Virtual Treasure Hunt Report

Presented To:

[redacted]

Sponsored By:

EVERSOURCE

Submitted By:

veic

Report Date: March 15, 2022

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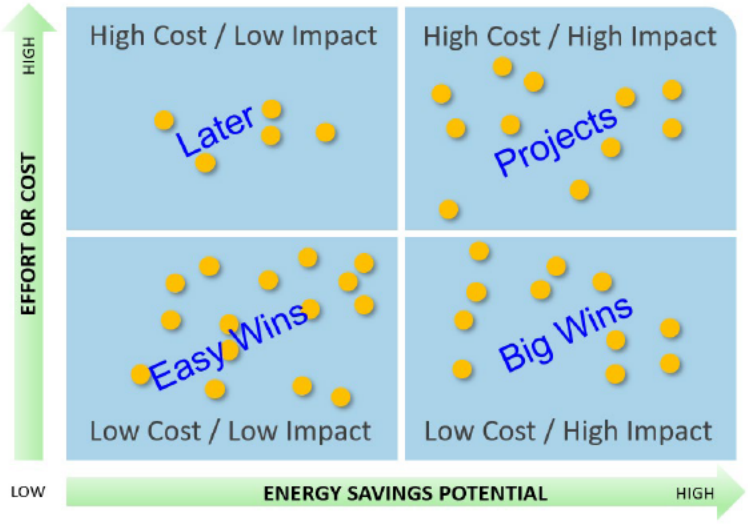
This report describes the results of the Virtual Energy Efficiency Treasure Hunt at [redacted] conducted on December 1 and December 2, 2021.

Section 1.0 Overview

Treasure hunts are done as a team with multiple stakeholders and the purpose of the Treasure Hunt is to identify low or no-cost opportunities (treasures) to immediately reduce facility energy use, "cost" can be money, effort, or risk. Treasure Hunts also generate ideas and opportunities that might be medium or high cost and with varying energy savings. All the opportunities are discussed and prioritized. The prioritization method used for this event was to place each opportunity into one of the four(4) following categories.

1. Easy Wins: Low to Medium amount of effort; Low to Medium savings
2. Big Wins: Low to Medium amount of effort and Medium to High savings
3. Projects: Medium to High amount of effort and Medium to High savings
4. Later: Medium to High amount of effort; Low to Medium savings

The four categories are shown graphically below:



The Treasure Hunt also engages employees in the process of improving energy performance and informs upper management of the energy and cost savings opportunities within their operations, thus setting the stage for persistent energy management activity.

1.1 Treasure Hunt Team:

The On-site team consisted of:

[redacted]

[redacted]

And with Off-site support from:

Patrick Haller, VEIC, Technical Lead

Section 2. Treasure Hunt Results:

The Treasure Hunt generated eighteen (17) ideas or opportunities which were prioritized; nine (9) "Easy" and "Big" Wins of low or no cost opportunities for improving energy performance and nine (7) longer term energy efficiency project suggestions, and One (1) requires further assessment, but may use more energy than existing conditions.

The following opportunities were selected for immediate action:

Section 2.1 Priority Actions –

Implement some Easy and Big Wins now. The Energy Team selected the following four (4) opportunities to achieve short-term savings.

1. **Orient the Variable Speed Compressor to be in the lead position**
2. **Turn off the fixed speed compressor**
3. **Turn down the delivered air pressure**
4. **Adjust/Re-Install Cooler Door Gasket**

Section 2.2 Priority Projects –

Begin evaluating potential scope/savings/cost now for future implementation. Report progress, strategize, and receive guidance during monthly follow up calls with the Technical Lead.

1. **Conduct a compressed air leak audit, and repair**
2. **Conduct a steam trap audit, and repair**
3. **Install Motion Sensor for Cooler Lighting Control**
4. **Insulate Boiler Condensate return tank**
5. **Insulate exposed Boiler Condensate return line**
6. **Investigate Cost to upgrade cooler evaporator with ECM motors and motor control**
7. **Investigate cost to upgrade cooler lights to LEDs**
8. **At time of replacement, consider upgrading the cooler condensers with high efficiency condensers having floating head pressure control and high efficiency, variable speed fans**
9. **Evaluate Event Space and Tap Room HVAC settings and update if appropriate including un-occupied time set back for heating or cooling.**

The opportunity to replace the use of compressed air in the canning line to blow liquid off the cans with a blower was suggested by Pat Haller of VEIC as typically cost-effective. However, the replacement blower from a common canning line manufacture was correctly identified by Eversource personnel to likely use more electricity than the estimated compressor use.

