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Eversource Cheshire Service Center – SCOPING STUDY

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Executive Summary

QGM Consulting (Padraic Hagan and Austin Malik) conducted an energy efficiency scoping study at the Eversource Cheshire Service Center located at 705 W Johnson Ave Cheshire, CT 06410 on Tuesday June 9, 2026. QGM analyzed the buildings' natural gas use and electric use as well as associated Greenhouse Gas emissions. Objectives were to identify and quantify potential Energy Efficiency Measures (EEMs) for energy reduction, and estimate Greenhouse Gas reduction potential to assist with any corporate initiatives or targets.

Included in this report is a list of potential EEMs with savings and implementation cost estimates – note that electric costs are based on typical rates for buildings in the region. Please note that the values presented in this report are meant to provide an order of magnitude and are not final values or guarantees for the determination of incentives. A measure summary is provided in the table below.

Eversource Cheshire Service Center - Scoping Study Measure Summary								
EEM#	Energy Efficiency Measure (EEM)	Estimated Annual Cost Savings	Estimated Annual Energy and GHG Savings			Potential GHG Reduction	Estimated Project Cost	Simple Payback
#	Description	$	kWh	CCF	GHG (MT CO2e)	% Site GHG	$	Years
1	Building Shell Remediation	$2,000	8,000	600	5.6	2%	$25,000	12.5
2	Summer WSHP Temp Reset	$600	4,000		1.2	0.4%	$5,000	8.3
3	Demand Control Ventilation	$9,000	13,000	3,000	20.3	6.7%	$50,000	5.6
4	Cycling Air Dryer	$1,000	7,500		2.2	0.7%	$7,500	7.5
TOTAL		$12,600	32,500	3,600	29.3	9.6%	$87,500	6.9

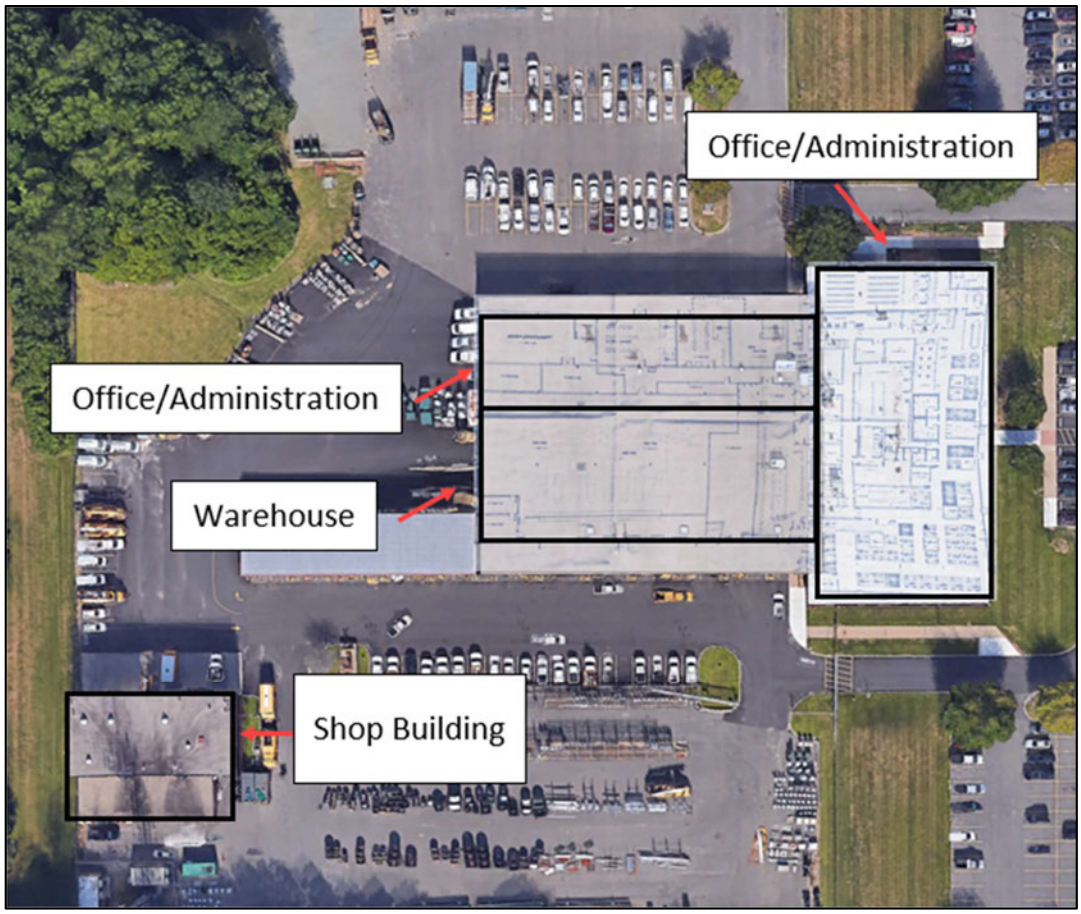
These are the measures identified during the assessment walkthrough; additional measures may become evident with more time on site. Simple paybacks do not include potential incentives or any non-energy benefits which may include maintenance savings, labor savings, water savings, etc. unless otherwise indicated.

