



# **Massachusetts Enterprise Energy Management System**

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# Enterprise Energy Management System (EEMS)

DOER \$9.7 million contract with EnerNOC

Installation of **1,300** real-time meters completed in August 2012

Electricity, NG, oil, steam, chilled & hot water, propane monitoring

25 million square feet,  
470 state buildings



# Primary Goals

- Help track energy use at the building level where such data was not previously available
- Provide real-time use information for all fuels to help facilities respond immediately and reduce use/costs
- Enable building comparisons within facilities and across facilities
- Support efforts to prioritize projects based on consumption data
- Compare usage to bills to find discrepancies

# EfficiencySMART Insight Features and Deliverables



**Real-time  
Data**



**Real Time Alerts**



**Savings  
Identification**



**Benchmarking and  
Reporting**



**Dashboards**



**Utility Bill  
Management**



**Analyst Support**



**DDER**

Massachusetts Department  
of Energy Resources

# Portfolio View: EUI Snapshot



# Real-time Visibility into Energy Use Patterns

Maggie Mccarey

Home
Energy Profiling
Carbon
Energy Efficiency
Reports
Administration

Profiling

Number of Locations

3  10



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**Locations**

- Commonwealth of MA
- ▼ Administration and Finance
  - ▼ Bureau of State Office Buildings
    - ▶ DEP Wall Experiment Station
    - ▶ Hurley Building
    - ▶ Lindemann Center
    - ▶ McCormack Building
    - ▶ Statehouse
  - ▶ Community Colleges
  - ▶ Health and Human Services
  - ▶ Judiciary
  - ▶ Public Safety
  - ▶ State Universities
  - ▶ UMass

Refresh
Display
Add Note
Export

Zero Axis

Range

1d 7d 1m 3m 6m YTD 1y

Data Interval View

1 Hour

1 ■ Commonwealth of MA > Administration and Finance > Bureau of State Office Buildings > McCormack Building  Compare To Past

— All Aggregated Energy Usage (BTU) [Change](#) [Remove](#)

+ Add Plot

2 ■ Commonwealth of MA > Administration and Finance > Bureau of State Office Buildings > Lindemann Center  Compare To Past

— All Aggregated Energy Usage (BTU) [Change](#) [Remove](#)

Data Category	Measurement
Fuels	Aggregated Energy Usage (BTU)
Electricity	Electricity Usage (kWh)
	Weather Sky Cover (%)

# Energy Usage Compare to Past – UMass Lowell

Using EEMS, Paul Piraino confirmed that electric usage in 2012 (blue) was much higher than 2011 (black)



By making a simple change to the BMS, the electricity usage was brought back to normal levels

