

ENERNOC

Integrating Energy Efficiency and Demand Response

AESP Technology Symposium

Rick Counihan, Senior Director

Agenda

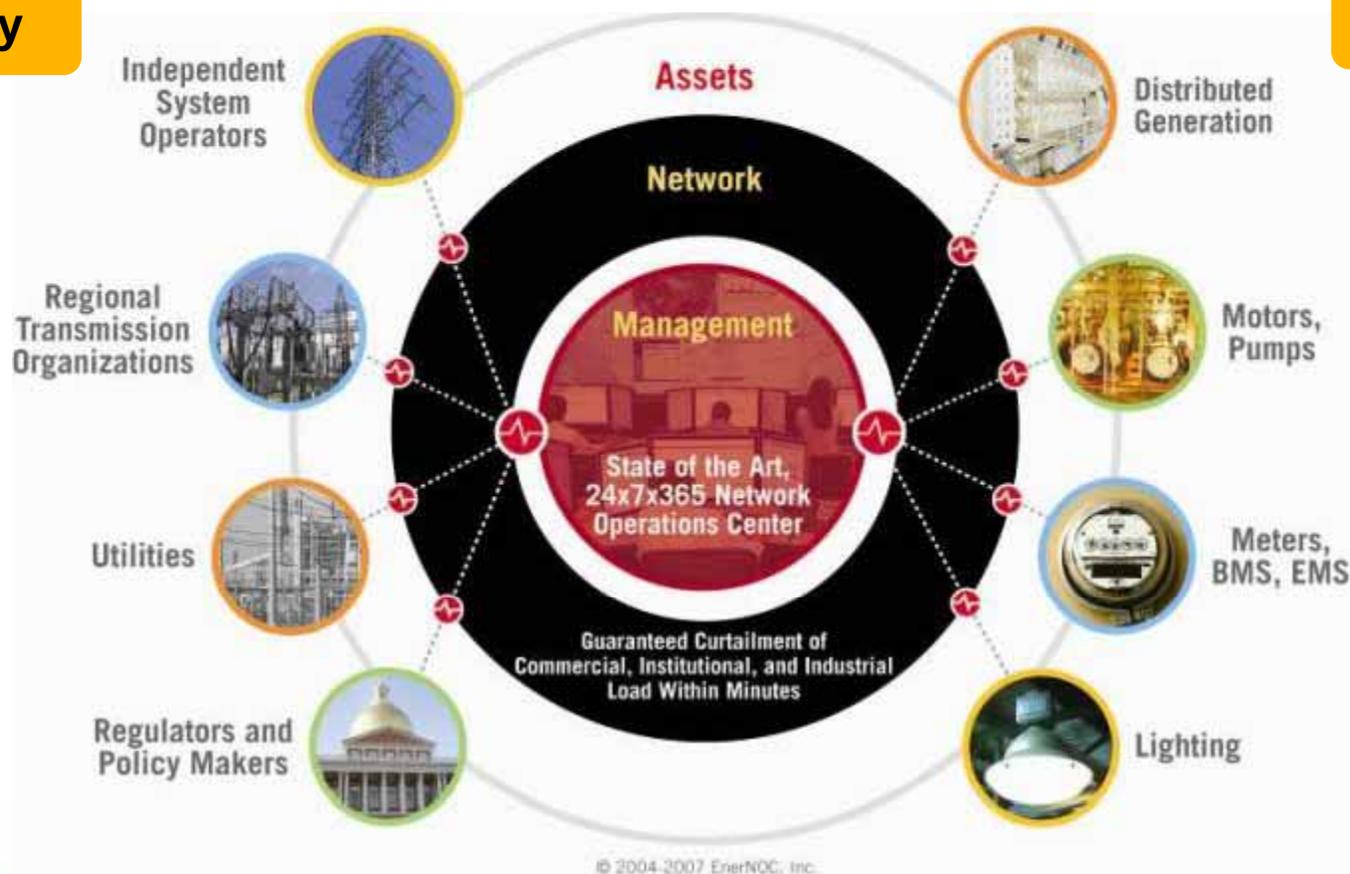
- Who is EnerNOC?
- Case Study for Integrating Demand Response and Energy Efficiency
- Creating Energy Efficiency Credits