General Facility Description

The Cheshire site consists of (2) buildings constructed in 1977:

- A main building consisting of offices, conference rooms, workrooms, and a warehouse
- A garage/shop building used for fleet vehicle maintenance

An aerial view of the campus is shown below:



Total facility footprint is ~68,000 SF across both buildings. Typical occupancy is 7:00 AM – 4:00 PM Monday through Friday, with equipment scheduled for occupancy 5:00 AM – 5:00 PM. Total site operating hours are estimated to be ~3,300 annually.

HVAC is provided through a mix of packaged rooftop units (RTUs) and water source heat pumps (WSHPs). HVAC equipment is controlled by a modern Building Management System (BMS) from Delta Controls, supported by a local mechanical vendor.

Lighting systems are modern LED with integrated controls and were observed to be functioning well.

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Monthly Billing Analysis

Site staff provided monthly historical natural gas use (CCF) and cost. Electric energy is metered but not billed at this site, with annual use provided. Monthly use was modeled based on annual use, the site's footprint, hours of operation, equipment power density and estimated utilization, and example monthly load profiles from similar sites.

$0.1428/kWh was used as an electric rate based upon Eversource Facilities' third-party electric supply costs for similar type facilities The most recent 12 months are summarized below:

Site - Last 12 Months							
Energy Usage and Costs	Costs		Energy			MT CO2 Emitted	Unit Costs
	Cost - $	% of total	kWh & CCF	mmBTU	% of total		
Electric (kWh)	$98,040	70%	686,553	2,343	55%	253.5	$0.14
Natural Gas (CCF)	$42,420	30%	18,789	1,933	45%	102.6	$2.26
Total	**$140,460**	**100%**		**4,276**	**100%**	**356.1**	

Natural gas costs as accounted throughout this analysis have the monthly per-meter "customer charges" removed, for assessment of natural gas marginal cost only. A monthly summary of electric and thermal use is shown below:

Monthly Utility Bill Summary							
Estimated Monthly Electric				Monthly Natural Gas			
Month	Electrical Use (kWh)	Estimated Cost ($)	Blended Rate ($/kWh)	Month	Natural Gas Use (CCF)	Total Cost ($)	Blended Rate ($/CCF)
Jun-25	55,164	$7,877	$ 0.14	Jun-25	112	$253	$2.26
Jul-25	68,955	$9,847	$ 0.14	Jul-25	20	$45	$2.26
Aug-25	75,851	$10,831	$ 0.14	Aug-25	35	$79	$2.26
Sep-25	55,609	$7,941	$ 0.14	Sep-25	115	$260	$2.26
Oct-25	34,478	$4,923	$ 0.14	Oct-25	533	$1,203	$2.26
Nov-25	48,269	$6,893	$ 0.14	Nov-25	2,012	$4,543	$2.26
Dec-25	62,060	$8,862	$ 0.14	Dec-25	3,826	$8,638	$2.26
Jan-26	75,851	$10,831	$ 0.14	Jan-26	4,311	$9,733	$2.26
Feb-26	82,746	$11,816	$ 0.14	Feb-26	4,086	$9,225	$2.26
Mar-26	62,060	$8,862	$ 0.14	Mar-26	2,235	$5,046	$2.26
Apr-26	31,033	$4,431	$ 0.14	Apr-26	1,113	$2,513	$2.26
May-26	34,478	$4,923	$ 0.14	May-26	391	$883	$2.26
TOTAL	**686,553**	**$98,040**	**$ 0.14**	**TOTAL**	**18,789**	**$42,420**	**$2.26**