SAVINGS **\$45,000**

kW Savings

**600 kW**

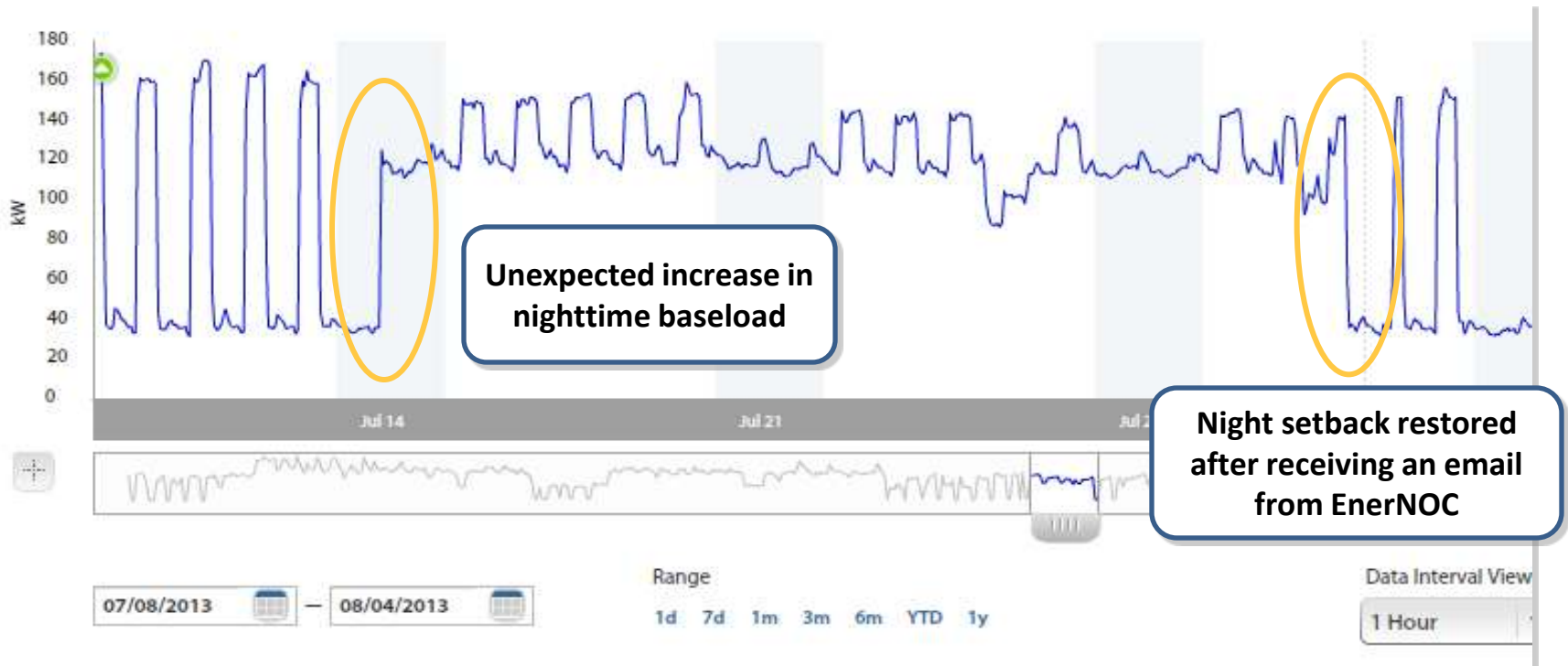
kWh Savings

**409,000 kWh**

Reduced Carbon Emissions

**970,000 lb**

# Night Setback – Framingham State University



SAVINGS **\$16,700**

