



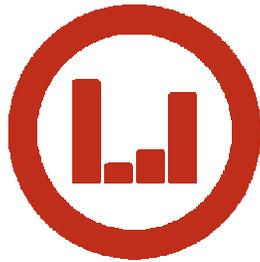
Demand Response and Energy Efficiency Insight

Connecticut Department of Energy
and Environmental Protection
May 15, 2012

Agenda

1. EnerNOC's Energy Management Applications
2. New England Program Details and EnerNOC Overview
3. DemandSMART Overview
4. EfficiencySMART - Insight Overview

EnerNOC's Energy Management Applications



DemandSMART
Comprehensive
Demand Response



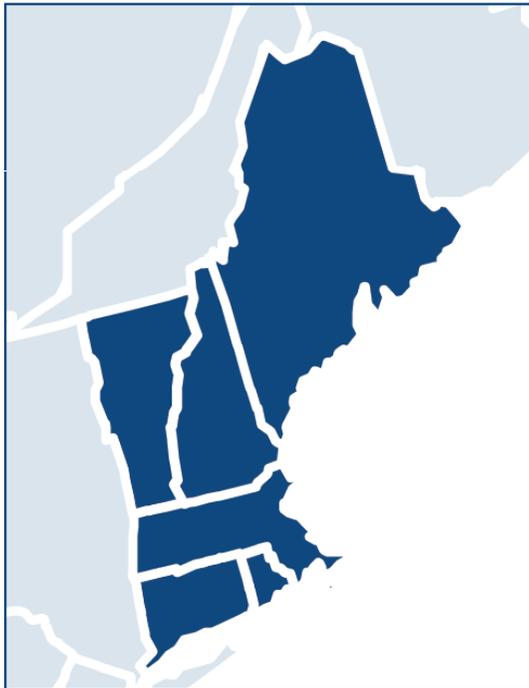
EfficiencySMART
Continuous Energy
Savings



DemandSMART
Comprehensive Demand Response

EnerNOC & ISO-New England

Partners in reducing peak demand.



About ISO-New England (ISO-NE)

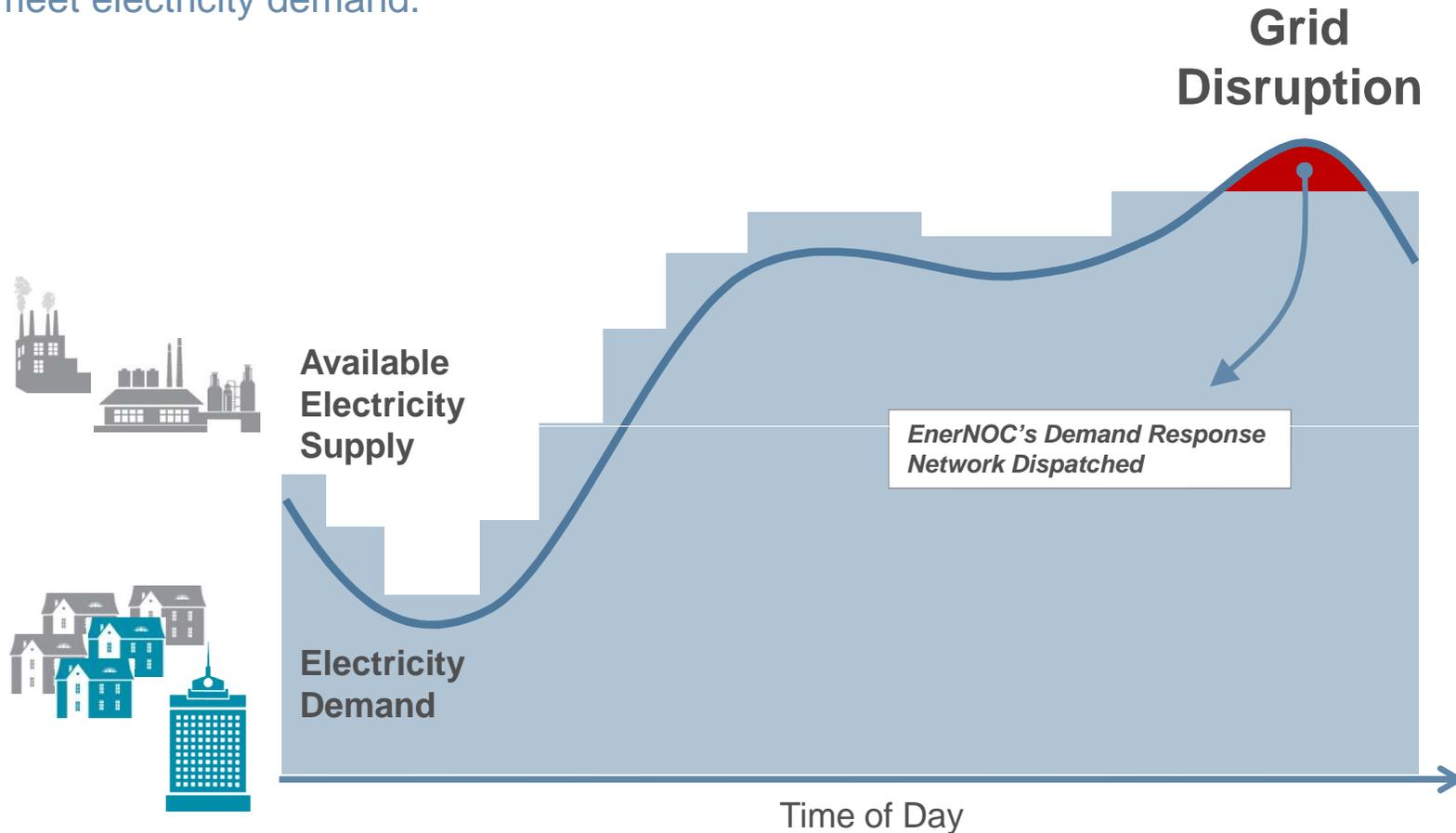
- ISO-NE is a Regional Transmission Organization (RTO) responsible for the design and structure of New England's wholesale electricity market to ensure a reliable power system and affordable electricity for the six-state region.
- ISO-NE is not a utility – it does not serve customers like you

ISO-NE: The Stats

# of people served	14 million
# of households and businesses served	6.5 million
Annual total energy market value (2008)	\$12 billion
Miles of transmission lines	Over 8,000
All-time peak demand – August 2, 2006	28,130 MW
Generation sources	Over 350
Square miles of territory	128,000

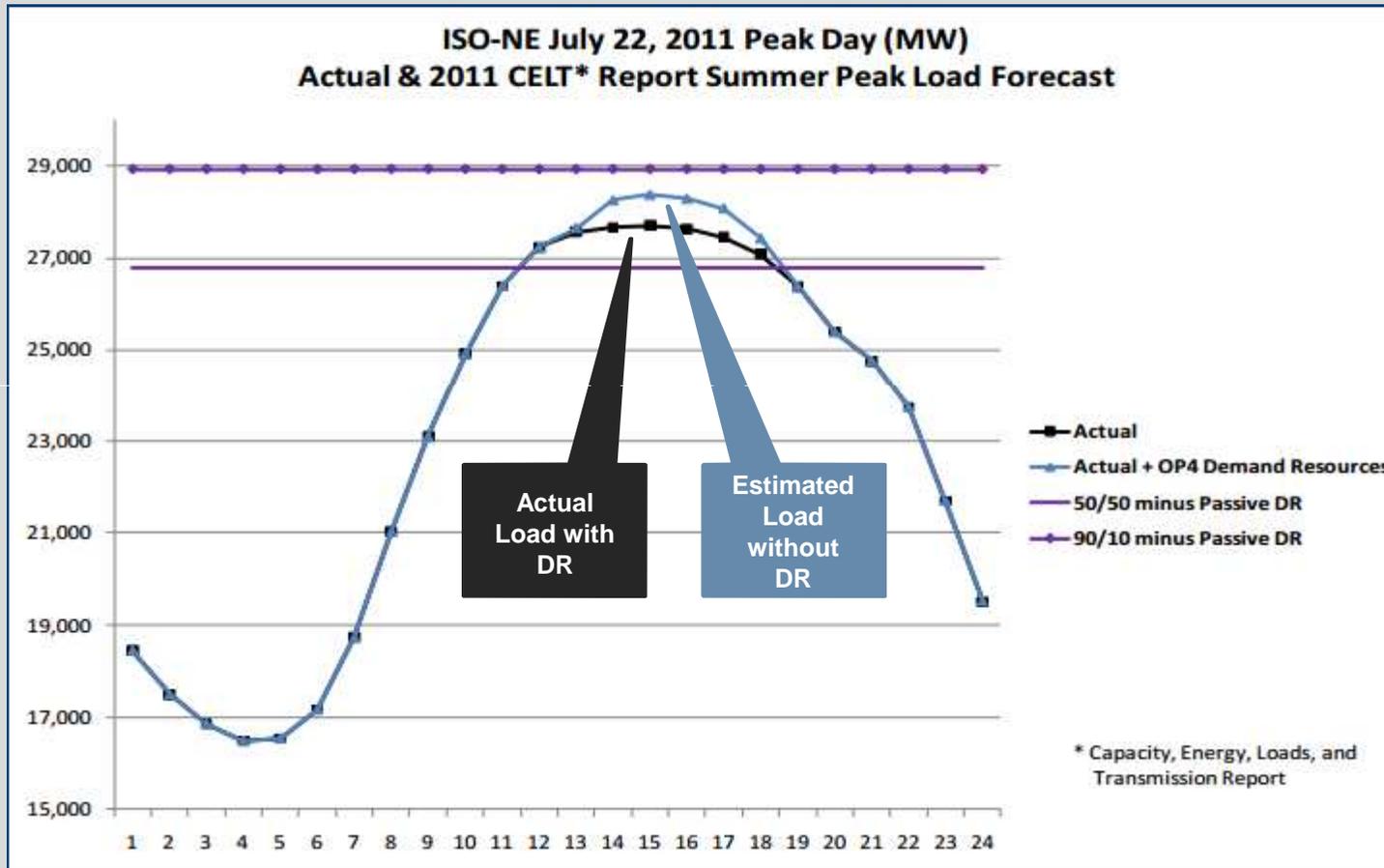
Problem: Balancing Supply and Demand

Every second of every day, ISO-NE must ensure that there is enough electricity supply to meet electricity demand.