Connecting Supply and Demand

EnerNOC bridges the supply side and demand side through scalable technology to aggregate guaranteed reductions in demand

Supply

Demand



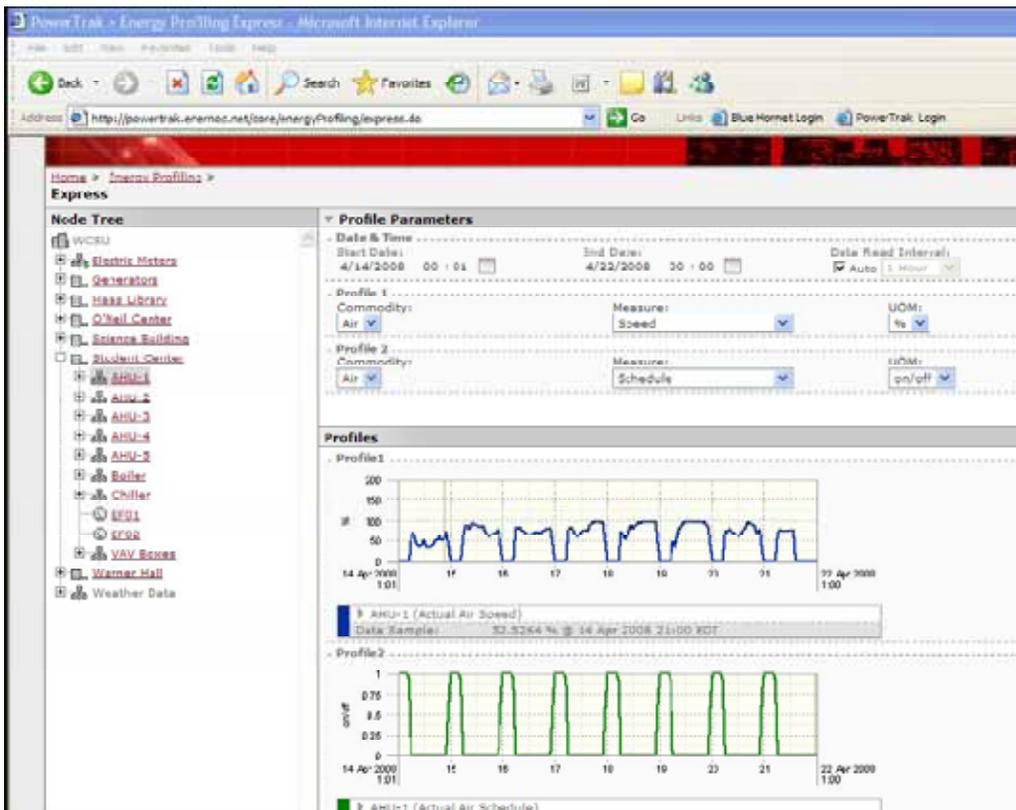
Technology and People Unlock Value

EnerNOC's award-winning, state-of-the-art Network Operations Center is staffed 27/7/365 to ensure continuous monitoring of all our customers