kW Savings

**80 kW**

kWh Savings

**152,000 kWh**

Reduced Carbon Emissions

**361,000 lb**

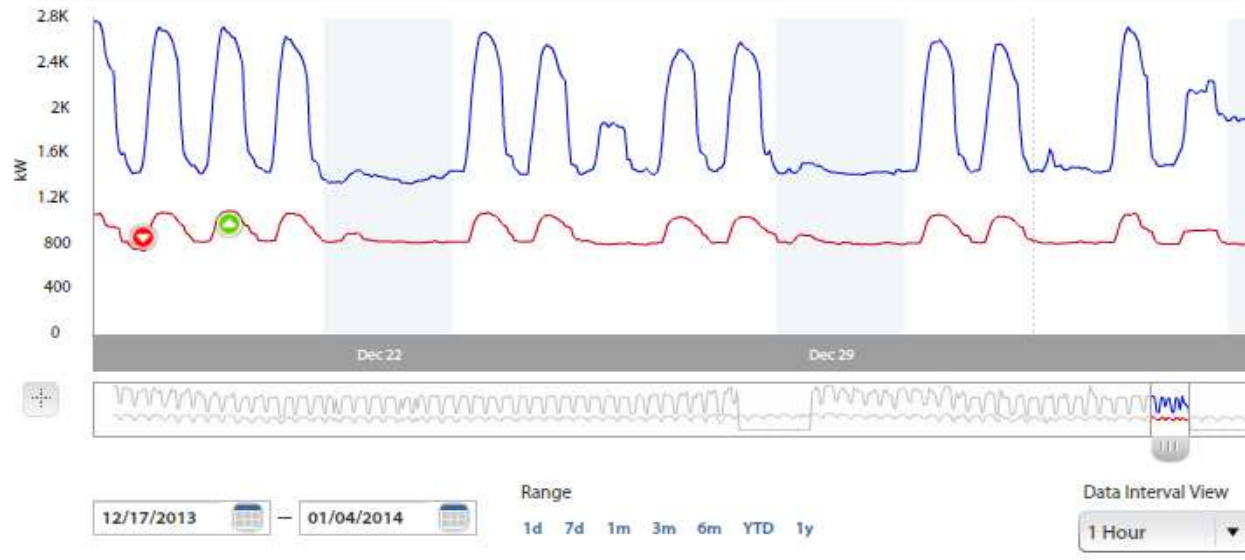
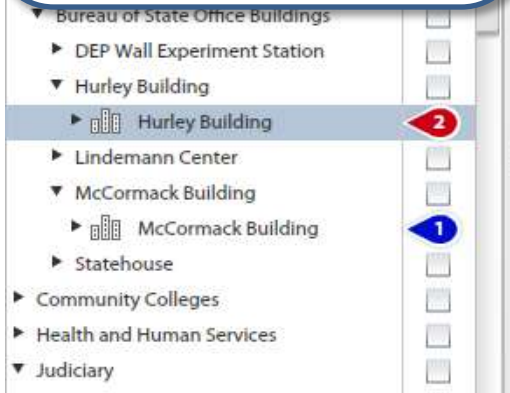