Solution: Demand Response

Demand response can provide quick relief when demand for electricity exceeds supplies, such as on July 22, 2011.



662 MW of Real-Time Demand Response were dispatched on July 22

Source: ISO-NE



About EnerNOC

● **Proven Customer Track Record**

- 4,900 customers across 11,400 sites with 7,100 MW's of demand response capacity in North America, Europe, Australia, and New Zealand
- 99% customer retention rate
- Highest industry customer satisfaction rating
- Over \$450 million in customer payments/savings to date
- Simple, risk-free commercial agreements

● **Full Value and Technology Offering**

- Energy management application platform addresses demand and supply-side
- Combine technology, managed services, and market access
- More than \$100 million invested to date in technology
- 24/7/365 Network Operations Center, real-time metering and web-based monitoring

● **World-Class Team and Resources**

- 600 employees and growing fast – multiple “top places to work” awards
- Publicly traded on the U.S. NASDAQ (ENOC)
- Over \$87 million in cash on balance sheet

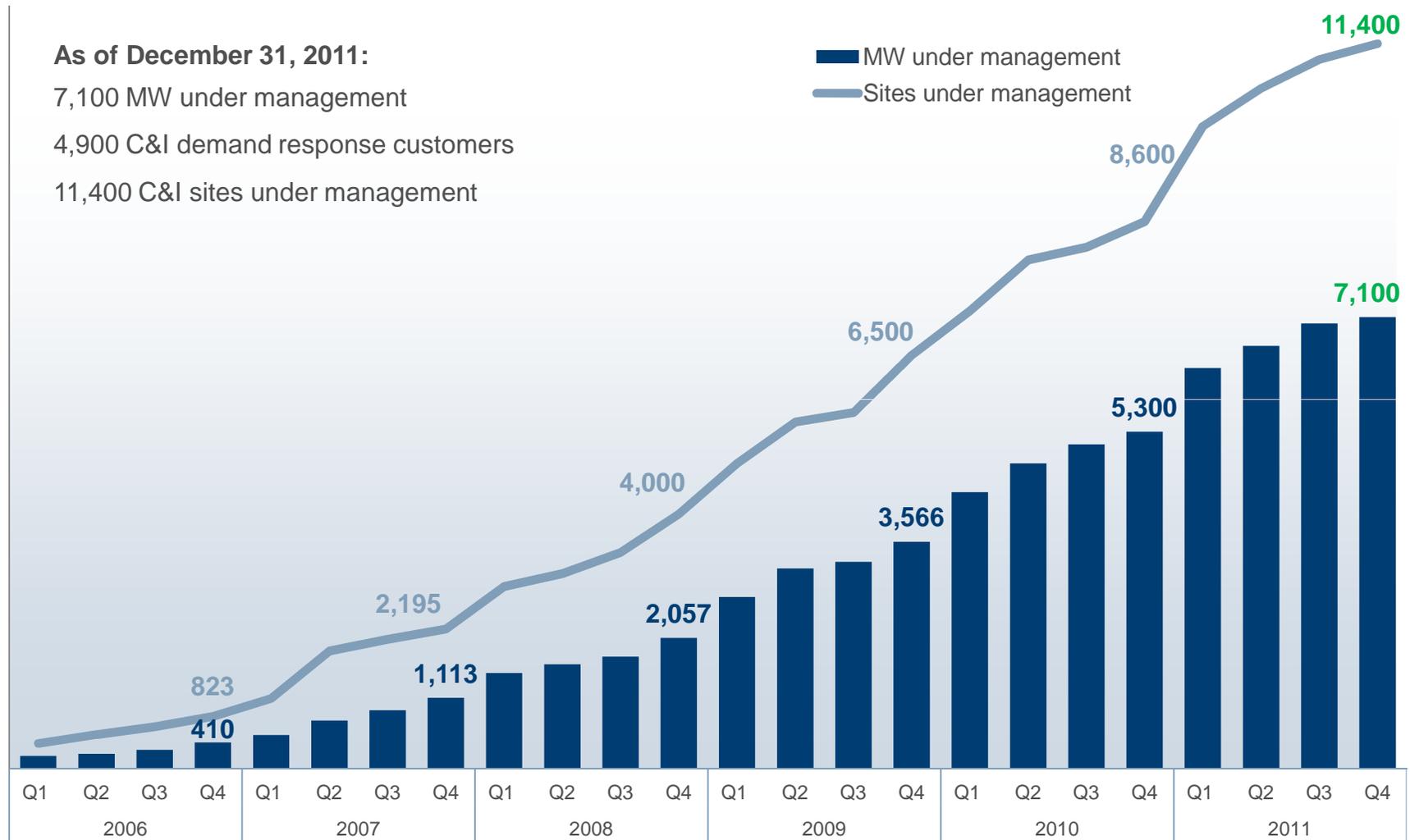
A History of Rapid Growth

As of December 31, 2011:

7,100 MW under management

4,900 C&I demand response customers

11,400 C&I sites under management

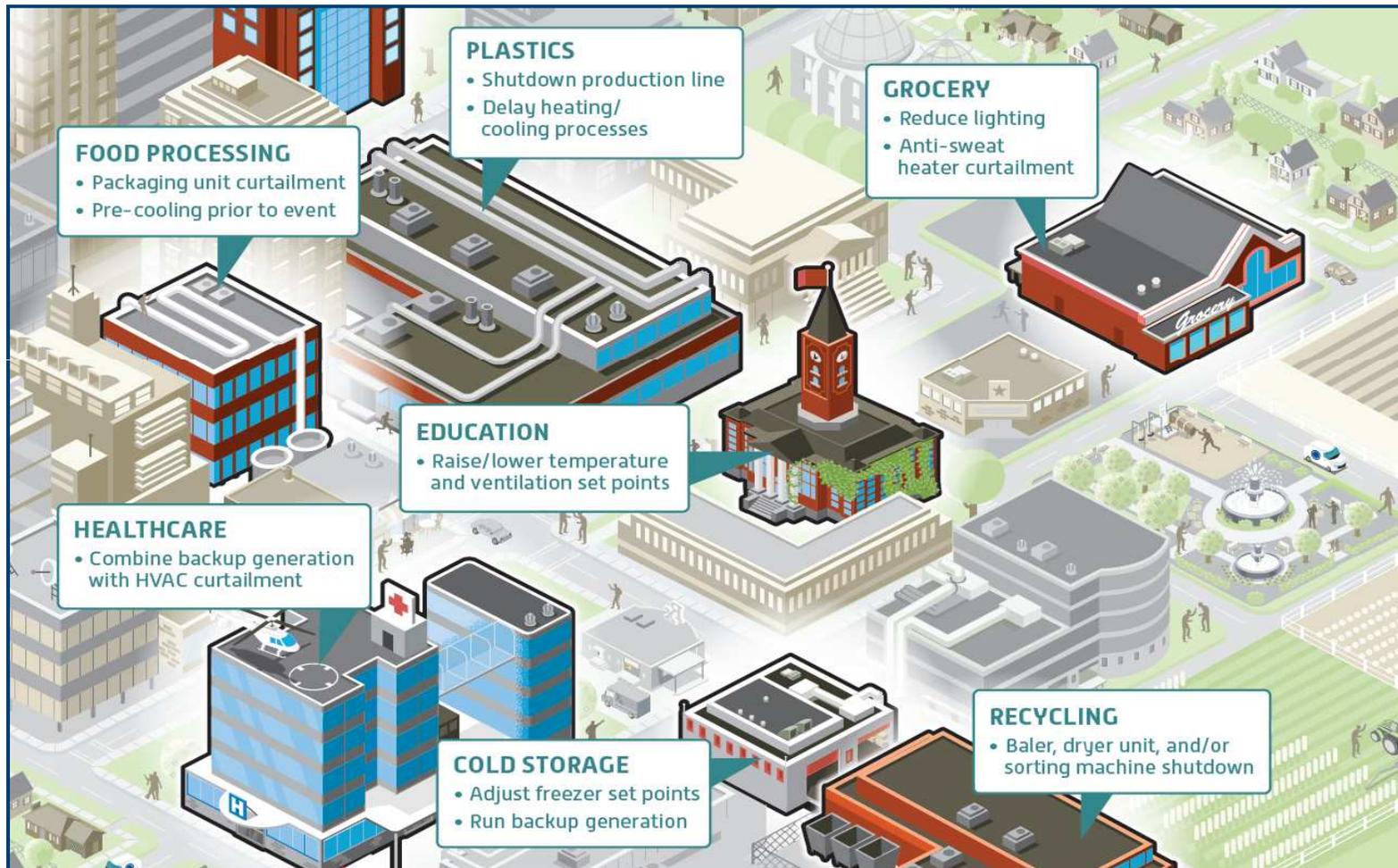


About EnerNOC and the State of Connecticut

- **Together since 2004**
- **Currently manage approximately 25 MWs in the ISO-NE Demand Response Program**
- **64 Connecticut sites currently enrolled include**
 - **State Universities**
 - **Community Colleges**
 - **Department of Corrections**
 - **Department of Developmental Services**
 - **Department of Children and Families**
 - **Mental Health Authorities, and**
 - **Department of Information Technology**
- **EnerNOC has delivered nearly \$5,000,000 in demand response incentive payments to the State**

How Demand Response Works

When the electric grid needs resources, ISO-NE “dispatches” EnerNOC’s resources and thousands of facilities across nearly every industry reduce electricity consumption.



