling Tower: Paying to get rid of heat

(elect., chem, water)

Approach to Uncover Typical & Advanced Saving Opportunities in Food & Beverage Manufacturing

Effective Energy Conservation

Engagement of key stakeholders during the assessment is essential for subsequent implementation.

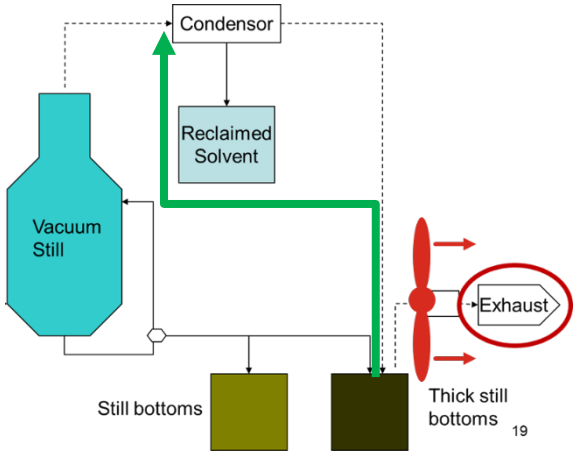
1. Who are your energy champions?
2. What are your wastes?
3. Why are your wastes generated?
4. Where can they be improved?
5. When should they be implemented?
6. How can implementation be expedited?

Integrated Approach

If you study any system, you can only learn 60% of it (systems design theory). If you want to learn the other 40%, you need to understand the systems it interacts with.

For example:

- If study electricity … new motor
- If study thermal … heat exchanger
- If study toxics … recover solvent



Root Cause Analysis (The Why)

Example:

- Hot water (22 litres/min) was being discharged to the drain
- The hot water was used to prevent clogging of the drain by lard discharged by the centrifuge

Solution: Rework Lard Savings

- 1,200 litres/day of lard (and electricity to process lard)
- 22 litres/min of water
- Gas to heat the water
- Effluent chemicals & sludge disposal

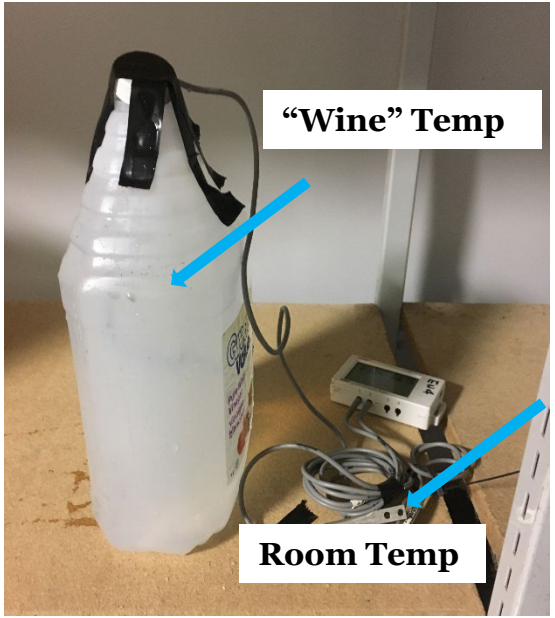
Case Study: Deeper Assessment of Southbrook Vineyards

- Already LEED gold certified
- Previous audit identified 5% savings with a 20-year payback
- Our assessment identified & implemented 40% savings with a 4-month payback

Set Point Selection: Southbrook Vineyards

How tight does a setpoint need to be?