# Night Baseload – State Office Buildings

McCormack shuts off just 40% of its electric load at night.

Hurley shuts off 30%

EnerNOC analyst and DCAMM team agreed these buildings should be able to achieve at least a 50% reduction.



EXPECTED SAVINGS

**\$100,000**

kW Savings

kWh Savings

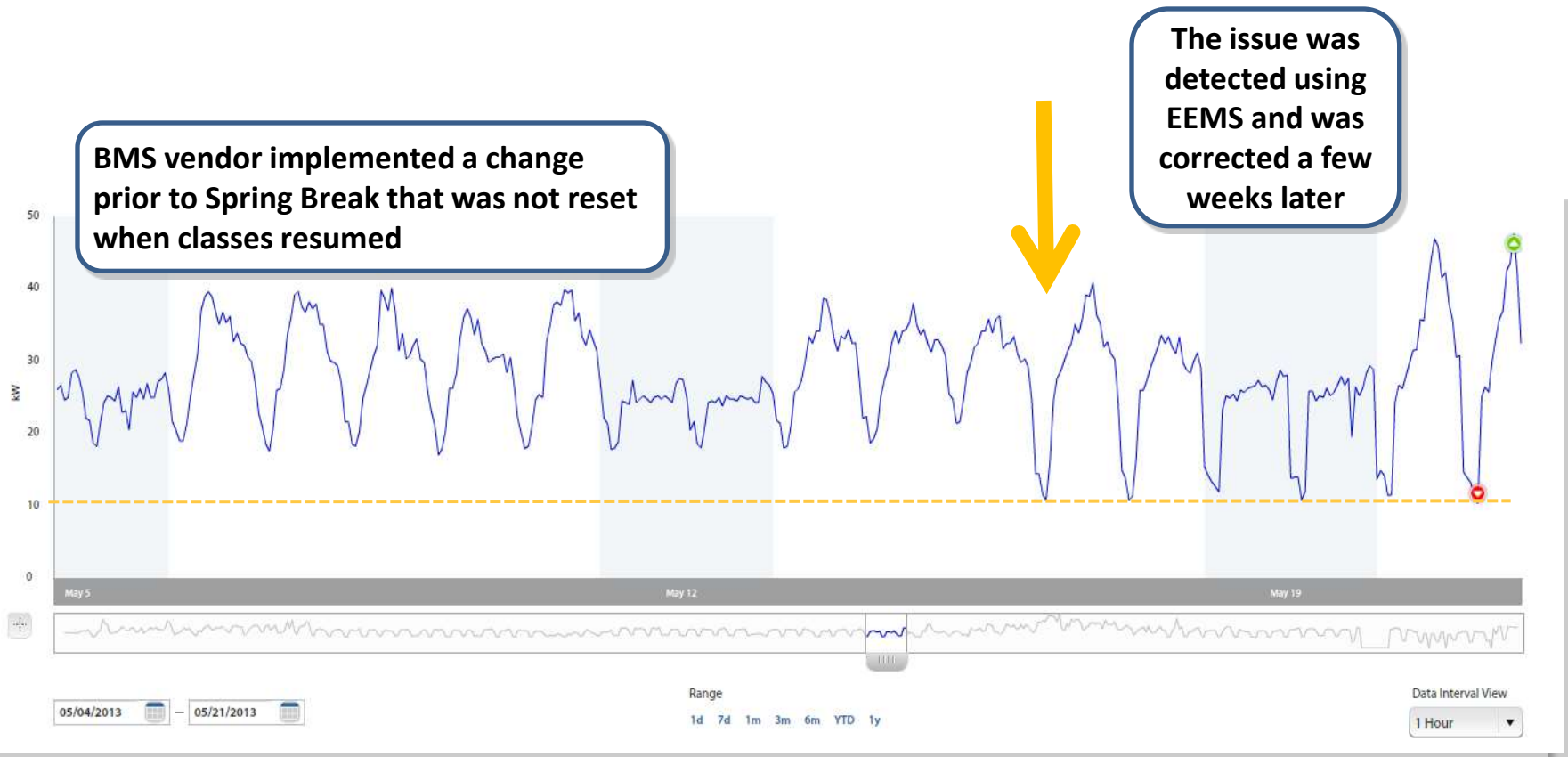
Reduced Carbon Emissions

**600 kW**

**909,000 kWh**

**2,160,000 lb**

# Break Scheduling – Massasoit Community College



SAVINGS **\$3,600**

kW Savings

**12 kW**

kWh Savings

**32,700 kWh**

Reduced Carbon Emissions

**77,700 lb**

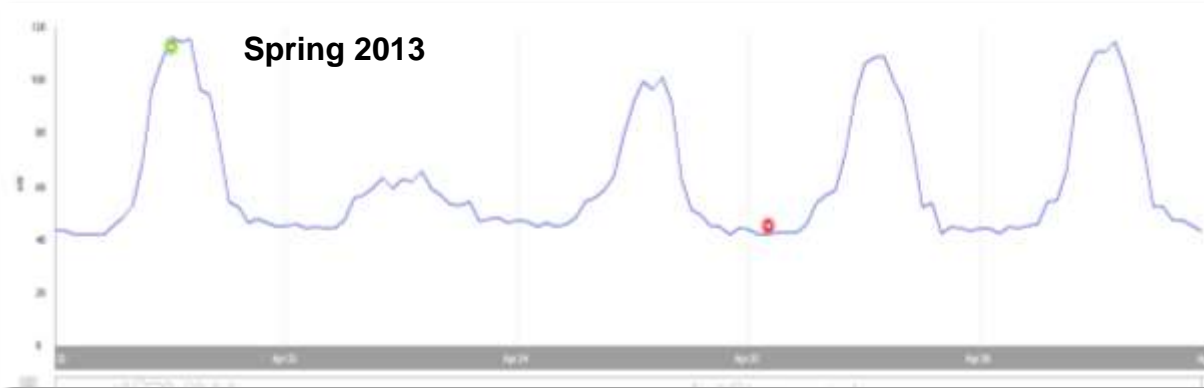
# Morning Startup – Peaks – Chelsea Soldiers' Home

Spring 2012



In the spring of 2012, chillers were being turned on simultaneously leading to unnecessary peaks

Spring 2013



After speaking with an EnerNOC analyst, the building was able to implement a staged startup sequence and eliminate the peaks