Demand Response at Your Facility

HOW YOU PARTICIPATE



Curtailment

and/or



Self-Generation

HOW YOU TAKE ACTION



Automatic

or



Manual

Curtailment (RTDR) Program Rules



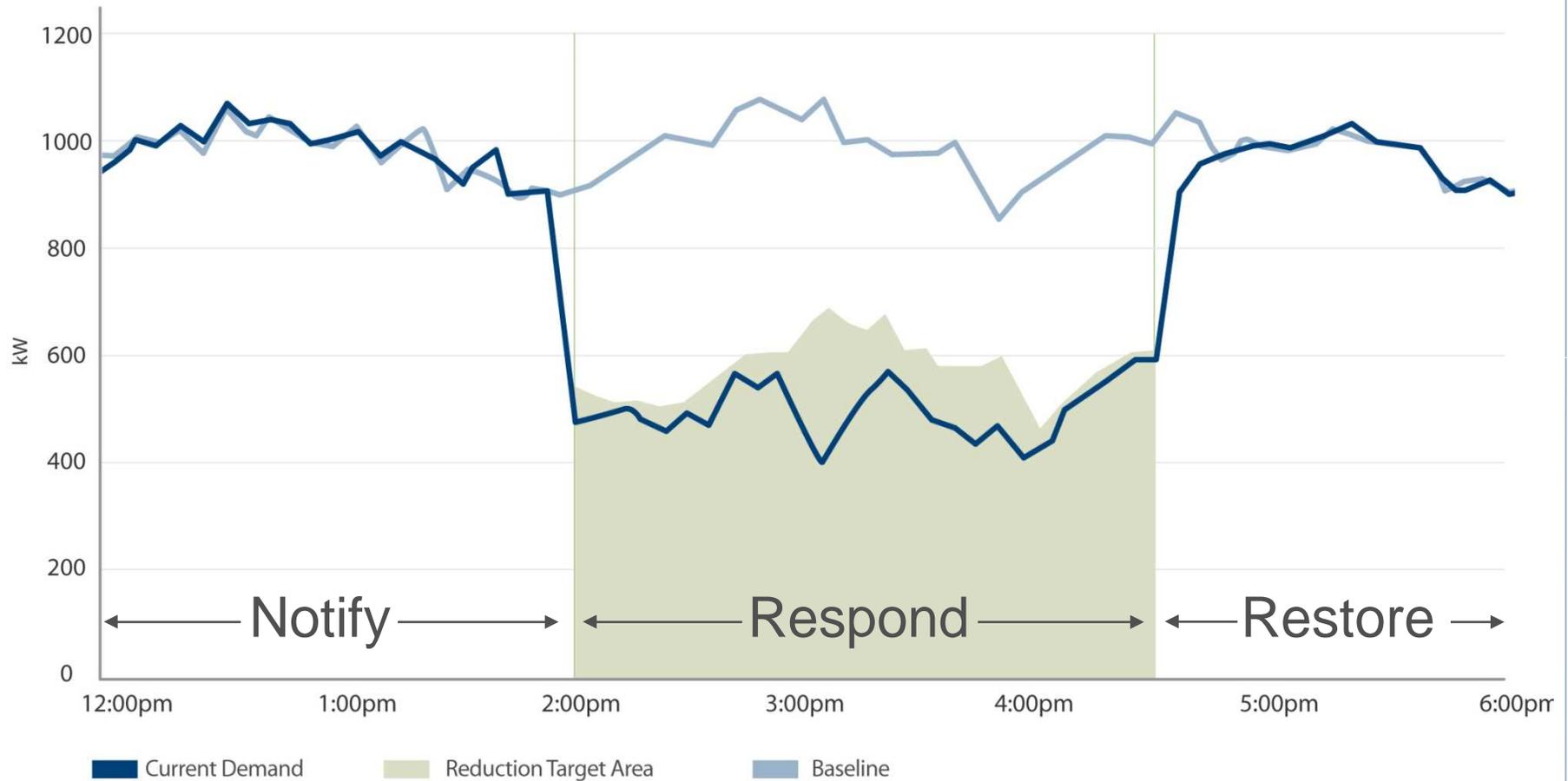
	Curtailment (RTDR)	
Event Trigger	"OP4, Action 6"	
DR Event Notification	30 minutes	
DR Event Duration	As requested by ISO-NE	
DR Event Hours	No restrictions (24/7)	
Frequency of DR Events	2 performance test audits + ~1-3 emergency events	
Performance	Hourly average	
Payments	\$35-\$38k/MW/yr	

Emergency Generation (RTEG) Program Rules



	Emergency Generation (RTEG)
Event Trigger	“OP4, Action 12” (near brown out)
DR Event Notification	30 minutes
DR Event Duration	As requested by ISO-NE
DR Event Hours	7am – 7pm, Weekdays only (non-holidays)
Frequency of DR Events	2 performance test audits + ~1-3 emergency events
Performance	Hourly average
Payments	\$26-\$29k/MW/yr

How Demand Response Events Work



Simple, No-Cost Enrollment Process

EnerNOC's enrollment process is designed to be straightforward, transparent, and focused on ensuring customer satisfaction and support.



DemandSMART is Simple and Rewarding

BENEFIT TO The State of Connecticut

1

Customized energy reduction plans

Benefit from a unique, customized energy reduction plan that will deliver the maximum reductions with the minimum impact on your operation.

2

Simple, no-cost implementation

Ensure that implementation is quick and easy for you and your staff so you stay focused on your business.

3

Maximum event preparedness & performance

Be prepared for an event so participation is easy for you. Meet your target reductions when an event is called – so you earn the highest payments.

4



Maximized payments and revenue assurance

Get the most financial benefit– and get paid on time



HOW WE DELIVER

- Expertise identifying reduction potential for a wide range of facilities
- Customized energy reduction plans that provide minimal impact on your business

- End-to-end program management
- Simple enrollment process
- No upfront costs or financial risk

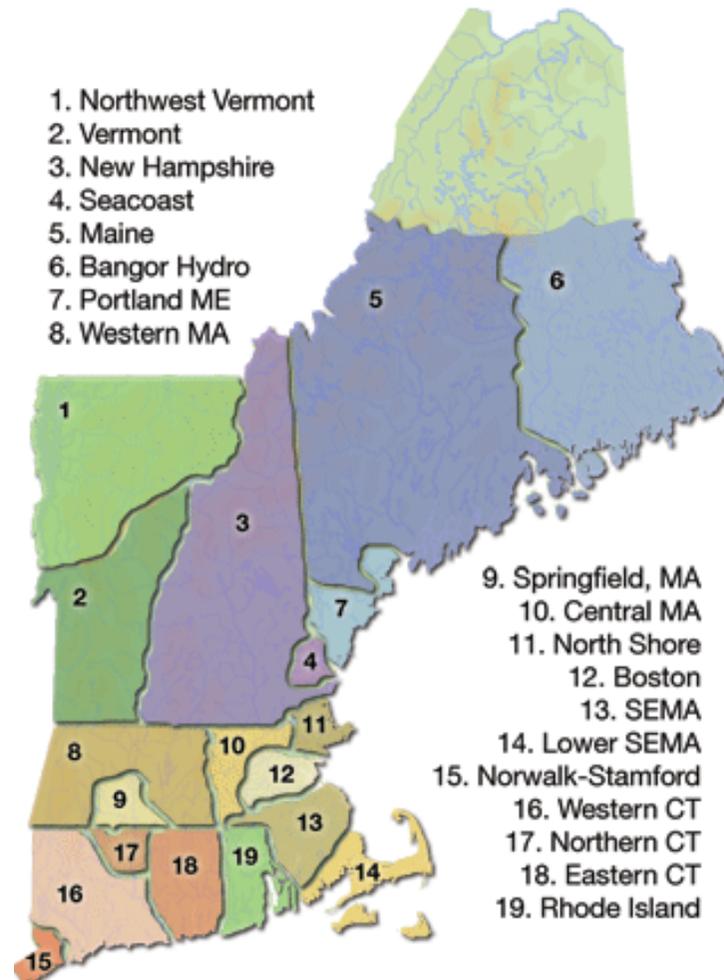
- 24/7 customer support
- Reliable advanced event notification
- Access to real-time event performance through DemandSMART
- NOC event performance coaching

New England DR Event History

Year	Date of Events	Type of Event	Zones Affected	Event Duration
2005	July 27	Curtailment & Generation	Southwest CT	6 hours
2006	July 19 August 1 August 2	Generation Curtailment Curtailment & Generation	Boston New England, except ME New England	3 hours 2.5 hours 3.75 hours
2007	None	None	None	None
2008	May 8	Curtailment	Boston	8 hours
2009	None	None	None	None
2010	June 24	Curtailment	New England	2.5 hours
2011	July 22 December 19	Curtailment Curtailment	New England New England	5 hours 3 hours

This table represents emergency events only and does not include mandatory audits.