Following the Treasure Hunt and report submission, the Eversource contact or Technical Lead will schedule check in calls at approximately 1 month, two (2) months, and six (6) months to discuss progress-to-date and provide guidance on Treasure Hunt next steps and program support in general. Feel free to contact the Technical Lead, Pat Haller for:

- Clarification on individual Action Items
- Assistance in strategizing on how to proceed or prioritize
- Consultation on the success or failure of individual Action Items
- Reviewing operational data for further advice
- Please take full advantage of this resource to make your treasure hunt a success

Section 2.3 – Opportunities

Attachment A: Full List of Opportunities

Attachment B: Opportunity Cost and Savings Estimates

Attachment C: Photographs of Treasure Hunt

Attachment A

Complete List of Identified Treasure Hunt Opportunities

1	Compressor- Orient Variable Speed compressor to lead	The fixed speed Atlas Copco ZT18 was operating while the Variable Speed Atlas Copco ZT22VSD was in stand-by. Substantial energy savings can be achieved by having the ZT22VSD in the lead position. while the ZT18 may be able to be shut-off for most of the time.
2	Turn OFF fixed Speed Compressor	The site may be able to operate fully with only the Variable Speed Atlas Copco ZT22VSD operating and the ZT18 may be able to be completely off.
3	Reduce Compressed Air Supply pressure to at least 105psi, lower if possible	The compressor supply pressure of 118 psi is likely higher than required and every 2 psi of pressure reduction will reduce the power required by the compressor by approximately 1%. Most end uses of compressed air need 90 psi or less. Higher pressure is required to overcome line losses, but requires more energy and leads to higher air leakage rates. Manage the supply pressure to the lowest pressure possible, 105 psi is likely higher than needed as well and further reduction would be beneficial.
4	Conduct a Compressed air leak survey and repair	Conduct a compressed air leak audit and repair leaks. It is common for compressed air systems to have a 10% to 30% leakage rate. Air leaks waste energy, cost money and make the compressed air system less resilient. Compressed air audits/repairs can be very cost effective; with a simple payback of under 2 years. Eversource can help identify qualified auditing professionals and may be able to provide financial support
5	Conduct a Steam Trap Audit/Survey	Conduct a steam trap survey and repair/replace leaking traps. Steam traps should be periodically surveyed to determine their effectiveness. Any steam that passes through a leaking or failed trap is energy loss. Like Compressed air audit/repairs, steam trap audit/repairs can be very cost effective; with a simple payback of under 2 years. Eversource can help identify qualified auditing professionals and may be able to provide financial support.
6	Insulate Boiler condensate return line	Near the boiler return tank, approximately 9 feet of condensate return piping is uninsulated. Insulating the pipe will greatly reduce energy loss and provide protection from burn accidents.
7	Insulate Boiler condensate return tank.	The boiler return tank should be insulated to reduce the amount of energy lost that would need to be made-up by the steam boiler.
8	Adjust/Reinstall Cooler Door Gasket	Site personnel identified an opportunity for a better fitting door gasket to the cooler to reduce cooling load.
9	Install Motion Sensors for Cooler lighting control	The cooler's lighting is switched and may be operating when the cooler is unoccupied. Installing occupancy sensors will ensure lights are on only as needed.

10	Upgrade Cooler light fixtures to LED fixtures	The existing lighting in the coolers appears to be total 9, 2-lamp T-8 fluorescent fixtures. Upgrading to LED fixtures would use nearly ½ the wattage and reduce cooling load. Replacing the lamps with Tube LED's or TLEDs is an option but Eversource can support fixture replacement but not tube replacement. Those that replace just the tubes have found trouble with the older tombstones ends and lens breaking. New LED fixtures have longer expected life and have a lower life cycle cost.
11	Replace Evaporator Fan motors with ECM Motors	The evaporator fan motors in the cooler are likely either shaded pole (SP)or permanent split capacitor (PSC)motors. ECM motors are more efficient, using 2 or 3 times less power as the originals and have less heat rejection into the refrigerated space. Motor controls may also provide substantial savings. Often evaporator fans run continuously but installing smart controls can reduce energy use while maintaining evenly mixed cooler temperature.
12	Install Evaporator Fan Controls	Motor controls may also provide substantial savings, especially for SP and PSC motors. Often evaporator fans run continuously. Installing smart controls can reduce energy use while maintaining evenly mixed cooler temperature.
13	Upgrade refrigeration and chiller condensers to "High Efficiency Condensing Units (HECU)	At time of replacement or purchase of additional new refrigeration units, choose High Efficiency Condensing Units with Floating Head Pressure Control. These can provide substantial energy savings especially in New England's cooler climate and often result in a simple payback of 3 years or less.
14	Adjust Event Space HVAC Setting	To be determined. Often HVAC control settings are no longer valid for existing use and schedules. Check to be sure the settings are reflective of the use of the space and include set backs for unoccupied heating and cooling.
15	Adjust Tap Room HVAC Settings	To be determined. Often HVAC control settings are no longer valid for existing use and schedules. Check to be sure the settings are reflective of the use of the space and include set backs for unoccupied heating and cooling.
16	Strategic Equipment Scheduling to reduce Peak Load	Some equipment may be able to be strategically staged only at times of lower facility power demand, reducing utility monthly demand charges. An example may be to stage the grain out system at times that the building HVAC system is at lower power (cooler outdoor temps)