- Wine temp vs room temp
- Allowing for the thermal storage capacity of wine, the cellar can be overcooled in the evening while preserving the wine aging setpoint
- Allowed a 70% turndown of ventilation system



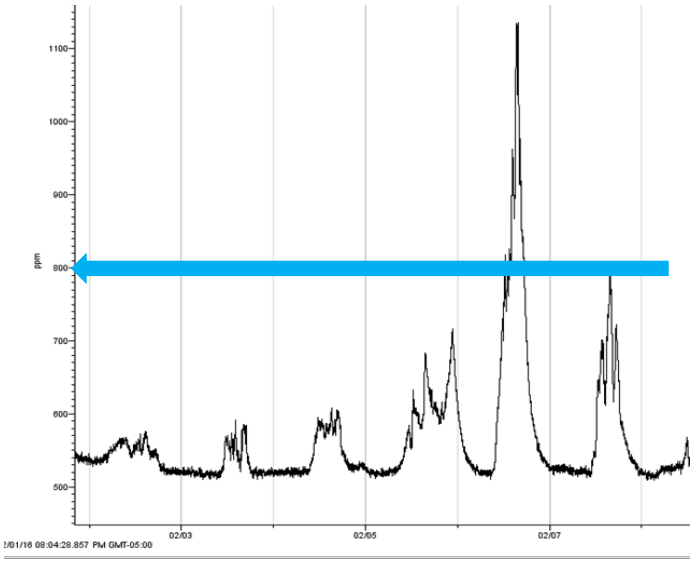
Hold Your Breath: Southbrook Vineyards

Buildings typically take in 10% outside air to dilute carbon dioxide

- Add carbon dioxide controls in pavilion

Projected Savings:

- $6,000/yr
- 15,700 m3 gas
- 3,000 kwh electricity

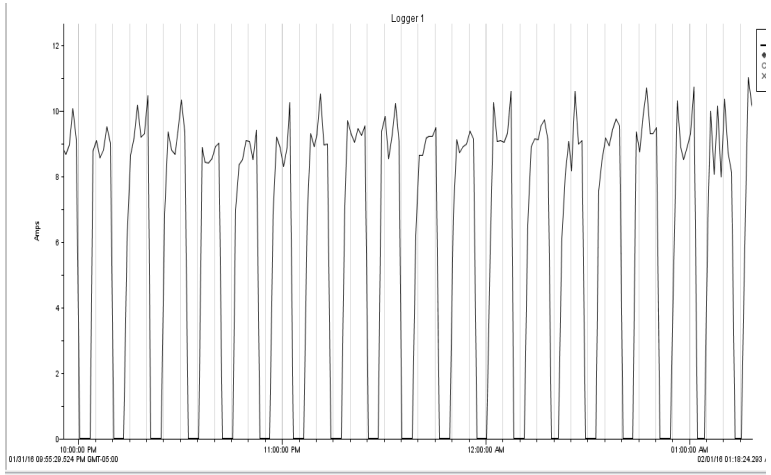


Carbon dioxide in pavilion

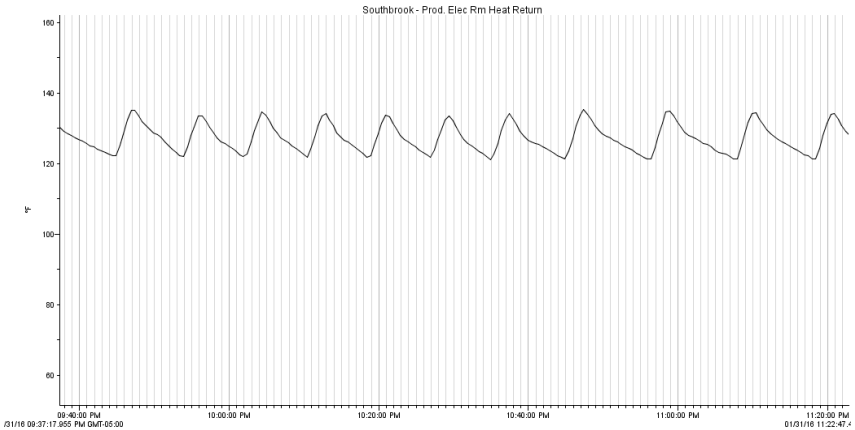
Recommissioning

- Unit heater and A/C unit fighting each other 24/7/365 (in a LEED certified building)