PowerTrak™ – Advanced Energy Technology

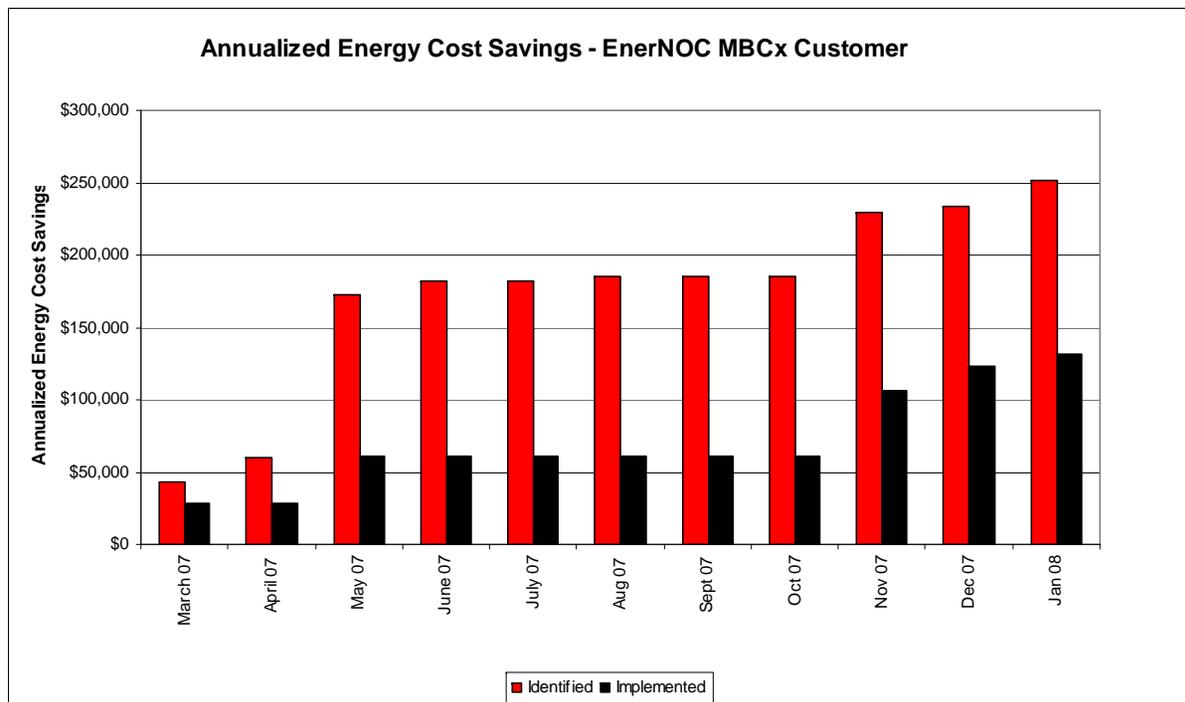
PowerTrak supports demand response and energy efficiency in a single platform that includes real-time analysis, control, and reporting



- Integrate meter, BMS and external data points
- Collect and view data in real-time
- Advanced, proprietary data filtering flags opportunities
- Browser-based application accessible remotely

Energy Efficiency and Demand Response

- Demand Response provides technology to support and increase awareness of energy efficiency
- Demand Response can be a gateway to continuous, internet-enabled monitoring based commissioning (MBCx) measures that reduce energy daily