SAVINGS **\$19,000**

kW Savings

**60 kW**

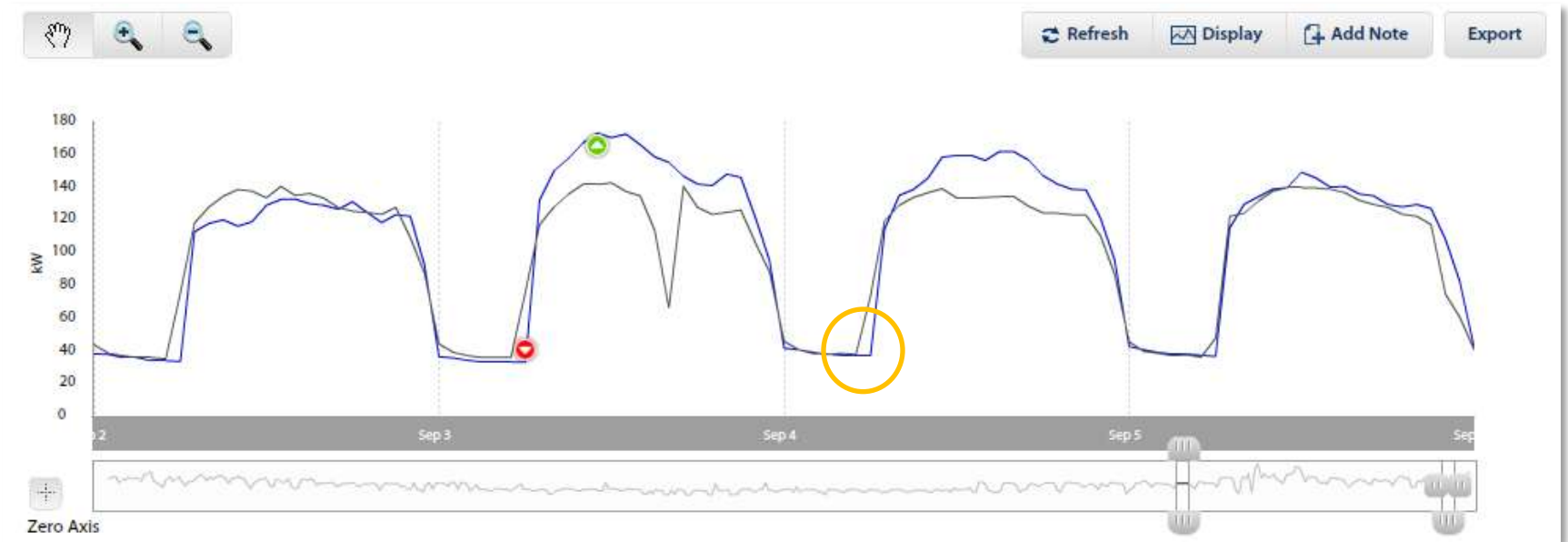
kWh Savings

**173,000 kWh**

Reduced Carbon Emissions

**411,000 lb**

# Morning Startup – Delayed Start – Bristol CC



Three buildings were starting up earlier than they needed to. They are now starting up 1 to 2 hours later than before.