The energy use intensity (EUI) shown below is an indicator of building performance in terms of energy use (kbtu) per building square foot:

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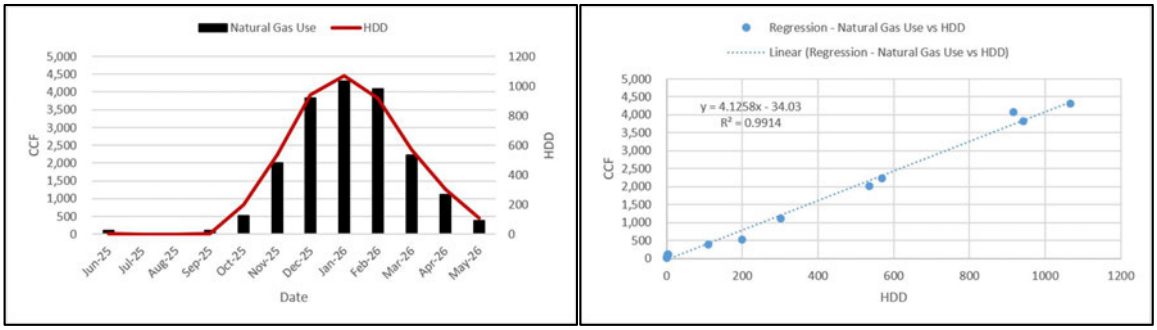
Building Energy Use Intensity (EUI)			
Utility	**Site EUI**	**Source EUI**	**Unit**
Natural Gas	28	29	kbtu/sf
Electricity	34	96	kbtu/sf
TOTAL	**63**	**125**	**kbtu/sf**

Source-site ratio per national average, source:
https://portfoliomanager.energystar.gov/pdf/reference/Source%20Energy.pdf

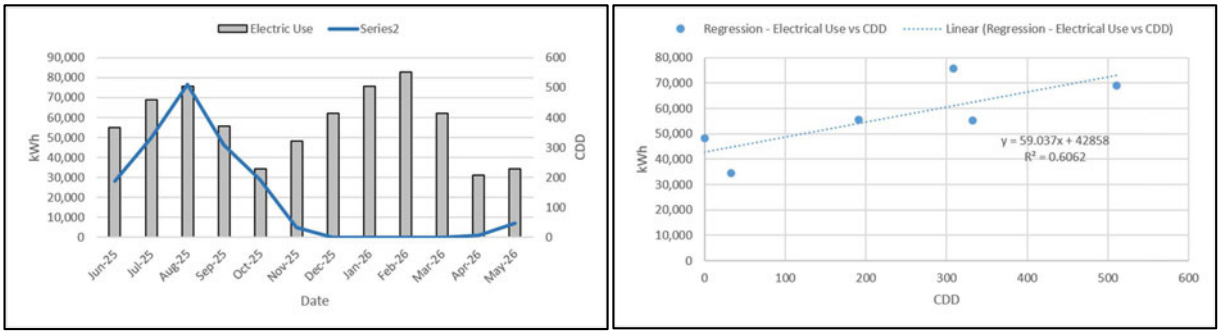
The EUI metric can be used to baseline existing energy use for future comparison or to compare this building to similar buildings of this type. Energy Star publishes median data by building type for overall comparison.