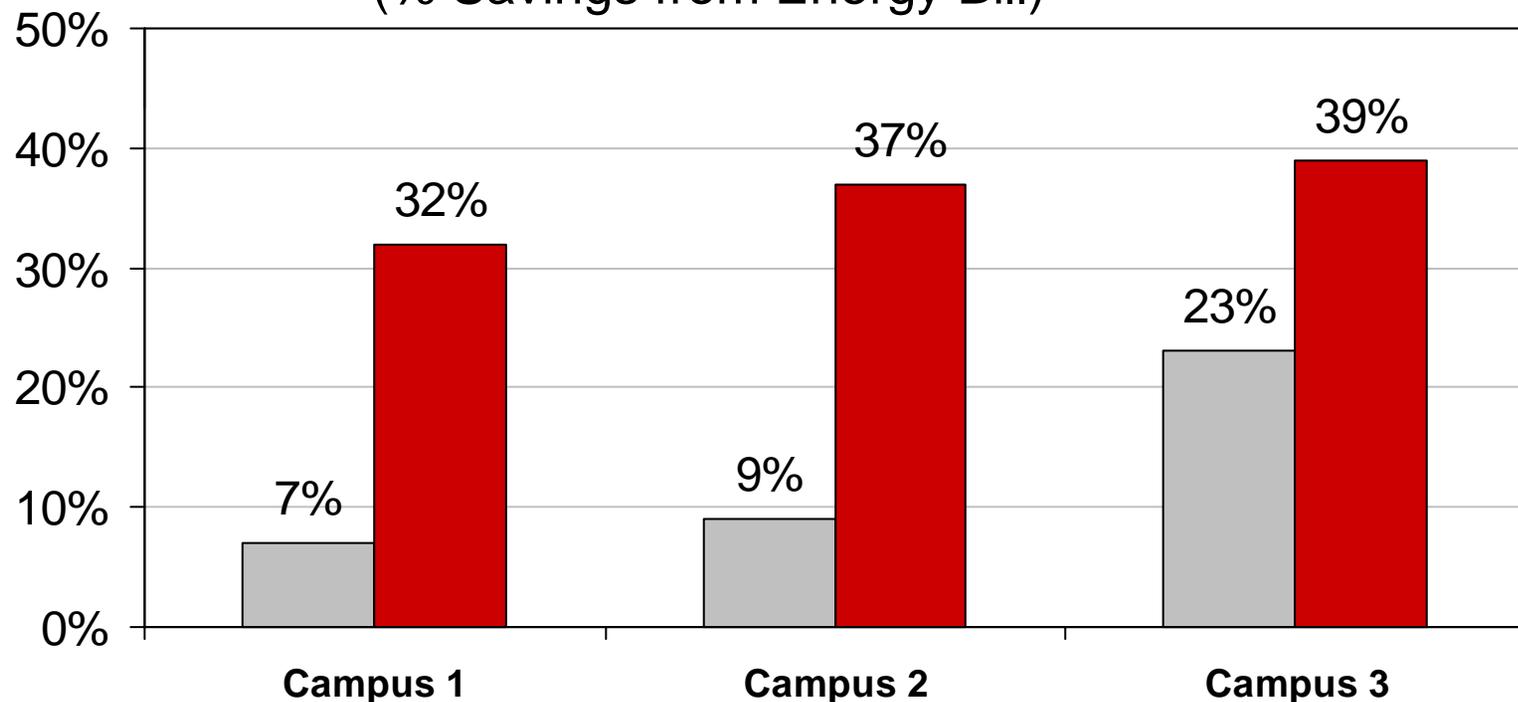
The chart shows the growth in energy costs savings from MBCx for one EnerNOC customer.

The red bars illustrate the annualized energy savings identified, and the black bars indicate the annualized savings resulting from measures implemented.

Taking Energy Efficiency Further

Combining retrofits with monitoring-based commissioning can deliver 3x the savings of efficiency measures alone.

Texas A&M Results from MBCx (% Savings from Energy Bill)