SAVINGS **\$2,500**

kW Savings

**N/A**

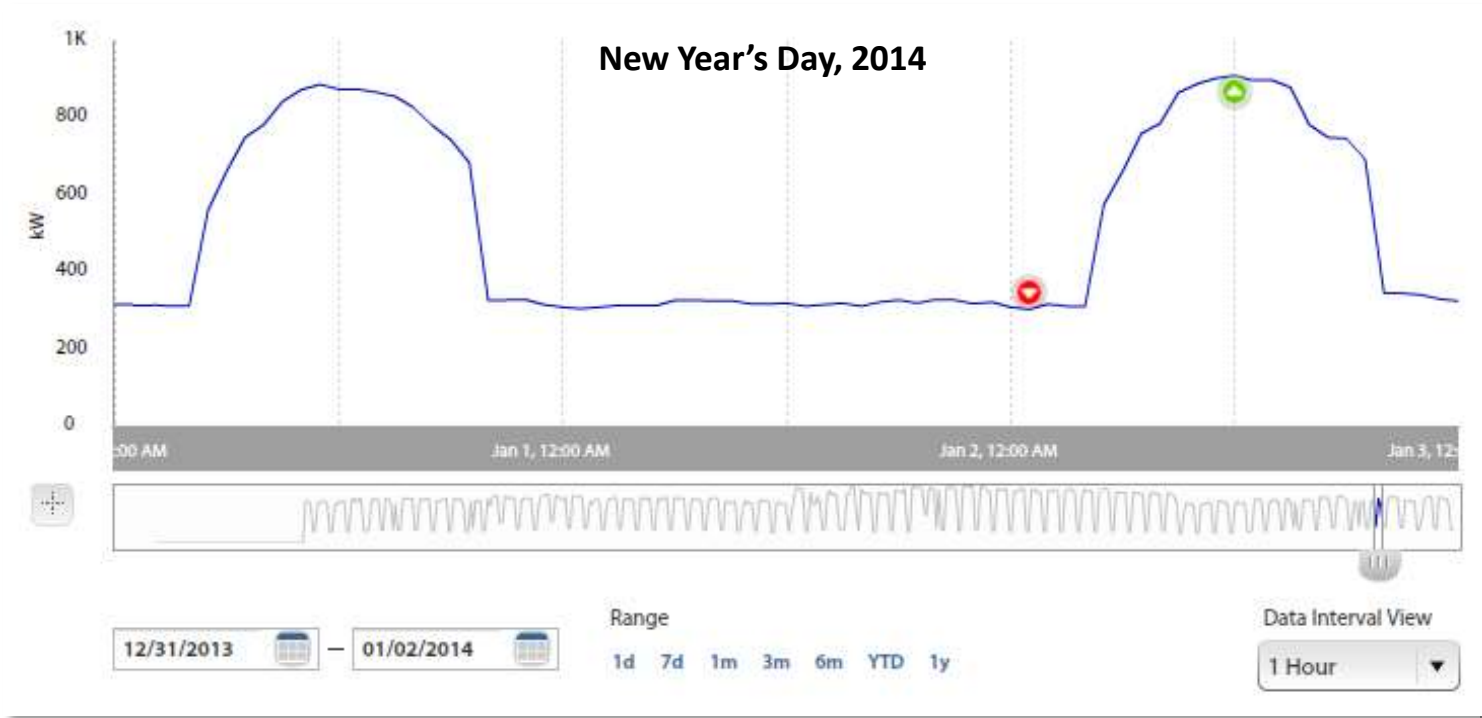
kWh Savings

**22,700 kWh**

Reduced Carbon Emissions

**54,000 lb**

# Holiday Shutdowns – Trial Courts



SAVINGS **\$10,000**

kW Savings

**500 kW**

kWh Savings

**8,000 kWh**

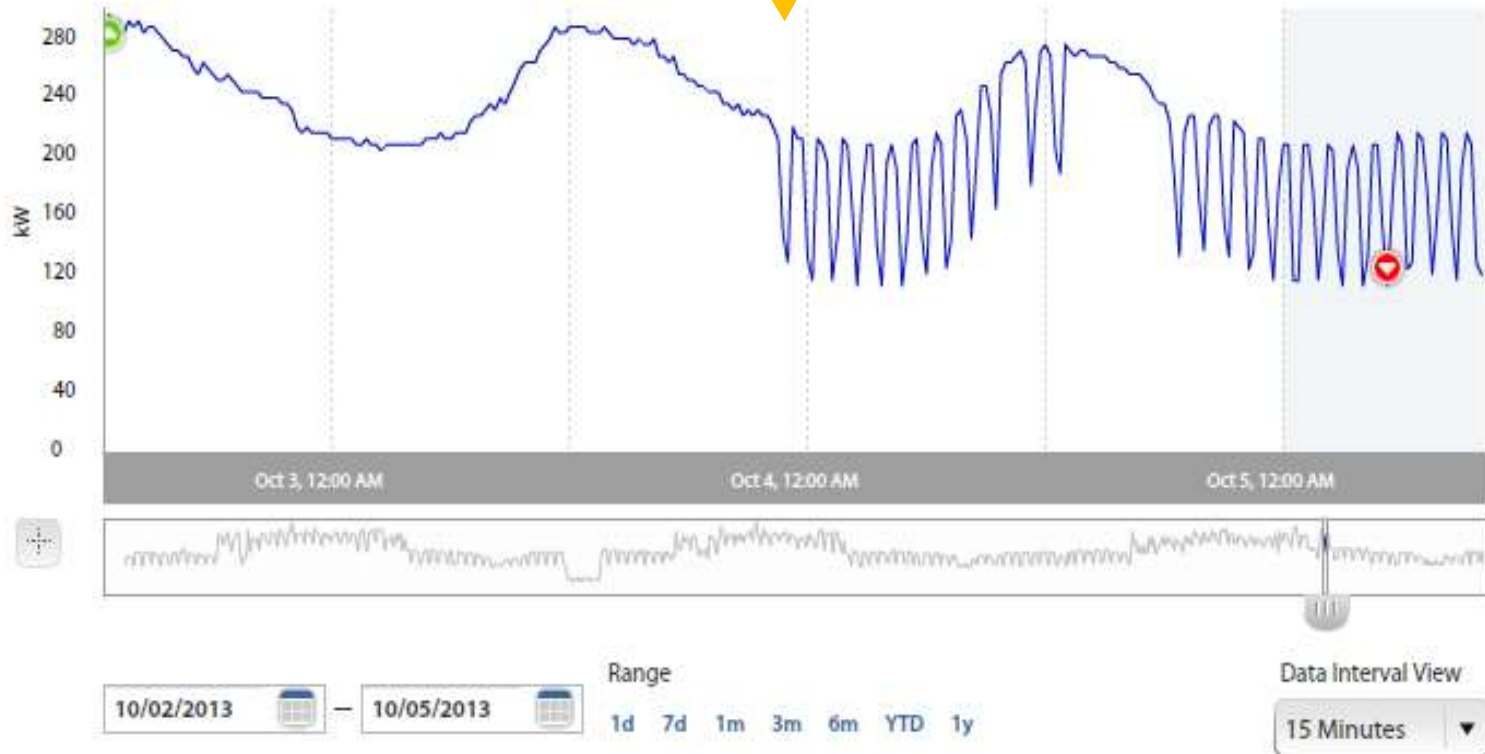
Reduced Carbon Emissions

**19,000 lb**

# Maintenance Cost Avoidance – UMass Lowell

Using granular EEMS data, this site was able to identify a large piece of equipment that was cycling on and off.

Proactively identifying and eliminating this issue will significantly increase the lifespan of the equipment and reduce maintenance costs