An analysis was carried out for the metered natural gas use and heating degree days (HDD), as seen below:



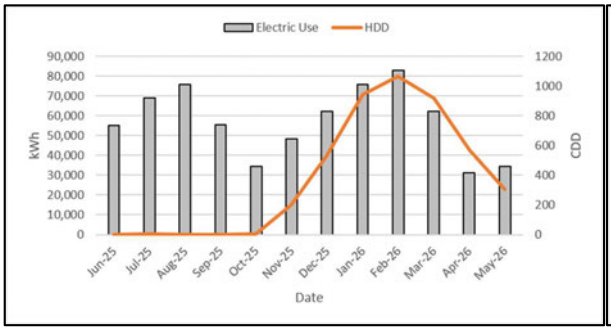
The first graph indicates a visual relationship between natural gas use and HDD, suggesting a majority of the natural gas is used for building heating. Minimal summer month natural gas use can likely be attributed to service hot water. The regression further shows that site natural gas use has a strong, statistically significant relationship to HDD, with an R^2 value of 0.99.

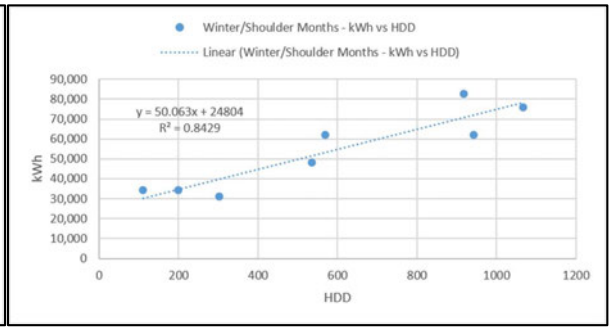
For electrical consumption, weather data for the site was utilized to help generate a monthly site profile. Below are graphs for the estimated monthly site electrical use and cooling degree days:



The regression above along with provided annual use was developed to help determine building monthly electrical use. Within the first graph, electric use can be seen to follow a similar trend to CDD during cooling season. The regression shows a statistically significant relationship to CDD, with an R^2 value of 0.61. The Department of Energy Superior Energy Performance (SEP) program qualifies that a statistical relationship exists between the two variables with an R^2 value of > 0.5, and a strong relationship with an R^2 value of > 0.75.

Additionally, monthly electric use was compared to the heating months and the winter/shoulder months to address site electric heating operations in the developed profile.



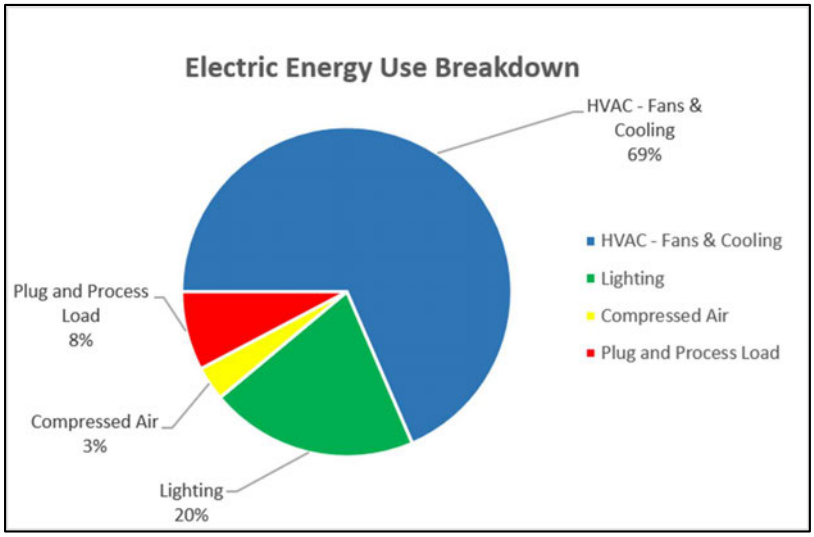


The regressions above show site electric use R^2 value as ~0.84 when compared against the winter and shoulder months, indicating a statistically significant relationship between the two variables, or that heating (as well as cooling) demand has an influence over site electrical use – due to electrical use during winter and shoulder months from electric heating from unit heaters and WSHPs.