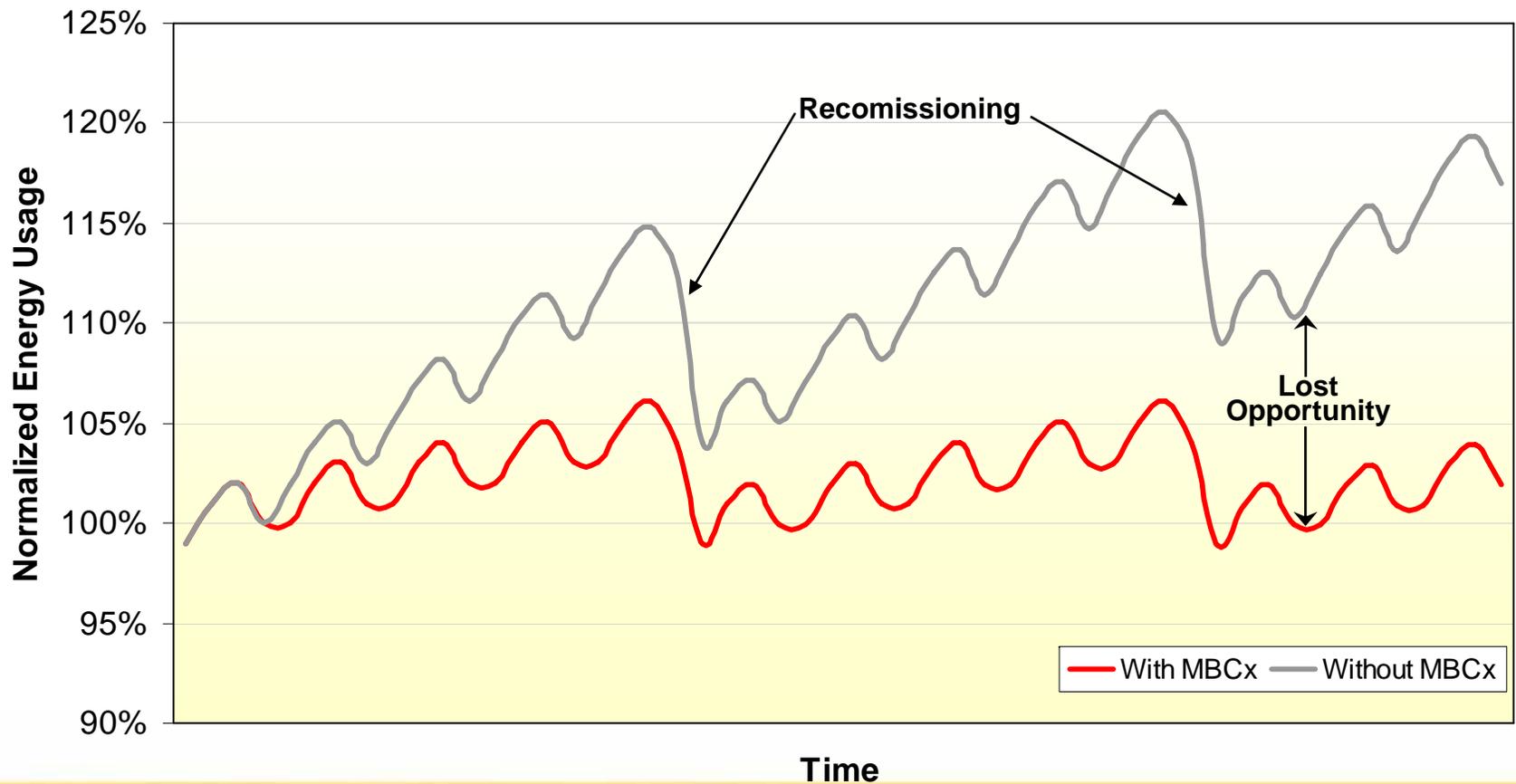
Sources: US Department of Energy.

■ Energy Efficiency Measure ■ Energy Efficiency Measure with MBCx

What is MBCx and How Does it Work?