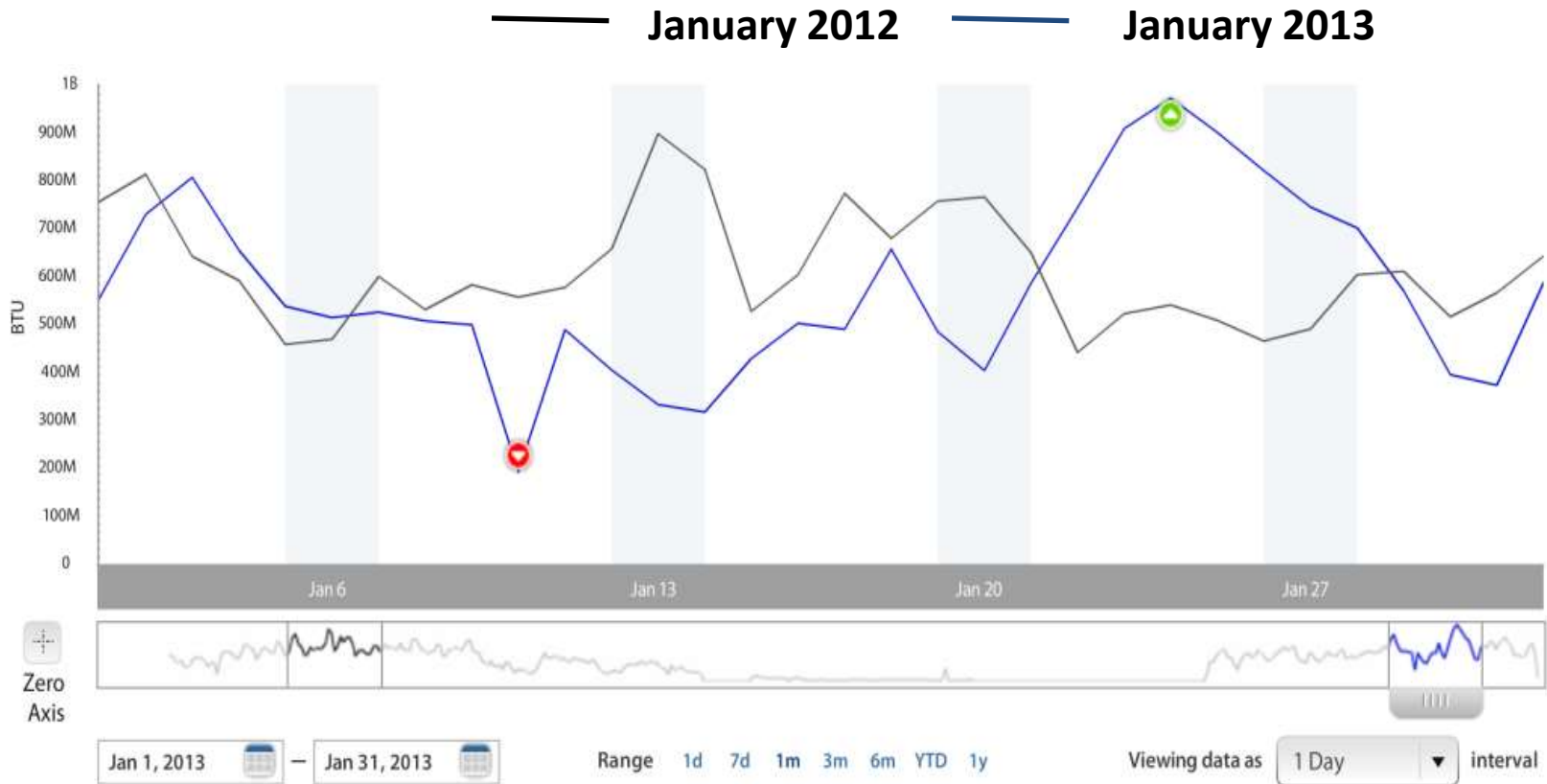


# Zero Net Energy Building Performance Tracking – North Shore Community College



**EEMS provides North Shore Community College with the necessary data to track the building's performance and determine how closely the building is performing to net zero.**

# Measurement & Verification – UMass Lowell



**EEMS is a great way to track the results of efficiency projects. The college's Energy Manager is using the EnerNOC application for M&V, to determine the level of savings achieved and to help inform his decisions going forward.**



# Other EEMS Uses and Benefits

- **BASELINE ANALYSIS**
  - Use EEMS data to project heat demand for potential CHP system (MassArt) and sizing of new boilers (Fitchburg State University, Dept of Correction)
  - Use historical data to benchmark buildings for large-scale efficiency projects (DCAMM)
- **BUILDING USAGE DATA FOR DEPARTMENT CHARGEBACK**
  - Use EEMS data each month to correctly distribute campus utility bill charges to appropriate departments (Westfield State University)
- **SCHEDULED REPORTS AND ALERTS**
  - Use scheduled reports to keep tabs on building performance and prioritize day-to-day work (Mass Hospital School)
- **EDUCATION AND OUTREACH**
  - Incorporate EEMS in sustainability courses (Bunker Hill CC)
  - Use EEMS data to feed public-facing Lucid dashboard to promote public awareness and behavioral change (Bunker Hill CC, MassART)
- **EXTRAPOLATE EEMS FINDINGS TO NON-METERED BUILDINGS**
  - Holiday shutdowns (Trial Courts)

# EEMS Challenges

- Building selection process
- Procurement, Installation process, schedule
- Data quality
- Old buildings and infrastructure
- Steam metering
- On-site resources and staffing
- Implementation of identified measures
- 24 hour sites and different usage patterns
- Planning for future projects, changes at sites
- Costs



# Total Identified Savings by Measure Type

Measure Type	# of Identified Measures	Annual Savings
Peak Demand and Usage Spikes	298	\$641,000
Energy Intensity/Unexpected Usage	86	\$592,000
Heating Optimization	204	\$339,000
Night Setback	133	\$269,000
Day to Day Comparison	380	\$180,000
Extended Breaks	150	\$120,000
Night Baseload	34	\$114,000
Weekend Setback	55	\$72,000
Delayed Start	41	\$52,000
Holidays	215	\$43,000
<b>Total</b>	<b>1,596</b>	<b>\$2,422,000</b>