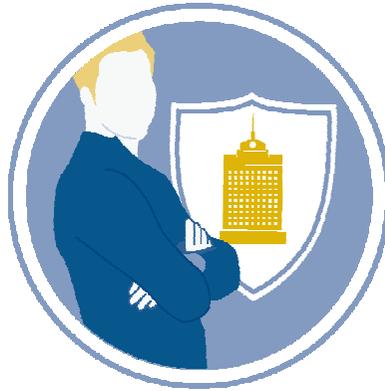
New England DR Dispatch Zones



The Benefits of Demand Response



Earn Payments



Protect Your
Operation



Protect Your
Community



Preserve the
Environment

Insight Program Overview – Why are we here?

- **Lead by Example Energy Efficiency Campaign**
 - Joint program by DEEP and DAS.
 - State owned/operated buildings must reduce the rate of energy consumed by 10% by January 1, 2013 and an additional 10% by January 1, 2018.
- **Existing Demand Response contract amended to expand energy monitoring and provide additional tools and energy analysis.**
 - EfficiencySMART Insight solution provides facilities managers with specific, concrete actions to reduce energy consumption – low or no-cost opportunities.
 - Also ensures that savings persist over time – building systems change, user requirements shift, new systems installed, energy economics fluctuate, etc..
- **Targeted at 100 largest energy-consuming state-owned buildings.**

Notable Quotes

“The Lead by Example program continues to demonstrate the economic benefits of reducing energy consumption. The installation of this service will more than pay for itself in bill reductions across these state facilities.”

Commissioner Daniel Esty

And

“Lead by Example is an energy efficiency program that works to reduce energy use in state and local government facilities. In addition to energy monitoring, Lead by Example is funding energy efficiency upgrades in buildings across state government, and is developing a standardized performance contracting program for use by state and local government.”

Commissioner DeFronzo



Efficiency SMART
insight

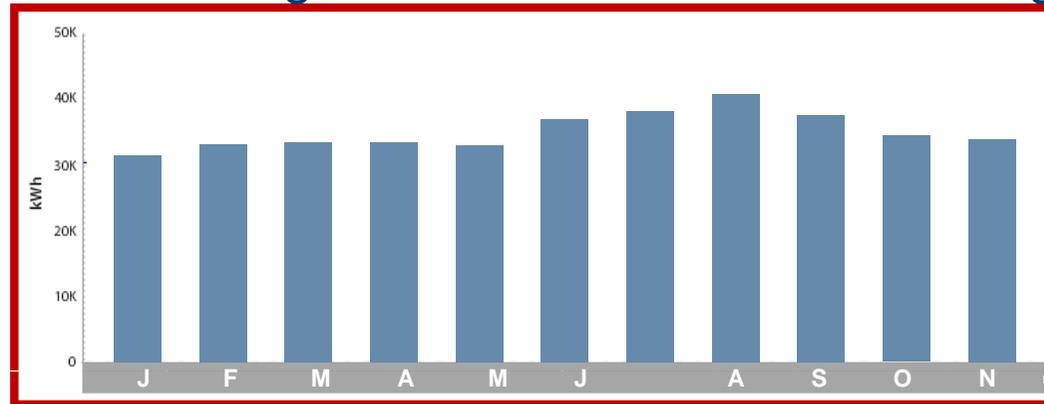
EfficiencySMART Insight



The Importance of Real-Time Data



Monthly Data:
No insight into where waste is occurring



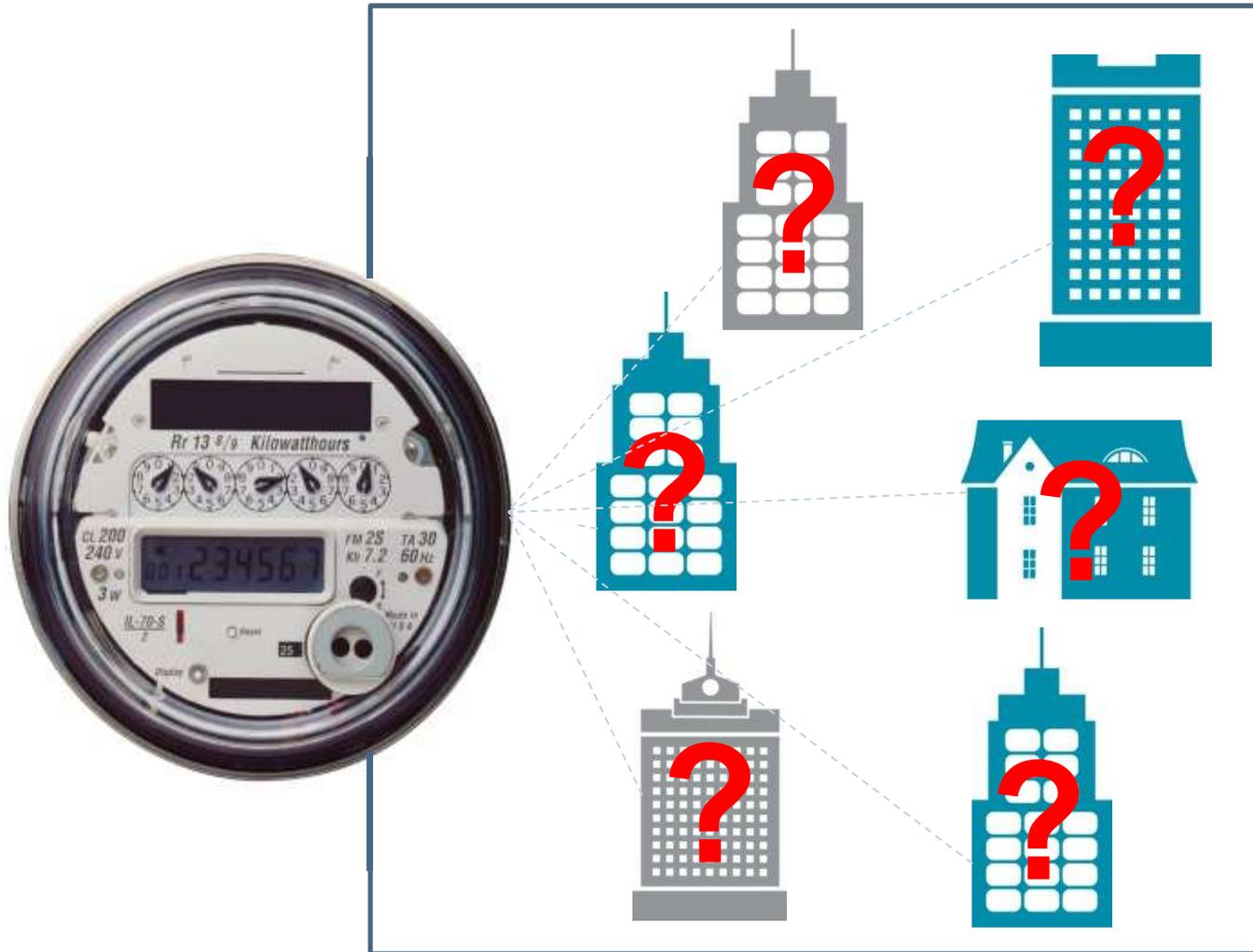
Real-time data:
Clear view of operational inefficiencies