Electrical Room A/C Amperage



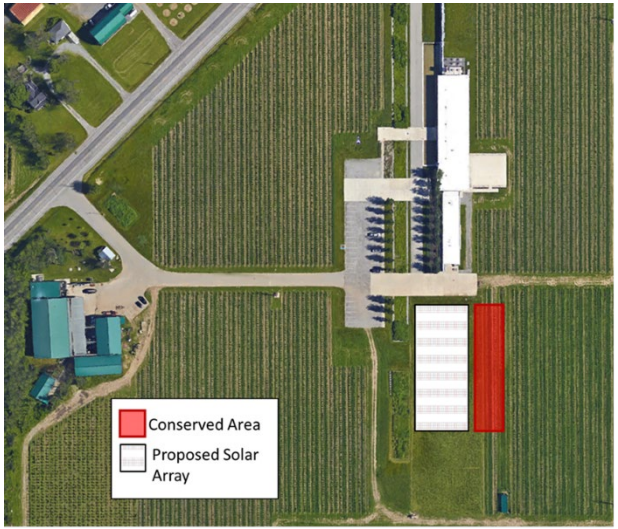
Electrical Room Heater Hot Water Loop



Megawatts vs Renewable: Southbrook Vineyards

- 7-year payback for solar
- 0.3-year payback for conservation
- Avoided ½ acre of panels
- 50 cases/yr of "preserved reserve"

"Don't use renewables to waste your energy more efficiently!"



What is the Why in this Picture?

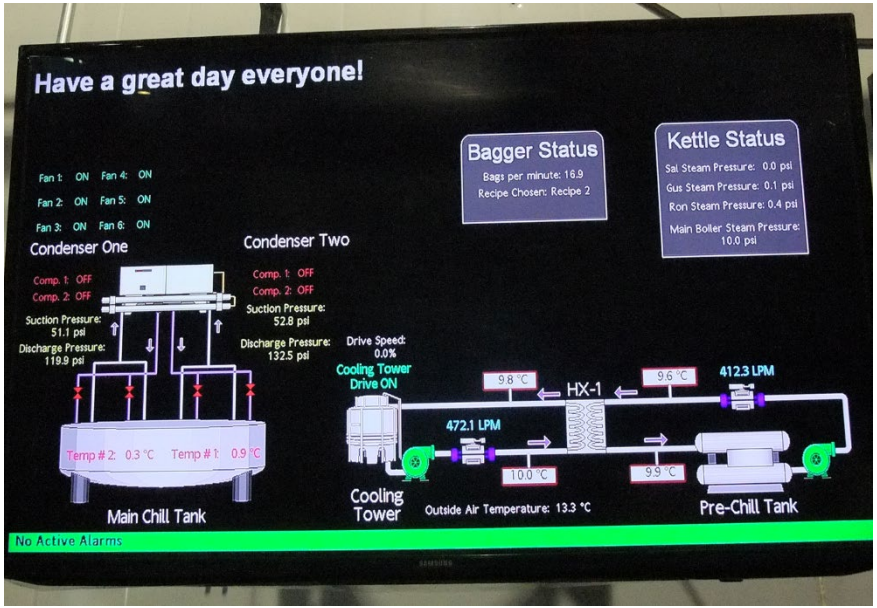
Blower Mixed Chilled Water Tank

- Air from blowers (40 C) enters 5 C chilled water tank (40,000 BTU/hr)
- Added humidity removed by refrigerant evaporators (31,400 BTU/hr)

What is the Why in this Picture?