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Attachment B

Number	Title	Description	Cost	Savings $	Savings (kWh)	Savings (mmBtu)	Simple py bk	Note
1	VSD Compressor Lead	Put VSD compressor in Lead position.	**$ 0**	**$1,204.28**	**6,800**		Immediate	Or, if Fixed speed was in modulation control instead of Load/No Load then 21,000 kwh & $3,719
2	Turn Off Fixed Speed Compressor	TURN OFF the fixed speed and perhaps only use on bottling days	**$ 0**	**$9,928.93**	**56,064**		Immediate	

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Number	Title	Description	Cost ($)	Savings ($)	Savings (kWh)	Savings (mmBtu)	Simple Py Bk	Notes
3	Reduce Plant Pressure	Reduce overall plant compressed air pressure to 105psi. Currently it's at 118psi. Every 2 psi reduction is about 1% less work the compressor has to do and it can provide MORE air, and reducing pressure reduces flow of any compressed air leaks. Assumes VSD operating	**$0**	**$1,211.29**	**6,840**		Immediate	
NA	Can dry with Blower instead of Compressed Air	Retrofit canning lines' liquid blow-off using compressed air to using a dedicated small hp blower	**$1,000**	**$ - 529.01**	**-2,987**		-1.9	*Not recommended without further assessment of air requirements. Commonly, a blower is more efficient than a compressor*
4	Compressed air leak Audit	Conduct a compressed air leak audit	**$3,000**	**$7,065.10**	**39,893**		0.4	

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Number	Title	Description	Cost ($)	Savings ($)	Savings (kWh)	Savings (mmBtu)	Simple py bk	Notes
5	Steam Trap Audit	Conduct a steam trap audit on the 9 existing steam traps	**$2,000**	**$1,928.64**		**200**	1.0	Assuming 1 trap at 15ps, 1/4 inch leak
6	Insulate Condensate Return Line	Insulate the un-insulated condensate return (short section)	**$93.42**	**$50.30**		**5.22**	1.9	9 feet, 1.5 inch insulation
7	Insulate Condensate Tank	Insulate the condensate receiver tank	**$300**	**$196.21**		**20.35**	1.5	11 sqft, 1.5 inch insulation
8	Cooler door gaskets	Adjust/upgrade the gaskets on the cooler doors	**$1,000**	**$837.75**	**4,730**		1.2	Notes, 2, 10 ton units, assume 5% savings, 1.2kw/ton and 45% duty cycle
9	Cooler Motion Sensors	Install Motion Sensors in Coolers	**$500**	**$589.78**	**3,330**		0.8	Notes, assume flourescent at 2 tube, 32 watt, I cooler has 4 fixtures and the other has 5, total 9
10	Upgrade Cooler light fixtures to LED's	Upgrade fixtures to LED fixtures	**$1,080**	**$446.80**	**2,523**		2.4	Notes, assume flourescent at 2 tube, 32 watt, I cooler has 4 fixtures and the other has 5, total 9. Replacement LED wattage = 16w. Savings assumes no occ sensors

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Number	Title	Description	Cost ($)	Savings ($)	Savings (kWh)	Savings (mmBtu)	Simple Py bk	Notes
11	Replace Evap Motors	TBD- Upgrade Evaporators with ECM Motors	**$1,144.00**	**$652.70**	**3,685**		1.8	For PSC motors (105 watt vs 64w, higher if Shaded Pole 135w)
12	Install Evap fan control	TBD- Upgrade cooler with Evaporator fan control (allows some of the fans to turn OFF, and then turn ON when compressor kicks on). This is TBD IF the Evap motors are ECM, it's LESS cost Effective	**$ 546.00**	**$261.05**	**1,474**		2.1	After changing to ECM motors
13.1	Install Floating Head Pressure Control-coolers	TBD- Upgrade refrigeration condensers with floating head pressure control (this allows the compressor to "float" pressure down when the outdoor air is cooler.	**$4,140**	**$1,480.55**	**8,360**		2.8	Web link to your manufacturer's web site https://t-rp.com/product/tes-indooroutdoor-air-cooled-semi-hermetic-condensing-units/

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Number	Title	Description	Cost($)	Savings ($)	Savings (kWh)	Savings (mmBtu)	Simple Py bk	Notes
13.2	Install Floating Head Pressure Control-chillers	Upgrade Chiller condensers with Floating Head Pressure	**$20,700**	**$7,402.74**	**41,800**		2.8	
14	Adjust Event space HVAC	TBD- Adjust/setback Event space HVAC to lower heating and higher cooling temps for unoccupied time						
15	Adjust Tap room HVAC	TBD- See above						
16	Strategic Equipment Scheduling	Manage Equipment to reduce co-incident peak Example: operating Centrifuge&Grain Pump while refrigeration is peaking may be setting the highest peak.	$0	$2,880.00	No energy savings			Example, if 30kw could be prevented from the highest peak and maintained for at least 11 months, savings is around $8/kw for the month ($240) and $240 x 11 mnths = $2640

Attachment C – Treasure Hunt Photos

Existing Lead Compressor

Existing Standby Compresssor

High Supply Pressure (118psi is target)

Zero Loss Condensate Drain

Un-insulated Boiler Condensate Tank and Piping

Cooler Evaporator (typical)

Cooler Door

Cooler Fluorescent lighting

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Event Space