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Eversource New Rd Madison, CT – SCOPING STUDY

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Executive Summary

QGM Consulting (Padraic Hagan and Austin Malik) conducted an energy efficiency scoping study at the Eversource Service Center located at 135 New Road Madison, CT 06443 on Wednesday April 22, 2026. QGM analyzed the buildings' electric use as well as associated Greenhouse Gas (GHG) emissions. Objectives were to identify and quantify potential Energy Efficiency Measures (EEMs) for energy reduction, and estimated GHG reduction potential for any corporate initiatives or targets.

Included in this report is a list of potential EEMs with savings and implementation cost estimates. 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 New Rd Madison - 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	GHG (MT CO2e)	% Site GHG	$	Years
1	Adaptive Optimal Start	$2,000	15,000	4.4	1%	$10,000	5.0
2	Demand Control Ventilation	$19,000	130,000	37.8	10%	$50,000	2.6
3	Building Shell Gap Remediation	$10,000	70,000	20.4	5%	$30,000	3.0
TOTAL		$31,000	215,000	62.6	17%	$90,000	2.9

These are the measures identified during the assessment walkthrough; additional measures may become evident with more time on site.

General Facility Description

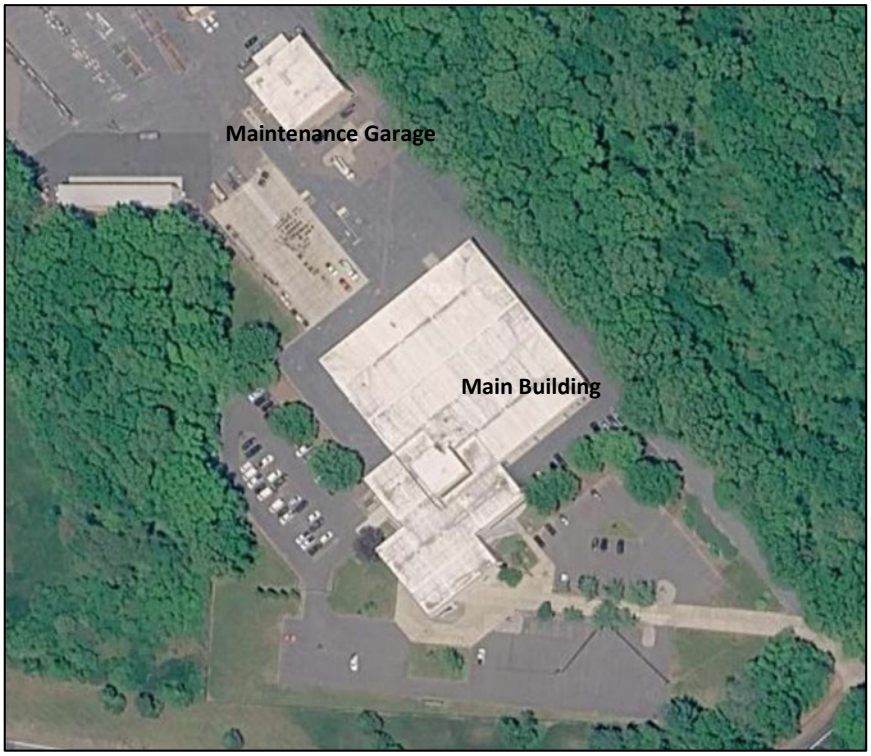
The Madison site consists of (2) buildings originally constructed in 1975:

- The main building consists of offices, conference rooms, workrooms, and a warehouse

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- The garage building used for fleet vehicle maintenance

An aerial view of the campus is shown below:



Total facility footprint is ~59,000 SF across all buildings. Typical occupancy is 7:30 AM – 4:00 PM Monday through Friday, with equipment scheduled for occupancy 5:00 AM – 7:00 PM. Additionally, the garage building has a second shift. Total site operating hours are estimated to be ~4,000 annually. Approximately 30% of the main building is occupied by a tenant, with utilities billed pro-rata. Tenant occupancy is understood to be similar to the service center, and the tenant is likely to leave the space in the summer of 2027.

HVAC is provided through a mix of packaged rooftop units (RTUs), electric unit heaters (UHs), a low-utilization electric resistance radiant floor system, and some spot use of split systems. HVAC equipment is controlled with a modern Building Management System (BMS) from Automated Logic.

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

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Monthly Billing Analysis

Electric use is metered but not billed at this site with annual use provided; monthly electric 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.