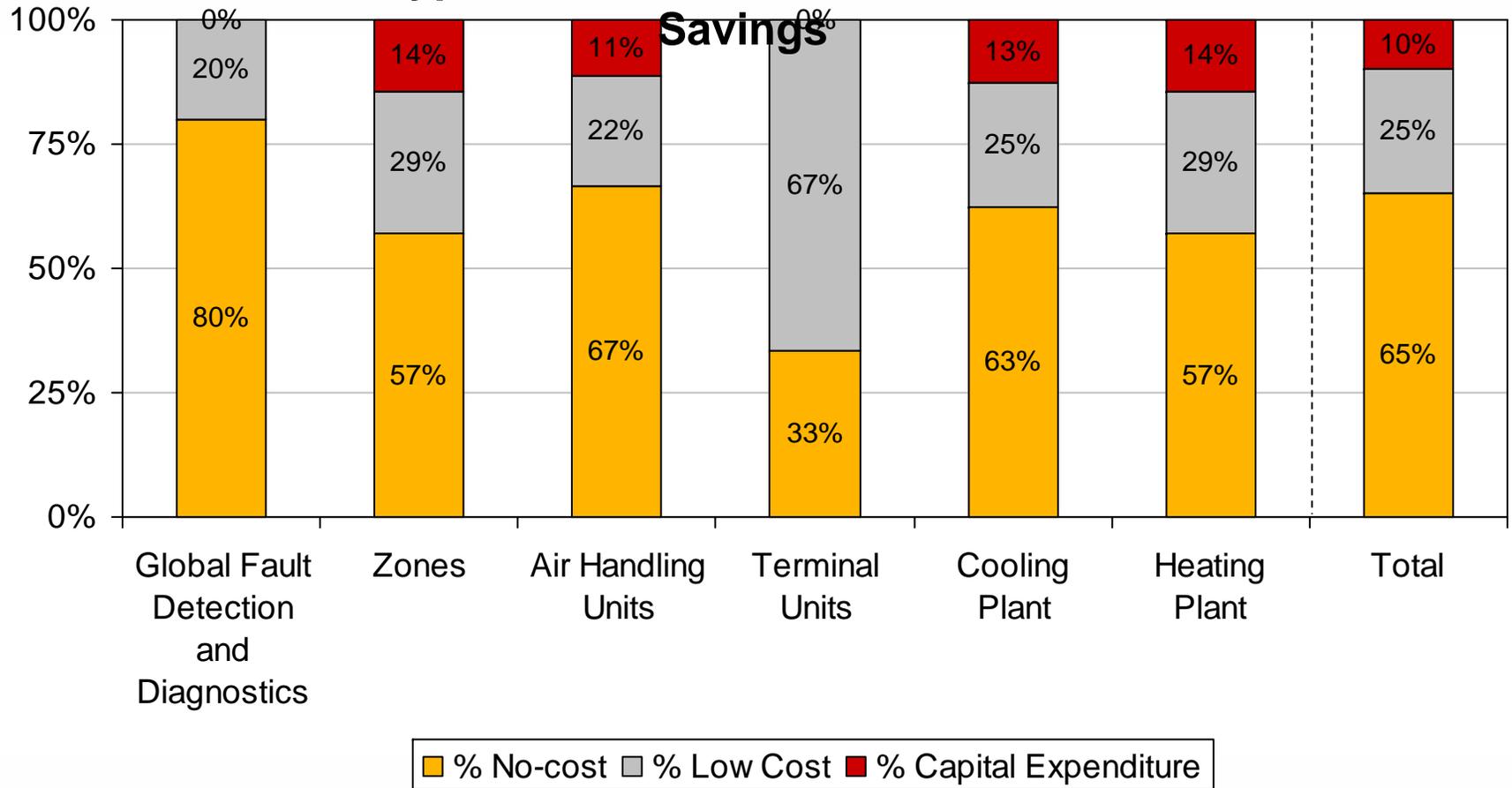
MBCx is to a facility what a constant diagnostic tune up is to a car – continuously monitoring a facility identifies savings that would otherwise go undetected.

Impact of Monitoring-Based Commissioning on Building Consumption



What is MBCx and How Does it Work?

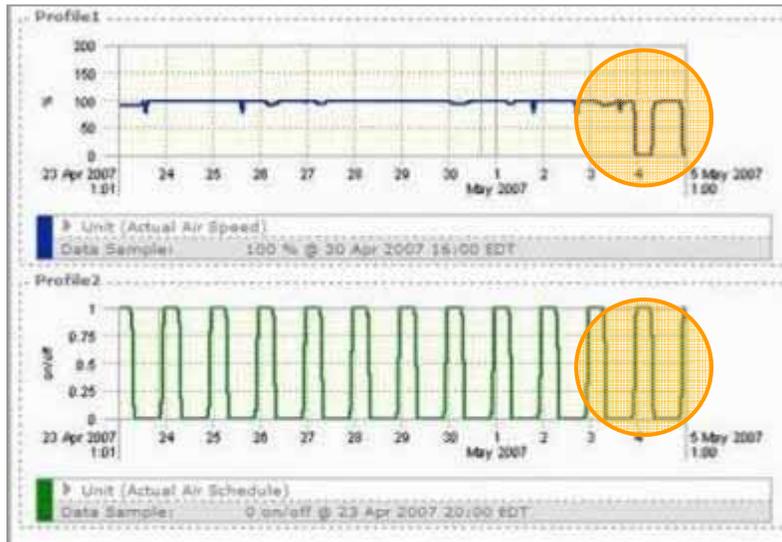
No-cost savings are the primary source of value. Savings from low cost measures (<6 month payback) and capital expenditures (<2 year payback) are also identified.



No-cost = Immediate action by in-house staff or vendor on routine basis, no incremental cost.
 Low Cost = Outside vendor contract with simple time to payback of less than 1 year.
 Capital Expenditure = Projects that require capital expense but have a payback of less than 2 years.

EnerNOC Business Model: Energy Efficiency

EnerNOC's MBCx solution is a **technology-based** offering designed to help commercial and industrial end-users **optimize** the way your buildings operate, measure the impact of key **energy** and **environmental** decisions, and optimize the **comfort** of occupants.