...and a roadmap for allocating resources

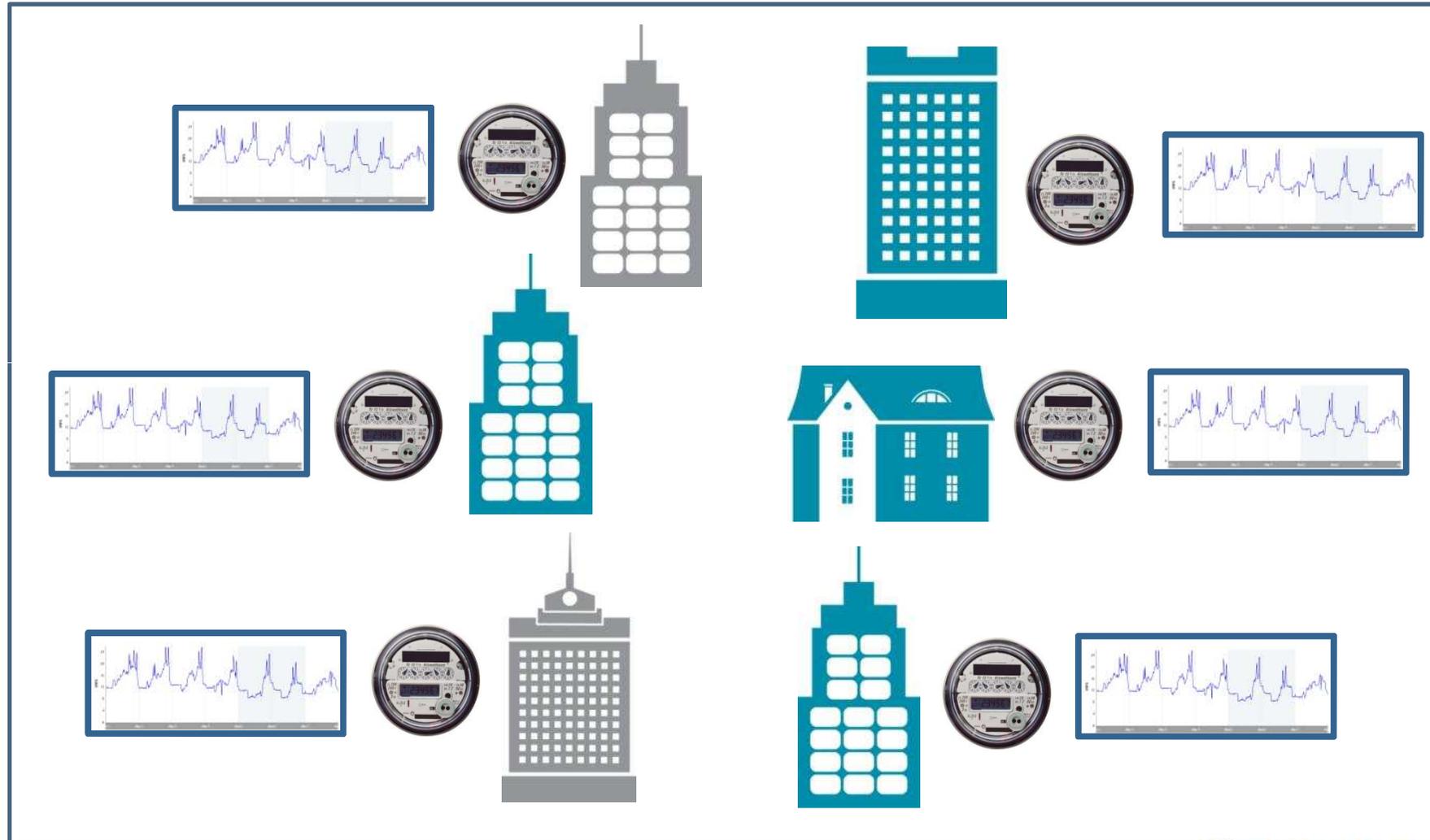
Single Meter; Multiple Buildings:

Zero visibility into energy use by any given building



One meter per building:

Clear understanding of each building's energy consumption



Insight for Connecticut – Metering and Costs

- **Existing Demand Response Sites**
 - Utilize existing demand response metering
 - Install additional building-level meters
- **New Demand Response Sites**
 - Install new metering to support participation in demand response and Insight
 - Demand response metering is provided free of charge
- **Insight Costs offset by Demand Response Revenue**
 - Insight Monthly Fee: \$194/building
 - Building-level meter installation: \$3000-5000/meter