Annual Site Summary					
Energy Usage and Costs	Costs	Energy		MT CO2 Emitted	Unit Costs
	$	kWh	mmBTU		
Electric (kWh)	$ 185,516	1,299,129	4,433	378.0	$0.14

$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:

Monthly Utility Bill Summary			
Estimated Monthly Electric			
Month	Electrical Use (kWh)	Estimated Cost ($)	Estimated Blended Rate ($/kWh)
Jan-25	157,153	$22,441	$0.14
Feb-25	125,722	$17,953	$0.14
Mar-25	94,292	$13,465	$0.14
Apr-25	62,861	$8,977	$0.14
May-25	52,384	$7,480	$0.14
Jun-25	115,245	$16,457	$0.14
Jul-25	146,676	$20,945	$0.14
Aug-25	125,722	$17,953	$0.14
Sep-25	104,768	$14,961	$0.14
Oct-25	52,384	$7,480	$0.14
Nov-25	115,245	$16,457	$0.14
Dec-25	146,676	$20,945	$0.14
TOTAL	**1,299,129**	**$185,516**	**$0.14**

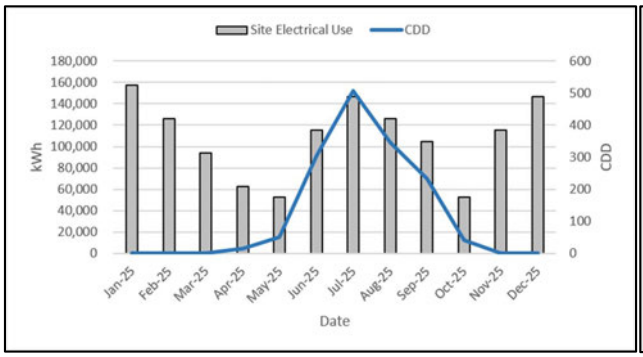
The energy use intensity (EUI) shown below is an indicator of building performance in terms of energy use (kbtu) per building square foot:

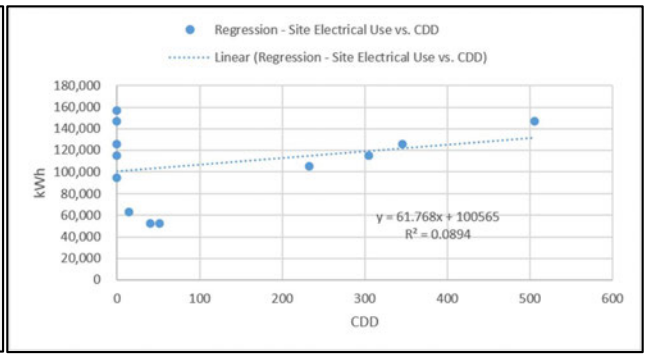
Building Energy Use Intensity (EUI)			
Utility	Site EUI	Source EUI	Unit
Electricity	75	209	kbtu/sf

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

Energy Star publishes median data by building type for overall comparison by general category but does not include this type of building (mixed use: general office space/shop/garage). However, 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.

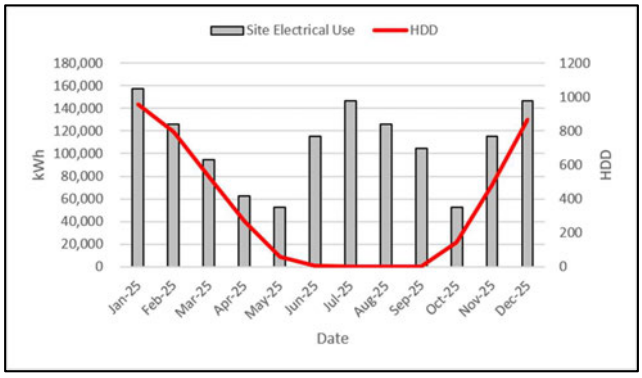
For electrical consumption, weather data for the site was utilized to help generate a monthly site profile. Below are graphs for the estimated monthly site electrical use and cooling degree days:

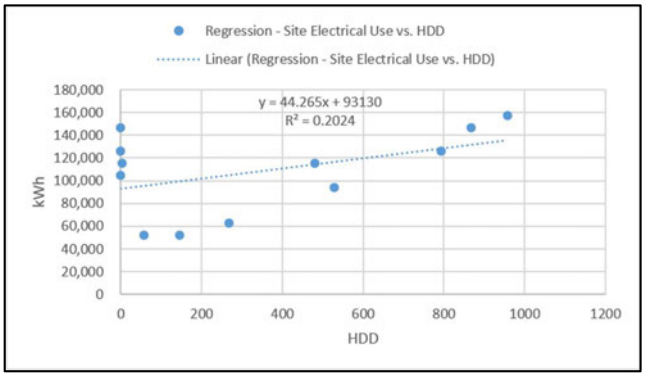




The regression above was developed to help model monthly building electrical use. Visual summer cooling electrical peaks line up with CDD but also peak in the winter due to the presence of electric heat. The first pass regression does not show a statistically significant relationship to CDD, with an R^2 value of 0.089. The Department of Energy Superior Energy Performance (SEP) program qualifies that a statistical relationship exists with an R^2 value of 0.75.