LCD Display in Gowning Area

- Cooling water temperature after it is cooled was warmer than before it is cooled
- Cooling tower was unintentionally a warming tower

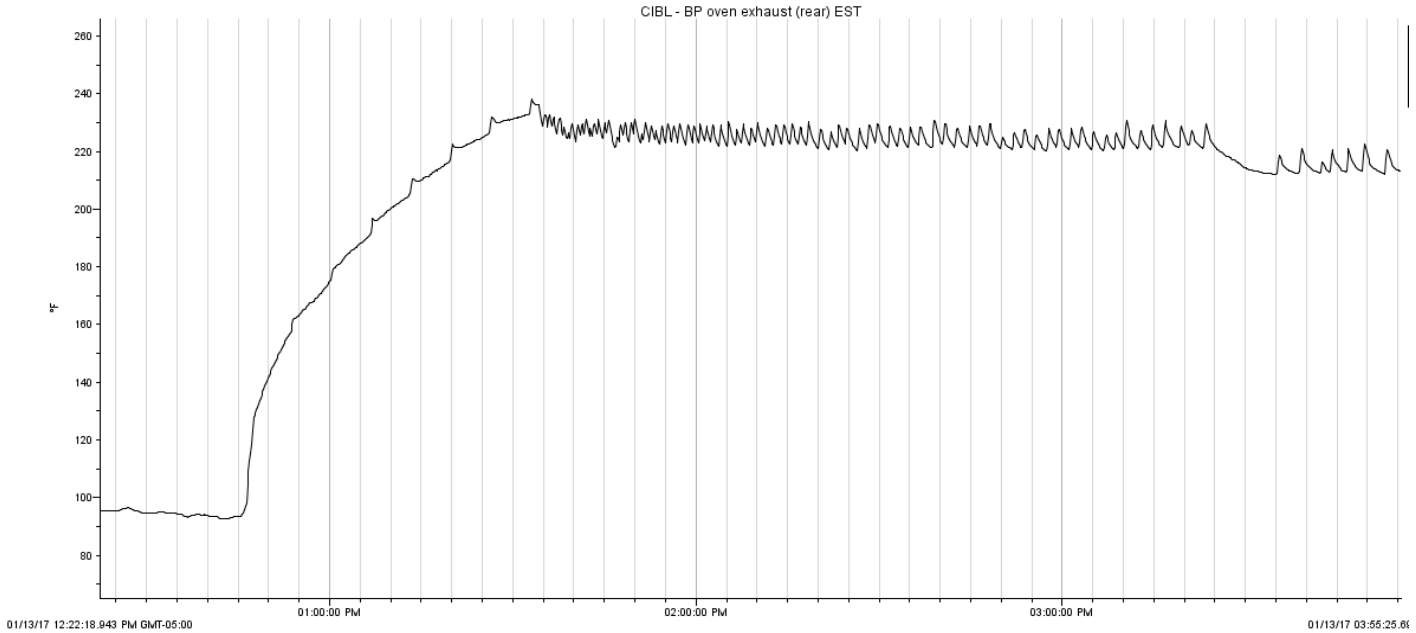


Bakery Energy, Water & Ingredient Conservation

Warmup Time: ~1hour

Oven heated with no product~1hour

Product entering oven



Campbell's Holistic Assessment

Process Integration (PI) Study:

- 3,233,000 kWh/yr
- 4,570,000 m3/yr of gas
- 123,000 m3 of water
- $1,645,000/yr with 2-year payback

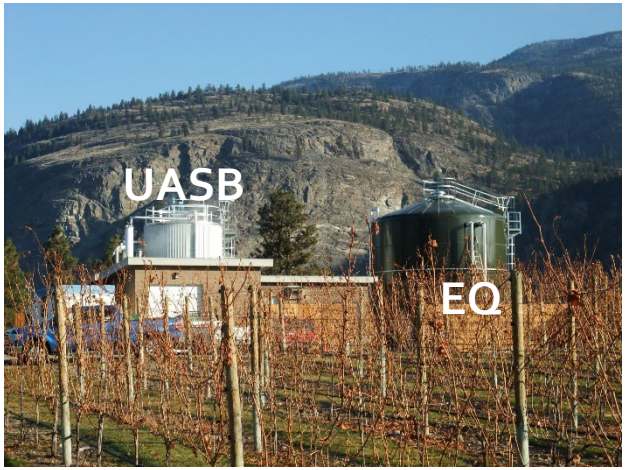
Food Loss Prevention Study:

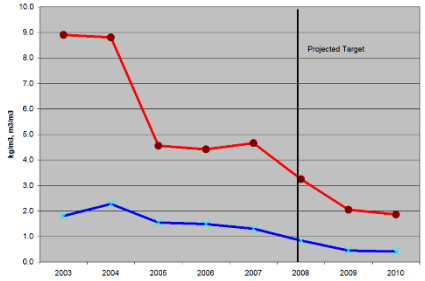
- $706,000/year food savings with 6-month payback (938 tonnes/yr)

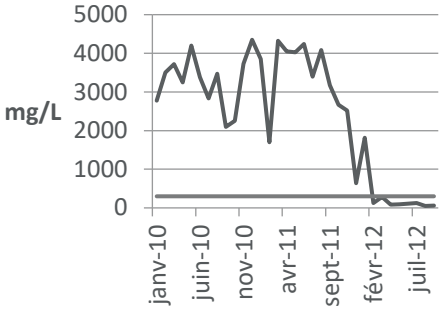
Effluent Treatment (Prevention First)

Jackson Triggs, Oliver BC

- $1.5 million capital cost savings
- Annual wine and water savings
- Avoided electricity for aeration







Water Conservation (Save Embedded Energy)

2019 OWWA Public Sector Award:

- High participation rate
- Integration of co-benefits (energy, climate adaption, P2 & embedded water)
- Average 36% water savings/facility
- Average payback 1.5 years
- Plus electricity of chilled water

Water Conservation (Save Embedded Energy)

Private Sector Award:

WATER SAVING:
>37,000 m’/year

TOTAL OPERATIONAL SAVINGS: $285,000

Payback: Less than 6 months

*Payback period includes water incentives, energy and operational savings.

Food Loss Prevention (Save Embedded Energy)

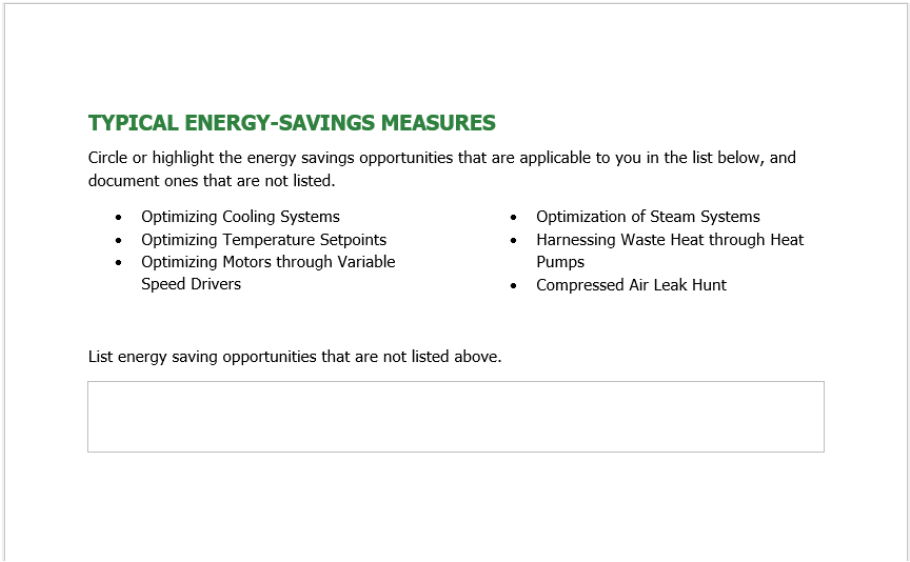
- 50 facilities averaged $230k/yr with under 1-year payback
- Enough for a line of grocery bags from CN Tower to London, Ont.