Mechanical System Energy Use Breakdown

Electric Use

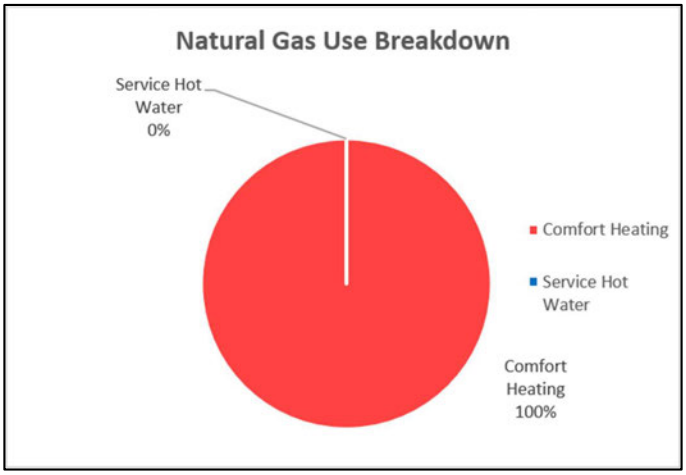
Based on the initial walk-through, the following electric energy use breakdown was developed. These results should be considered high level and were sourced from motor nameplates, typical load factors, and estimated operational hours. Actual data logging is required to confirm these assumptions.



Estimated End Use Breakdown - Electricity	
Electric End Use	**Energy Use (kWh)**
HVAC - Fans & Cooling	470,000
Lighting	140,000
Compressed Air	23,000
Plug and Process Load	53,000
TOTAL	**686,000**

Natural Gas Use

Based on the site walk-through and provided billing data, the following site natural gas use breakdown was developed. As above, these results should be considered high level and were sourced from equipment nameplates, typical load factors, and estimated operational hours. Actual data logging is required to confirm these assumptions.



Estimated End Use Breakdown - Natural Gas	
Natural Gas End Use	**Energy Use (CCF)**
Comfort Heating	18,800
Service Hot Water	0
TOTAL	**18,800**

Equipment Inventory

Equipment inventories were created to catalog existing equipment, as shown below:

HVAC Equipment:

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Eversource Cheshire Service Center HVAC Equipment Inventory									
Tag	Type	Manufacturer	Model	Serial #	Cooling Ton	MBH	Fan HP	CFM	Notes
	Packaged Roof Top Unit	Trane	YHC060F4RHA1TH0C1A1	203213959L	5	104	1	3,953	
	Packaged Roof Top Unit	Trane	YHC120F4RHA0RH600C1	204513289L	10	202.5	2.75	6,800	
RTU-2	Packaged Roof Top Unit	Trane	YHD240G4RHD15H8	210910529D	20	324	7.5		
	Packaged Roof Top Unit	Trane	YHC074F4RHA0RH0C1A1	203411566L	6	121.5	2.75		
MAU-1	Make Up Air Unit	Greenheck	DG-109-H10-DB	15510990			2		
	WSHP				1.5	18	0.66		Typical of 20
	Infrared Heater			153739					
	Infrared Heater								
1	Exhaust Fan								
	Exhaust Fan	Canarm HVAC	RTA42T30500M				5	23,874	
3	Exhaust Fan								
6	Exhaust Fan								
5	Exhaust Fan								
4	Exhaust Fan								
12	Exhaust Fan								
11	Exhaust Fan								
8	Exhaust Fan								
9	Exhaust Fan								
	Exhaust Fan	Cook	195 ACRU	140SH598010-00/0000701			0.75	3,990	
14	Exhaust Fan								
15	Exhaust Fan								
	Exhaust Fan	Cook	300 ACRU	140SH59801-00/0002001			2	10,500	
16	Exhaust Fan								
17	Exhaust Fan								
18	Exhaust Fan								

Boiler Equipment:

Eversource Cheshire Service Center Boiler Equipment					
Quantity	Type	Make	Model	Max Input (kW)	Max Output (MBH)
1	Electric Boiler	LAARS	EB-144-480	144	491

Eversource Cheshire Boiler Pumps		
Description	Quantity	HP
Circulation Pumps	2	1.5

Compressed Air Equipment:

Eversource Cheshire - Compressor Inventory								
Make	Model	HP	Full Load Power (kW)	Capacity (SCFM)	Compressor Type	Control Type	Cooling	Voltage
Chicago Pneumatic	RCP-C15123D4	7.5	6	46	Reciprocating	On/off	Air Cooled	460

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Eversource Cheshire - Dryer Inventory				
Make	Model	Rated CFM	kW	Type
Quincy	QRHT-75	75	1.6	Non-Cycling

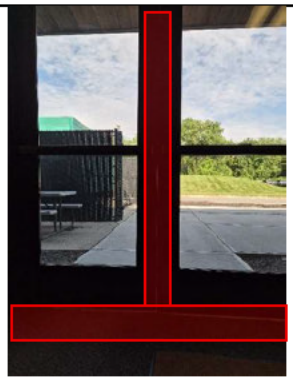
Eversource Cheshire - Air Receivers	
Location	Capacity (gal)
Integrated with Compressor	120

Energy Efficiency Measures/Recommendations

EEM – 01 – Consider Building Shell Gap Remediation

During the walkthrough of the site, gaps and cracks were noted at door and window seals and are suspected at roof/wall transitions. Insulation and air sealing are understood to be original construction and have likely degraded over time. Envelope gaps are thus allowing the infiltration/exfiltration of untempered air and increasing the load on HVAC equipment.

It is recommended that the site perform a comprehensive building and thermal shell survey and remediate any identified gaps. Pictures below detail some of the observed building shell gaps:



Exterior door with degraded seals allowing air infiltration



Exterior door with degraded seals allowing air infiltration

Savings were estimated assuming a reduction in outdoor air infiltration during both heating and cooling seasons:

- **Estimated Annual Energy Savings:** 8,000 kWh and 600 CCF
- **Estimated Annual Cost Savings:** $2,000
- **Estimated Implementation Costs:** $25,000 including survey costs

Next Steps:

- Facility staff are encouraged to discuss building shell survey and remediation with a specialized vendor.

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EEM – 02 – Consider Water Source Heat Pump Loop Summer Temperature Reset

WSHP loop temperature reset may be a viable controls strategy. Currently the loop temperature is set at 85˚ F, and the fans modulate to maintain that supply temperature. With reset, the loop temperature would be set by the outdoor air wet bulb temperature and an offset (7-15˚ F depending on age and condition of the cooling tower) and the fans would modulate to meet that temperature. The result would be cooler tower supply water to the heat pumps, thus reducing the "lift" seen by the compressors and the load required to achieve cooling setpoints.

It is recommended that facility staff work with their local controls vendor to determine feasibility and execution of loop temperature reset. Savings assume a conservative 10% reduction in annual cooling energy use.

- **Estimated Annual Energy Savings:** 4,000 kWh
- **Estimated Annual Cost Savings:** $600
- **Estimated Implementation Costs:** $5,000

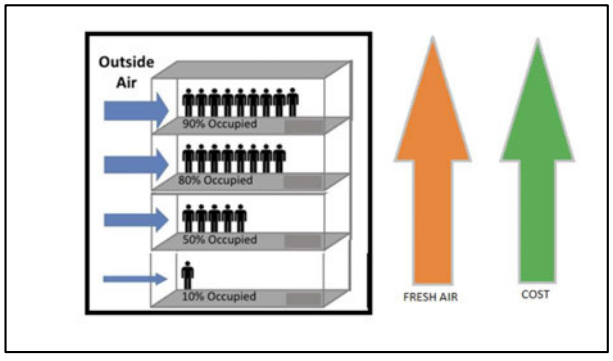
Next Steps:

- The site is encouraged to discuss potential control upgrades with a reputable mechanical/controls vendor.

EEM – 03 – Consider Building Management System Upgrade – Demand Control Ventilation

Building HVAC operation and controls do not currently include Demand Control Ventilation (DCV). DCV uses CO_2 sensors in the return airstream or space served to monitor the level of CO_2 in the space and modulate outdoor air dampers to introduce only as much outdoor air as needed. Modern DCV controls would offer a significant increase in the ability to modulate the introduction of outside air based on occupancy.