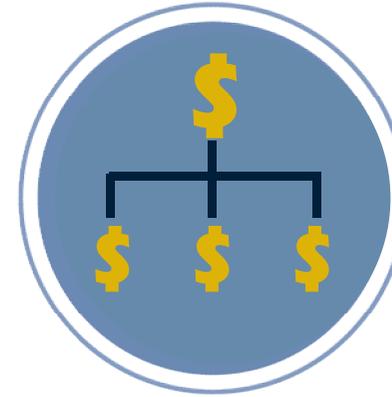
The Benefits of EfficiencySMART Insight



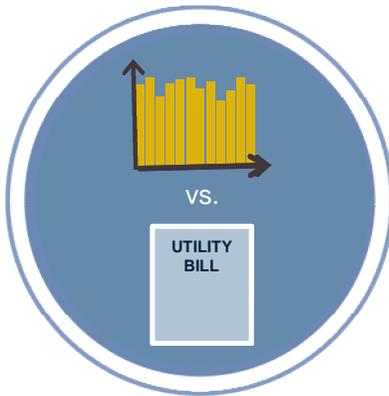
Reduce Energy Usage



Mitigate Peaks and Demand Charges



Allocate Energy Costs



Address Utility Bill Overcharges

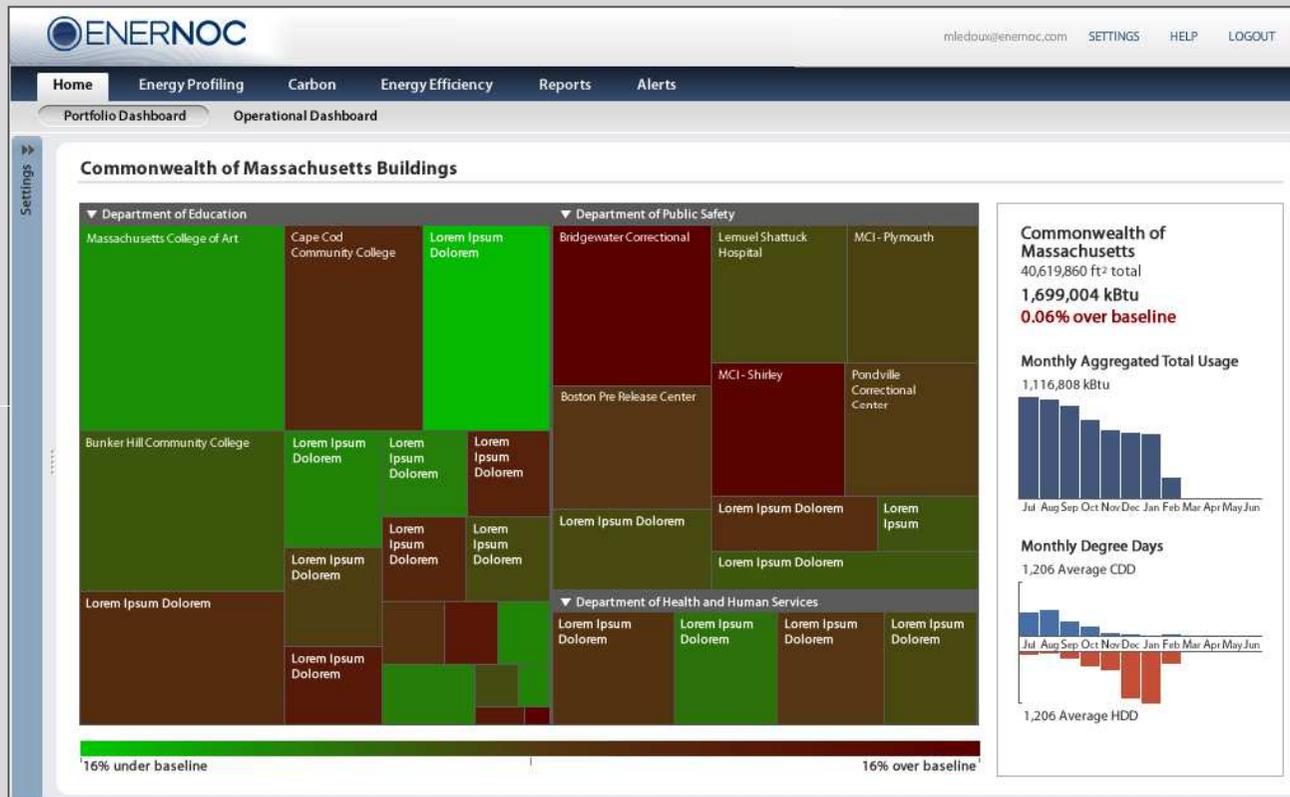


Enhance M&V Efforts



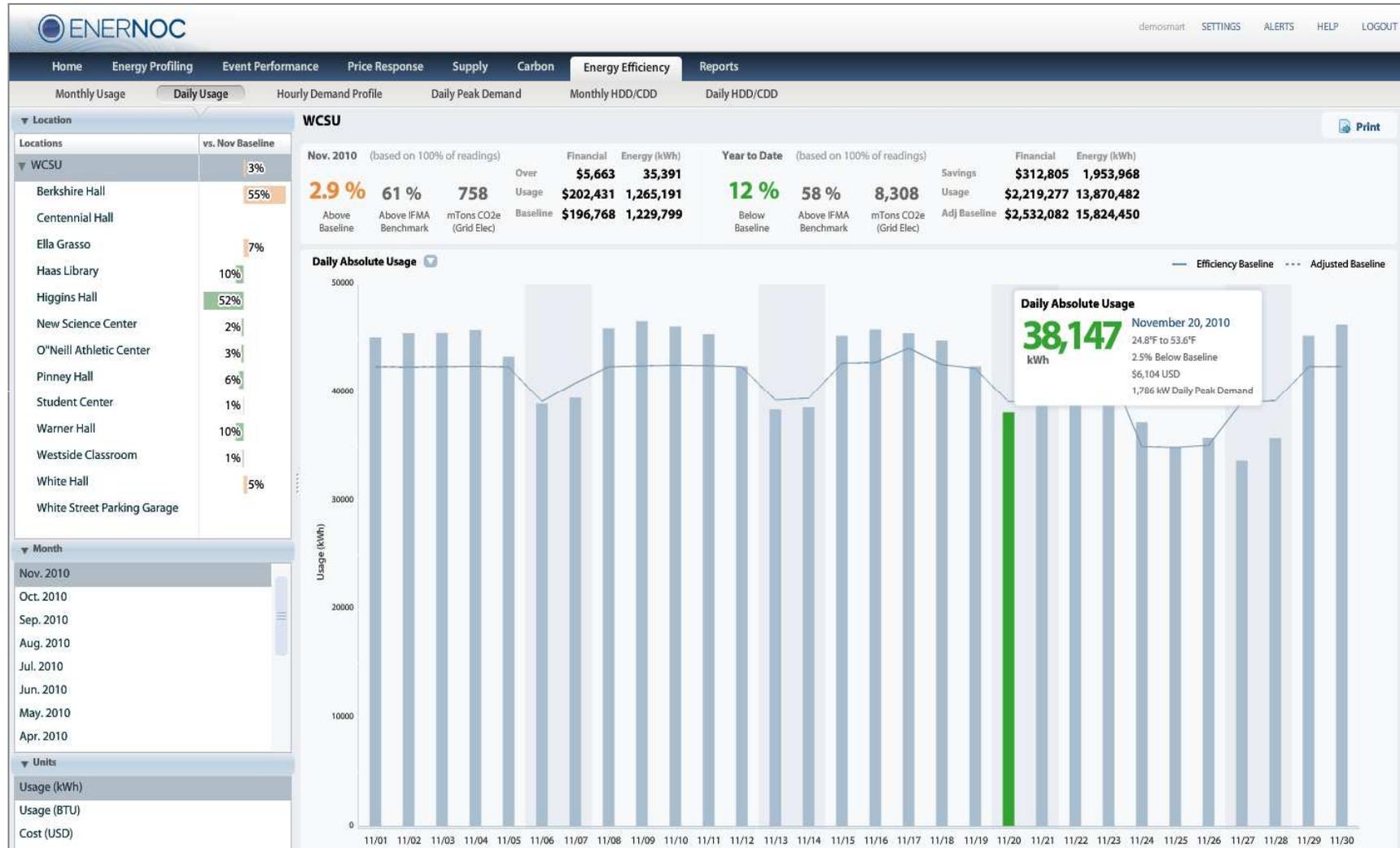
Optimize Energy Efficiency Investments

Benchmark and Compare Facilities

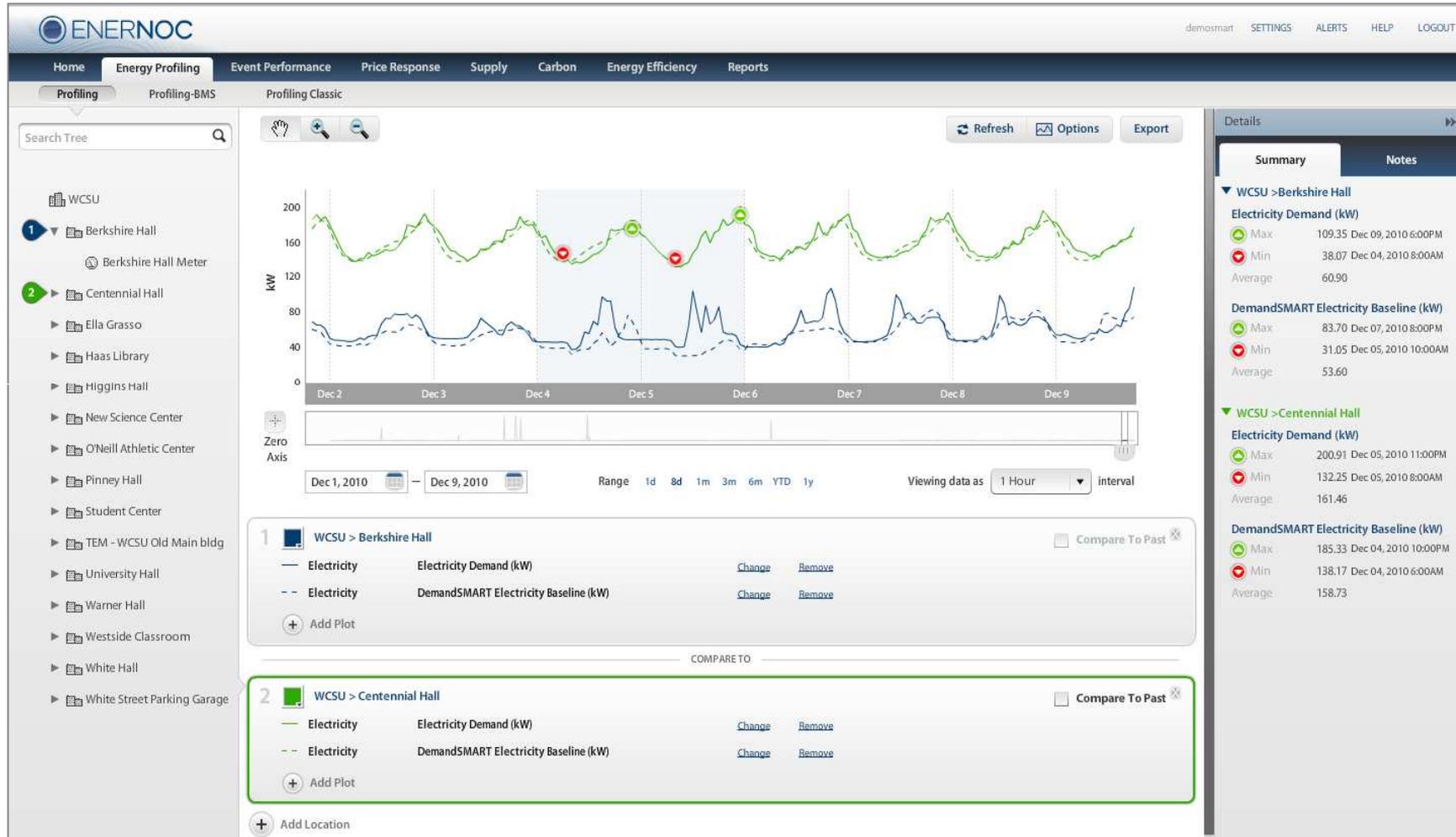


Through intuitive benchmarking tools, EfficiencySMART Insight enables large, multi-site organizations to quickly identify buildings that are underperforming when compared to their peers or historical baselines.

Energy Efficiency Dashboard



Enhanced Profiling



Alerting

- Set Alerts based on demand or usage
- Alert key personnel by text message or email
- Prevent demand spikes and identify abnormal or out-of hours operation
- Reduce energy waste

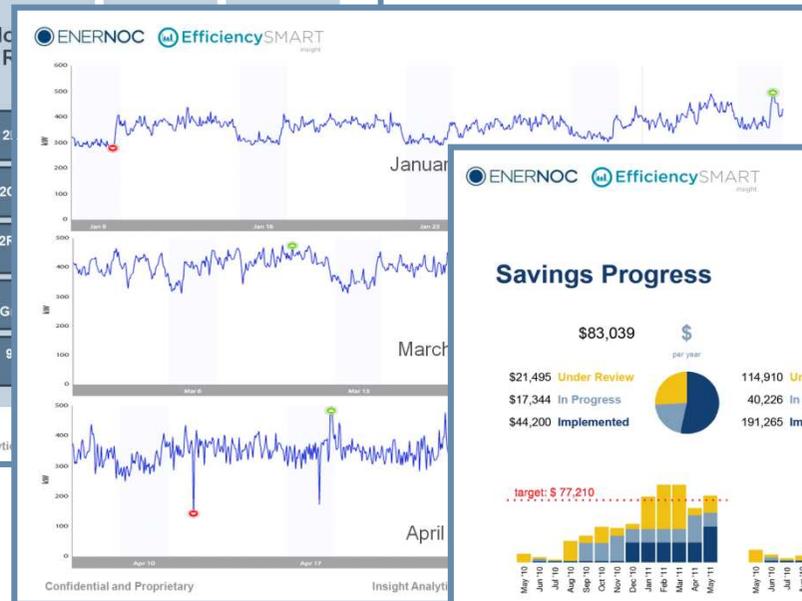
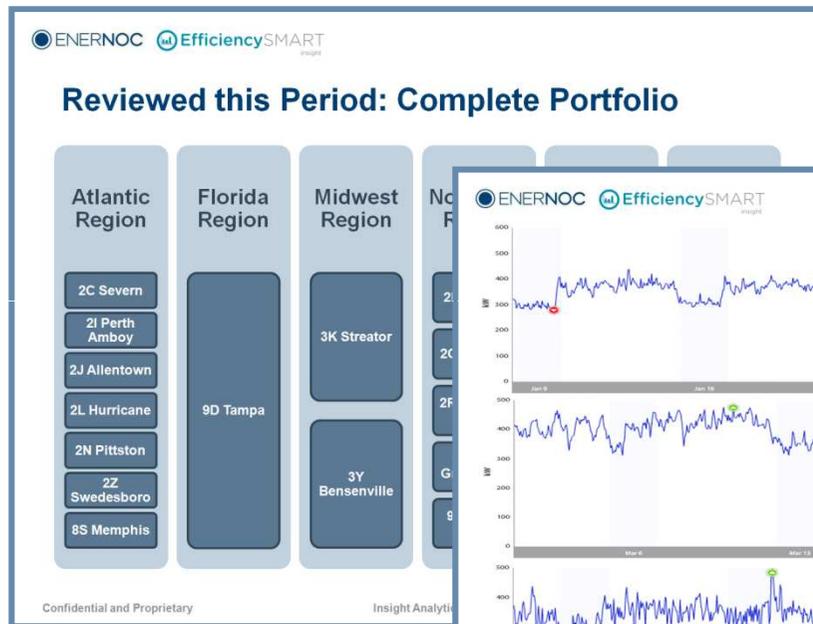
The screenshot displays the ENERNOC web application interface. At the top, the user is logged in as 'Lee Garf' and is in the 'ALERTS' section. The navigation menu includes Home, Energy Profiling, Demand Response, Utility Demand Response, Price Response, Supply, Carbon, Energy Efficiency, Reports, and Administration. The sidebar on the left shows a tree view of building locations under 'WCSU', with 'Berkshire Hall Meter' selected. The main content area is titled 'Add Alert' and contains the following fields and options:

- Name:** Night setback alert
- Location:** Berkshire Hall Meter
- Creator:** lgarf@enemnoc.com
- Alert Rules:**
 - Measurement:** Electricity Demand
 - Threshold:** Above 20 kW
 - Alerting Hours:** Always On, Only Outside of Operating Schedule hours
- Contact Settings:**

Recipient Name	Notify By	Email Address	Cell Phone Number	Wireless Carrier
Lee Garf	Email & SMS	lgarf@enemnoc.com	617 555 5555	AT&T
- Add Recipient** button
- Additional Notes:** Shown in emails only

Insight Analyst Support

Monthly Progress Tracking: Insight Analysts will provide reports to help you understand your energy use and inefficiencies, and to track energy reduction & savings over time.



Vacation Set-backs

SAVINGS POTENTIAL

Athletic Center kW Savings = 110 kW

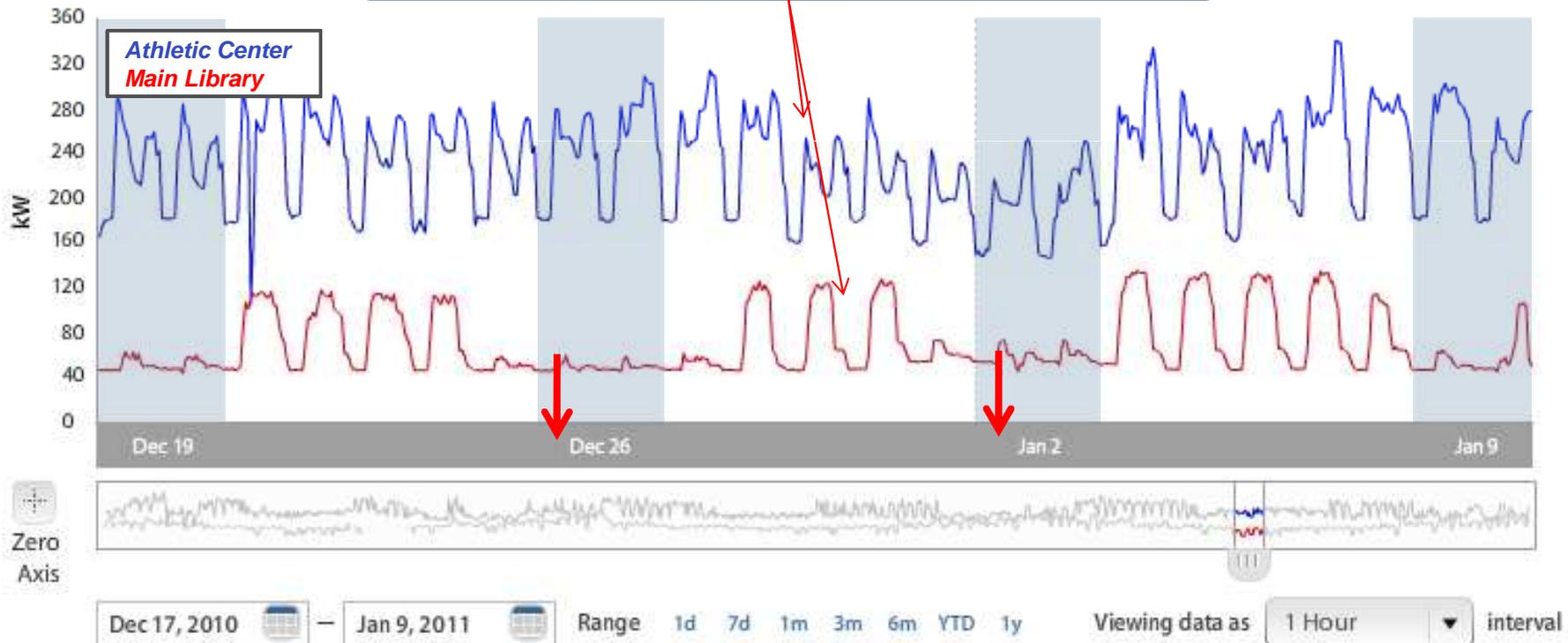
Main Library kW Savings = 75 kW



Weekly \$ Savings = \$1,550*

*savings calculated for week of Christmas through New Years only

According to the website, this Athletic Center and Library are closed during the holiday week and for a couple weeks after as well. By continuing their regular demand schedules, these buildings are costing the school over \$1,500 per week!



Morning Start-up Spikes

SAVINGS POTENTIAL

These peaks are likely setting monthly demand charges, which can often be unnecessarily high. Demand charges typically comprise 25-40% of a facility's monthly bill.

An earlier start-up time can also reduce equipment stress and lengthen operating life.

These classic morning start-up spikes generate very unnecessary high demand charges, and can be eliminated by allowing the building to “ramp-up” in the morning.

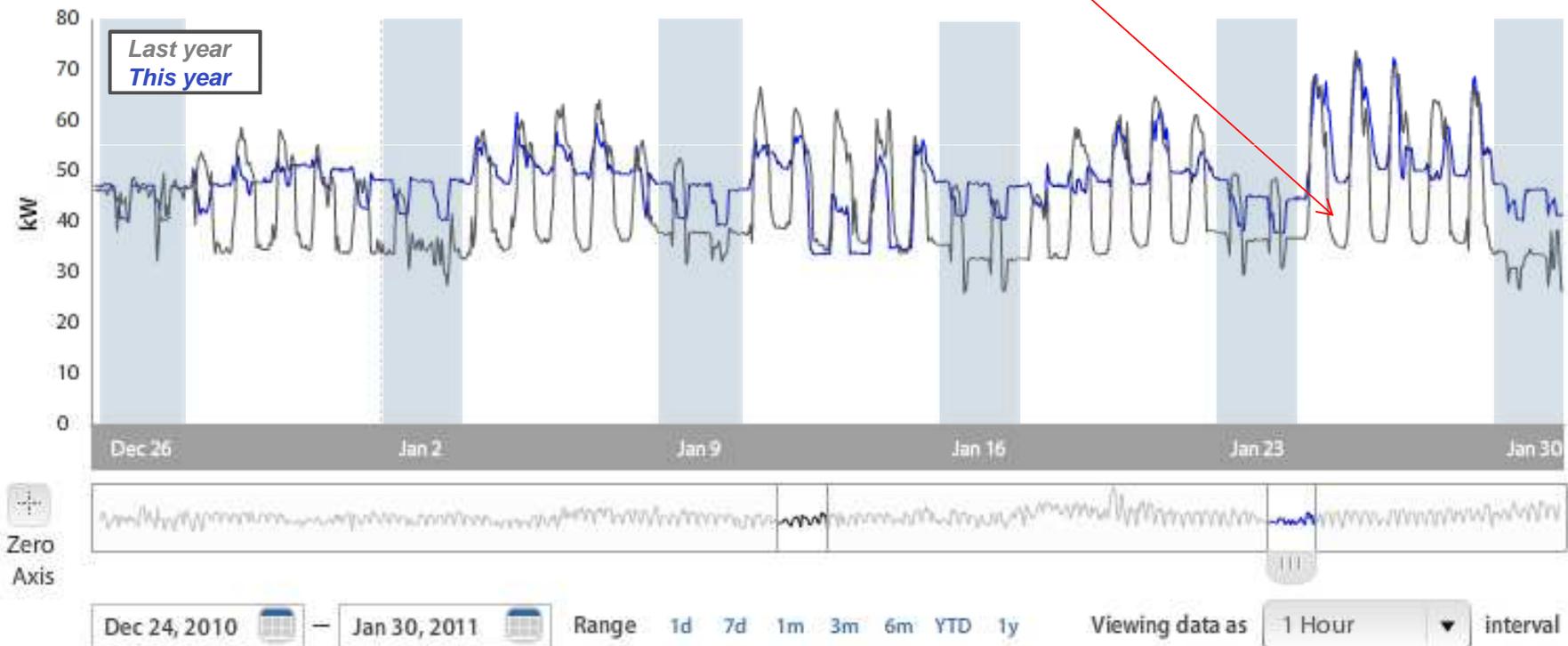


Compare to Past, Evening Set-backs

SAVINGS POTENTIAL

Insight's compare-to-past feature allows facility managers to compare building usage from different periods of time, enabling them to quickly recognize drift or abnormalities.