Case Study: Bimbo Canada

Common Energy-saving Measures in F&B

Pg. 7

- Take some time to identify energy-saving measures applicable to your facility



TYPICAL ENERGY-SAVINGS MEASURES

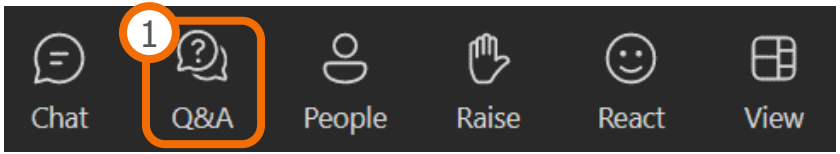
Circle or highlight the energy savings opportunities that are applicable to you in the list below, and document ones that are not listed.

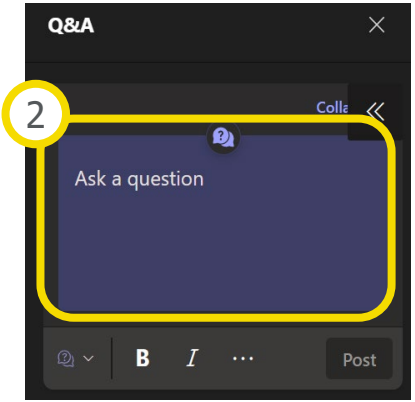
- Optimizing Cooling Systems
- Optimizing Temperature Setpoints
- Optimizing Motors through Variable Speed Drivers
- Optimization of Steam Systems
- Harnessing Waste Heat through Heat Pumps
- Compressed Air Leak Hunt

List energy saving opportunities that are not listed above.

Q&A with Bruce Taylor

Use the Q&A function to type out your questions.



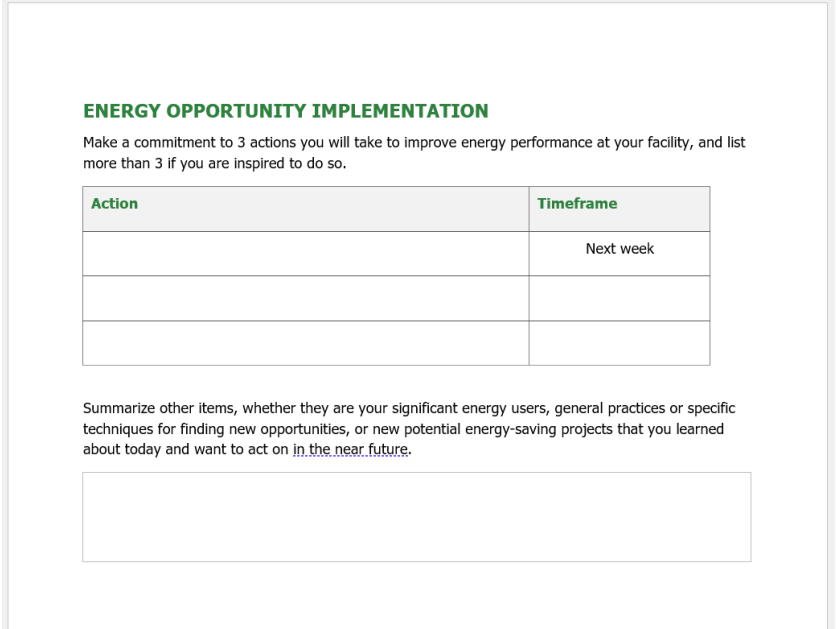


Feel free to turn on your camera to ask questions as well!

Energy Opportunity Implementation

Pg. 8

- Turn to page 8 of your workbook
- Take some time to note down commitments you will take to improve your energy performance at your facility



ENERGY OPPORTUNITY IMPLEMENTATION

Make a commitment to 3 actions you will take to improve energy performance at your facility, and list more than 3 if you are inspired to do so.

Action	Timeframe
	Next week

Summarize other items, whether they are your significant energy users, general practices or specific techniques for finding new opportunities, or new potential energy-saving projects that you learned about today and want to act on in the near future.

Mentimeter

What will you do in the next week to start capturing energy saving opportunities?

0 responses

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