The graphic below illustrates how DCV modulates the intake of fresh air based on occupancy:



It is recommended that the site consider the addition of DCV controls for all areas served by RTUs. Savings are estimated based on overall site occupancy profiles during all periods, assuming high occupancy during peak daytime hours, average occupancy during mornings and evenings, and low or no occupancy during overnights and weekends.

- **Estimated Annual Energy Savings:** 13,000 kWh and 3,000 CCF
- **Estimated Annual Cost Savings:** $9,000
- **Estimated Implementation Costs:** $50,000

Next Steps:

- The site is encouraged to discuss potential control upgrades with a reputable mechanical/controls vendor.

EEM – 04 – Consider Installing Cycling Air Dryer

During time of site audit it appears the site is operating a non-cycling compressed air dryer. Due to the low demand of the system at times the dryer will consume close to max rating of demand regardless of the sites compressed air load. Therefore it is recommended to consider costs to upgrade the dryer before or after failure.

It is recommended that facility staff work with their local vendor to determine cost for new dryer with installation. Savings assume a reduction in annual energy use due to dryer being able to operate at part load.

- **Estimated Annual Energy Savings:** 7,500 kWh
- **Estimated Annual Cost Savings:** $1,000
- **Estimated Implementation Costs:** $7,500

Next Steps:

- The site is encouraged to discuss potential upgrades with existing compressed air vendor.

Additional Considerations

Water-Cooled Ice Machine

The site is currently operating an air-cooled ice maker that rejects heat into the surrounding space, adding minor thermal load to the building during cooling season. Discussion with site staff indicates that the installation of a water-cooled ice maker is under consideration. An advantage of a water cooled unit is that the waste heat could be rejected into the water source heat pump loop again reducing the lift and load seen by the compressor.

The savings available from reducing the load on the ice make compressor would likely be very close to or less than the load added to the electric heating equipment to make up the heat currently supplied by the air cooled condenser of the ice machine. Thus, this measure is unlikely to be cost effective.

Additional Electrification

As at other sites of this type through the portfolio, electrification was considered via replacement of existing natural gas fired RTUs for heat pump equipment to eliminate site fossil fuel use for heating. Possible technologies could include additional WSHPs, ASHPs, or a ground source heat pump installation.

Given the recent replacement of the gas-fired RTUs, direct replacement does not appear to make sense. Future consideration of additional heat pump technology could be considered when replacement of the existing rooftops is necessary due to equipment life.

Sustainability Considerations

Background

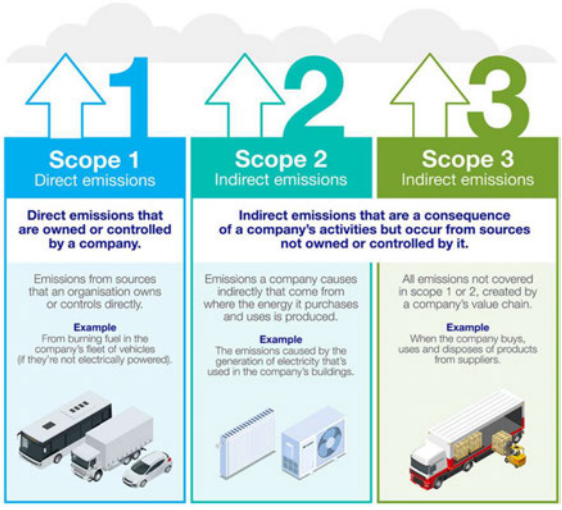
Site and portfolio sustainability is best guided by the framework and methodology set forth in ASHRAE Standard 228-2023 *Standard Method of Evaluating Zero Net Energy and Zero Net Carbon Building Performance* (available for purchase here: https://www.ashrae.org/technical-resources/bookstore/ansi-ashrae-standard-228-standard-method-of-evaluating-zero-net-energy-and-zero-net-carbon-building-performance). The site is not known to have a present net-zero strategy; however, the ASHRAE standard presents a strong method to:

- Assess current building energy use and carbon emissions
- Establish a baseline
- Develop milestones
- Develop a plan to reach milestones

The data and information shown below are intended to help develop an understanding of where current portfolio sustainability goal aligns with current position.