Next, electrical use was compared to heating degree days to investigate any statistical relationship between kWh and seasonal heating:

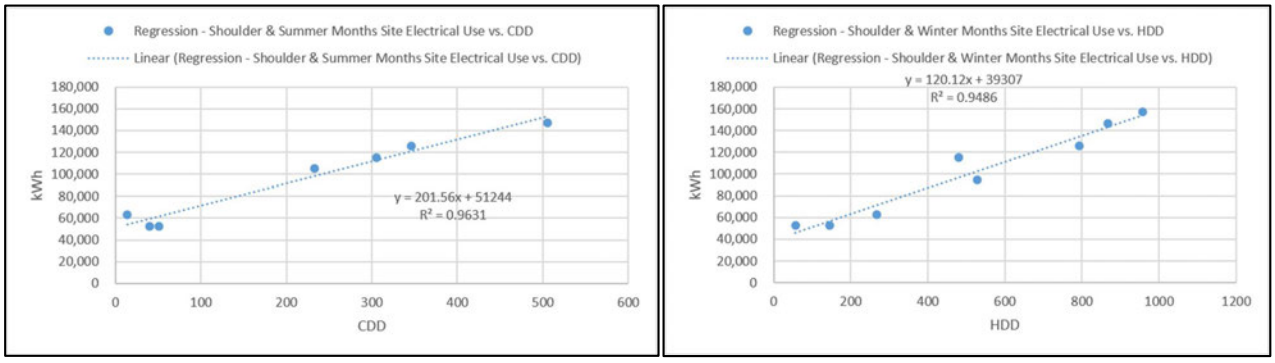




As above for CDD, visual kWh peaks to coincide with increases in HDD; however, the regression indicates no statistical relationship. The combination of two correlations makes initial regression difficult.

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As an additional aid to modeling monthly electric use, CDD and HDD were next compared to only the relevant months: summer and shoulder months for CDD and winter and shoulder months for HDD, with the resulting graphs shown below:

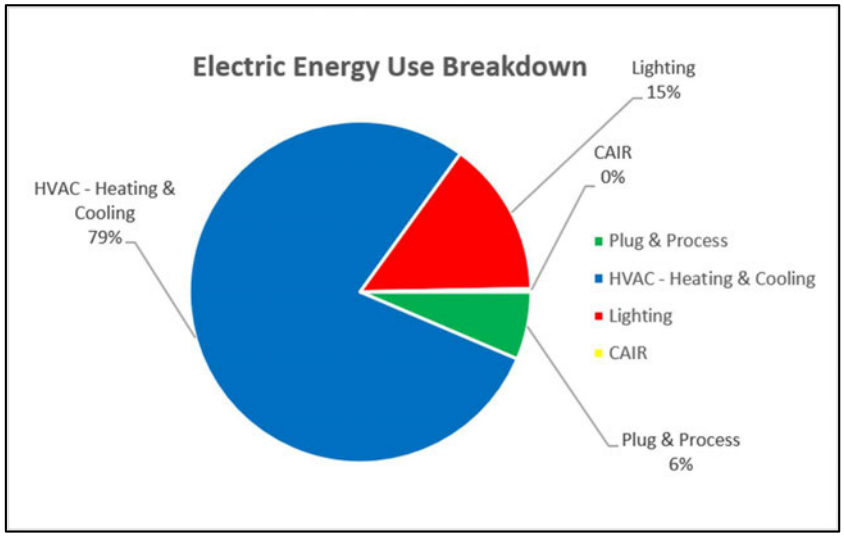


R^2 values of 0.96 for separated cooling electric use and 0.95 for separated heating electric use indicate good model fits for the estimated electric use at this site.

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.



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Estimated End Use Breakdown - Electricity	
Electric End Use	**Energy Use (kWh)**
Plug & Process	83,000
HVAC - Heating & Cooling	1,020,000
Lighting	190,000
CAIR	4,000
TOTAL	**1,297,000**

Lighting Equipment

The entire site has been retrofitted with LED lighting and controls that appears to be in good working order.