This building set-back farther last year that this year during evening off-hours. Although the difference in usage is small, it can add up over a significant period of time.



Irregular Set-back Schedule

SAVINGS POTENTIAL
kW Savings = 135 kW



\$ Savings = \$1,460*

*savings calculated for anomalous days shown below only

Using Insight's Alerting functionality, facility managers could have been notified that this building failed to set-back correctly.

This facility did not fully set-back during random evenings from May into June. From just these evenings shown below, the school could have saved close to \$1,500!



Zero Axis

May 13, 2011

Jun 13, 2011

Range

1d

7d

1m

3m

6m

YTD

1y

Viewing data as

1 Hour

interval

EfficiencySMART
insight

ENERNOC

M&V With Meter Data

SAVINGS POTENTIAL

Despite this project, electricity demand actually increased from 2009 to 2010. Insight can help detect whether or not energy efficiency investments are proving effective.

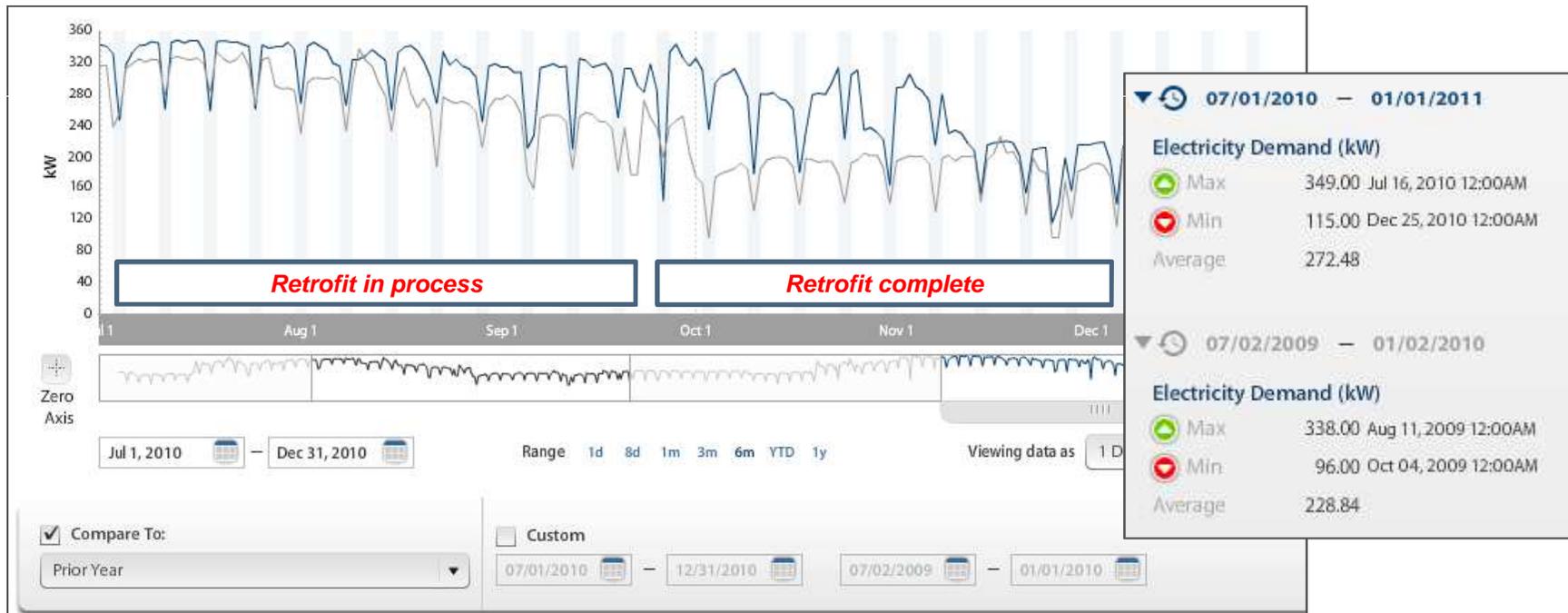
DETAILS

Industry: Government
Data Type: Meter Level

Project: Retrofit 2 Chillers with High Efficiency Bearings and Controls

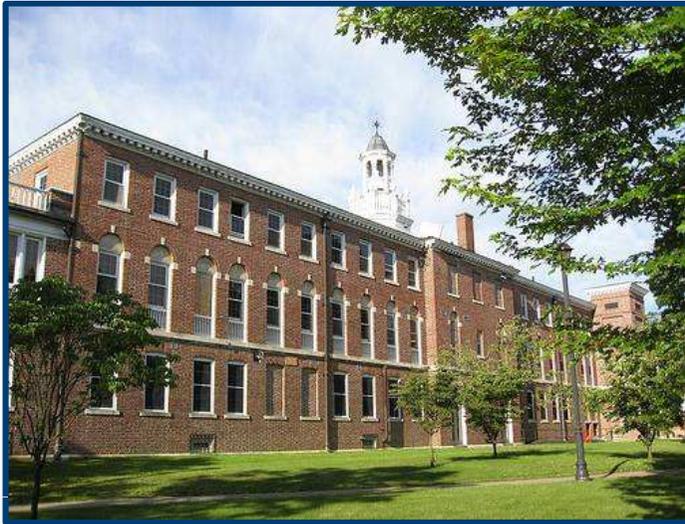
Timeline: June – September 2010 | **Cost:** \$127,000 | **Savings Goal:** 35% energy savings on chillers

Energy Profile: July – Dec 2010 compared to same period in 2009



Customer Spotlight:

Western Connecticut State University



Western Connecticut State University relies on EnerNOC as its comprehensive energy management solutions provider

Combines DemandSMART and EfficiencySMART to reduce energy consumption and cut costs

“EfficiencySMART has become a really valuable tool for us. It’s transparent and continues to help us improve energy efficiency on a day-to-day basis.”

Luigi Marcone, *Director of Environmental and Facilities Services*

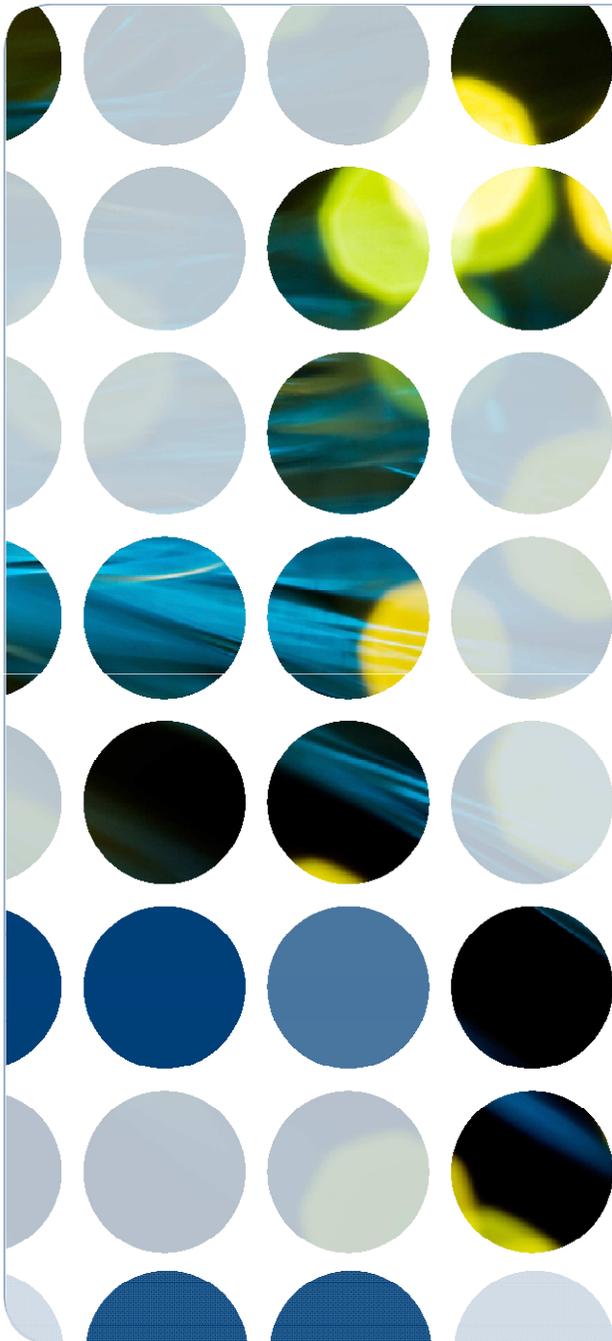
Industry
Education

Location
Danbury, CT

Applications
EfficiencySMART PCx & DemandSMART

Annual Savings
Approximately 18%

WCSU has implemented measures to save more than **900,000 kWh** of electricity and more than **\$400,000 in energy savings per year.**



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