Emissions Scopes

Emissions reporting is generally addressed across three Emissions Scopes, as seen below:



An important aspect of developing a sustainability plan is the determination of which emissions scopes will be targeted for reduction. The majority of sustainability planning at the time of this report is focused on Scopes 1 and 2, although large corporations with significant supply and delivery chains have begun to address Scope 3 as well. The focus of the sustainability plan in this report is on Scope 1 and 2 emissions.

ASHRAE Standard 228-2023 *Standard Method of Evaluating Zero Net Energy and Zero Net Carbon Building Performance*

ASHRAE 228-2023 includes the following diagram illustrating energy flows into, from, and out of a site:

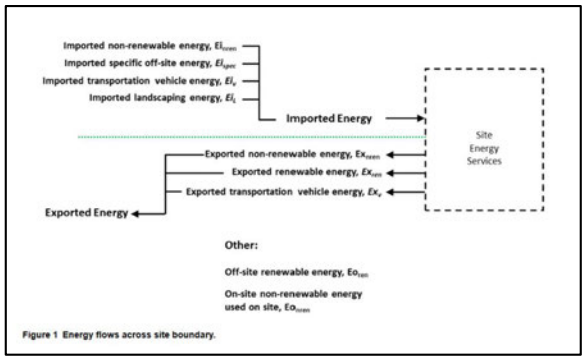


Figure 1 Energy flows across site boundary.

The difference between energy flow into a site, and energy flow out, is site net energy. The primary goal of sustainability is to reduce this net energy, and therefore, net carbon emissions associated with the site and its operation.

Sustainability Plan

With a carbon baseline established and a goal and timeframe put in place, the next step is to develop a sustainability plan to reduce site net energy and carbon. A four-step plan, as outlined in an article from CBRE (Decarbonizing Commercial Real Estate | CBRE) and shown in the chart below, is recommended:



The table below details the four-step plan with narrative descriptions and progress to date for the target site. Note that the process is by nature to be repeated for continuous improvement and consideration of new technologies:

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ESCT Cheshire Service Center Sustainability Plan			
Step	**Description**	**Progress**	**Notes**
1	Efficiency/Conservation	50%	In process, identifying and determining measures
2	Electrify Remaining Loads	50%	Identify and electrify remaining energy loads
3	Renewable Energy Offset	0%	Onsite or purchased renewable electricity
4	Offset Remaining Loads	0%	Purchase RECs on open market, consider portfolio offsets

Step 1: Efficiency and Conservation

Identify possible efficiency and conservation measures at the target site to reduce energy use and associated carbon. This step is in progress at this site – this study has identified several possible measures for the reduction of energy use. These measures should be considered for implementation.

Step 2: Electrify Remaining Loads

Site net energy loads not able to be reduced should be considered for electrification. This step has been partially addressed at the target site with the use of water source heat pumps for comfort heating and cooling.

Step 3: Renewable Energy Offset

Offset of site electrical energy use via renewable energy: either generated onsite or through purchasing of renewable energy from sources such as community solar or solar farms as well as energy brokerage.

Step 4: Offset Remaining Loads

Lastly, the site may consider RECs and/or purchased carbon offsets to meet the remaining site net carbon. ASHRAE 228-2023 rigorously defines each of these categories and is strongly recommended as a guideline for these efforts and associated accounting.

Repeat: Steps 1 – 4

A sustainability plan should be viewed as a process of continuous improvement. The site is encouraged to consider additional opportunities and technologies as they become available and more economical.

Next Steps:

- Facility staff to review suggestions in report (and calculation assumptions) and discuss internally if any interest to move forward with any of the recommended opportunities.
- Most attractive measures in terms of energy savings, operational efficiencies, and potential utility incentives include:
  - HVAC control strategies
  - Building shell gap remediation
  - Cycling Compressed air dryer
- QGM would like to have a virtual report-out to discuss this report. The goal of the meeting is to determine which, if any, of the suggested ECMs are to be acted upon in the near to intermediate future.

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- For those ECMs that require input from designers, site is suggested to initiate the process sooner than later. Site staff are encouraged to get contractors/vendors to site to review and provide budgetary costs – QGM can assist.