Equipment Inventory:

Site equipment inventories were created to catalog the current equipment, as shown below:

Eversource Madison CT HVAC Equipment Inventory									
Tag	**Type**	**Manufacturer**	**Model**	**Serial #**	**Cooling Ton**	**MBH**	**Pump/ Fan HP**	**CFM**	**Notes**
AHU-1	Air Handling Unit	Trane	CSAA035UAC00	K11B16530			9.8	17,500	
AHU-2	Air Handling Unit	Buffalo	Model G				10	20,000	
Chiller 1	Chiller	Trane	CGAM120F2R02A	U18L71609	120				
	Condenser	Mitsubishi	Mr. Slim						
	Condenser	Trane	XR						
VAV-1	Variable Air Volume Box	Price	SDV 12				0.25	1,300	Typical of mult.
	Exhaust Fan	Cook	135 C15D 135 ACE	140PL45174			0.5	1,500	
	Air Handling Unit	AAON	RN-016-3		16	182	5		
	Packaged Roof Top Unit	Trane	TSC036G4RGA	202910323L	3		1		No heat
	Exhaust Fan	Greenheck	G-090-DGEX-QD	15402439			1		
	Exhaust Fan	Centri Master	P36L				1		
EUH	Electric Unit Heater					5.1			Typical of 11
	Chilled Glycol Pump 1						10		VFD control
	Chilled Glycol Pump 2						10		VFD

Site Energy Efficiency Measures/Recommendations

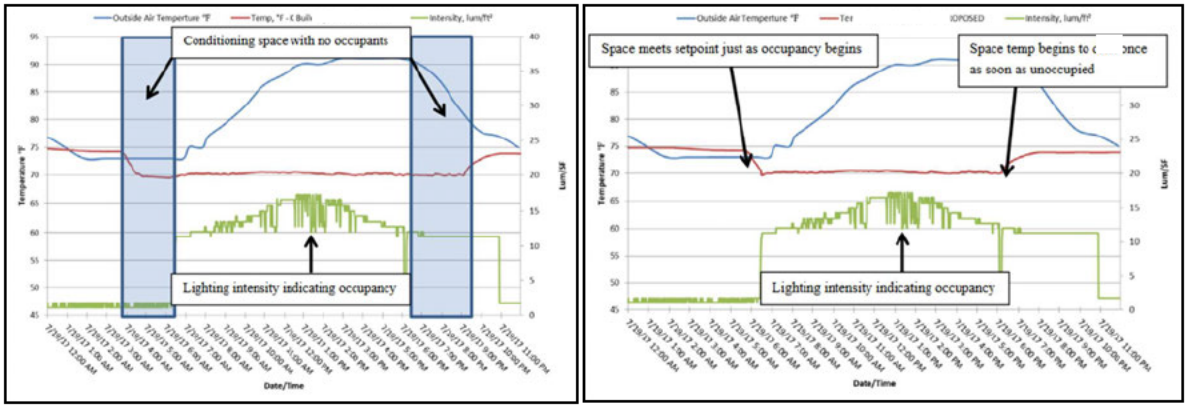
EEM – 01 – Consider Building Management System Upgrade – Adaptive Optimal Start

Adaptive/Optimal Start/Stop (AOS) is a control sequence available within modern Building Management Systems that allows the control system to iteratively "learn" the most optimal times to start up heating or cooling equipment so that the space is conditioned the minimum period of time required by occupancy.

The example below is historical data from an example building, with the blue curve representing outdoor air temperature, the red curve, space temperature, and the green series lighting intensity (indicating occupancy).

The blue rectangles highlight the unnecessarily long equipment ramp up and cool down periods in the "before" graph, while in the "after" graph with AOSS enabled, the equipment runs only as long as needed to meet occupied setpoints:

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Savings assume existing long startups could be reduced from 3-4 total hours to maximum 1 hour (or less).

- **Estimated Annual Energy Savings:** 15,000 kWh
- **Estimated Annual Cost Savings:** $2,000
- **Estimated Implementation Costs:** $10,000 (likely only programming required)

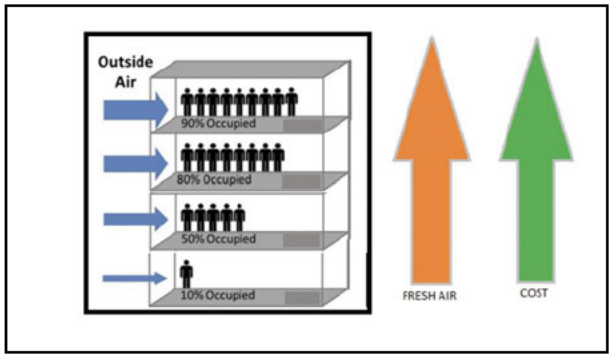
Next Steps:

- Datalogging is recommended to confirm equipment loading assumptions and schedules.
- The site is encouraged to discuss potential control upgrades with a reputable mechanical/controls vendor.

EEM – 02 – Consider Building Management System Upgrade – Demand Control Ventilation

Building HVAC operation controls did not include CO_2 sensors. 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:



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It is recommended that the site consider modern DCV controls for all areas as an integration with the existing Building Management System (BMS). 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.

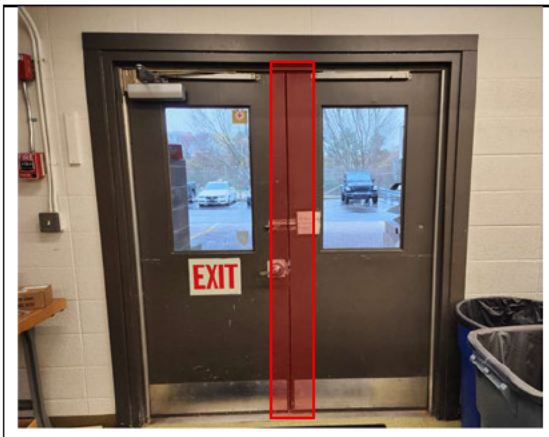
- **Estimated Annual Energy Savings:** 130,000 kWh
- **Estimated Annual Cost Savings:** $19,000
- **Estimated Implementation Costs:** **$50,000 (sensors and programming)**

Next Steps:

- Datalogging is recommended to confirm equipment loading assumptions and schedules.
- The site is encouraged to discuss potential control upgrades with a reputable mechanical/controls vendor.

EEM – 03 – Consider Building Shell Gap Remediation

During the walkthrough of the site, gaps and cracks were noted at doors and windows. 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:



Example of double door system with gap along junction


Exterior door with visible daylight at bottom

Savings were estimated assuming improvements in thermal envelope as well as a reduction in outdoor air infiltration during both heating and cooling seasons`:

- **Estimated Annual Energy Savings:** 70,000 kWh
- **Estimated Annual Cost Savings:** $10,000
- **Estimated Implementation Costs:** **$30,000 including survey costs**

Next Steps:

- It is recommended that the site discusses building shell survey and remediation with a specialized vendor.

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:



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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:

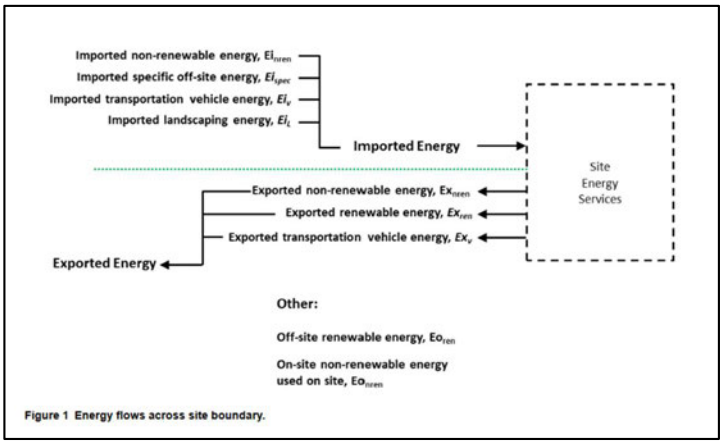


Figure 1 Energy flows across site boundary.

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:

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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:

ESCT Madison Service Center Sustainability Plan			
Step	Description	Progress	Notes
1	Efficiency/Conservation	50%	In process, identifying and determining measures
2	Electrify Remaining Loads	100%	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 – complete at this all-electric site.

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

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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:

- Site to review suggestions in report (and calculation assumptions) and discuss internally if any interest to move forward with any of the recommended.
- Most attractive measures in terms of energy savings, operational efficiencies, and potential utility incentives include:
    - BMS upgrade and control strategies
- 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.
- For those ECMs that require input from designers, site is suggested to initiate the process sooner than later. Site is encouraged to get contractors/vendors to site to review and provide budgetary costs.