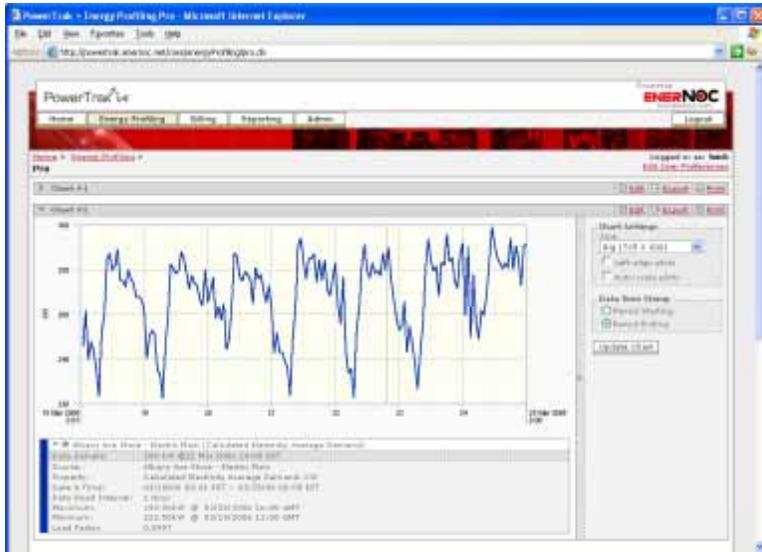


PowerTrak screen shot, showing how the application is used to identify and address energy efficiency issues.

<http://www.enernoc.com/ea.html>

- Provide actionable recommendations for energy efficiency
- Reduce the burden on facility staff by prioritizing facility maintenance and repair activities
- Provide mission critical information for energy, complaint call and comfort reporting.
- Benchmark buildings and compare them to others
- Assist with Measurement and Verification (M&V)
- Plan for capital equipment upgrades by calculating baselines.
- Document emission footprint and track environmental impacts

Case Study – Western Connecticut

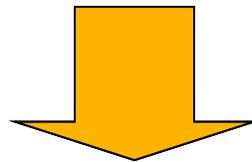


- Western Connecticut State University
- Two campuses, with about 25 buildings:
 - 5 buildings monitored on the BMS (Johnson Controls Metasys)
- Buildings include 283,000 square feet
 - Academic (classroom) Buildings
 - Library
 - Student Center
 - Admin Building
- Successful demand response customer since 2004
- >\$2 million annual energy spend

The Challenge – Reduce Energy Costs!

WCSU Faced with common energy management challenges:

- **Energy costs:** CT energy prices spiked by 40% in 2006
- **Lack of Visibility:** No site-specific reporting of energy use to perform building-to-building or year-to-year comparisons
- **Lack of Integration:** Disparate systems monitoring and controlling building energy usage; No integrated platform
- **Lack of support:** University understaffed, so a “detailed evaluation” of the BMS not a priority; Shrinking budget; Capital expenditures hard to justify



Ideal Opportunity for Monitoring-Based Commissioning

The Approach

EnerNOC and WCSU sought an approach that would eliminate capital investment, and make the process as simple as possible for the customer.

- Expand NOC Monitoring to include all existing sub-meters
- Integrate NOC with existing BMS system – “plug and play”
- Collect Meter and BMS Data in near real-time through PowerTrak
- Perform continuous remote monitoring
- Provide recommendations to WCSU facility staff on regular basis

Summary Results of MBCx Services

- In first 12 months EnerNOC had identified over **\$275,000** in annualized energy savings for this customer – 14% of annual spend
- WCSU has realized actual energy savings of ~**\$120,000** to date
- WCSU was recognized for this effort in an award for best energy management project from the New England chapter of the Association of Energy Engineers
- There was no capital outlay on the part of WCSU – services were paid through deductions from demand response payments
- Energy savings from EnerNOC's MBCx solution now qualify as Renewable Energy Sources and will receive RECs in Connecticut

Connecticut Class III RECs

- In 1998, CT enacted legislation mandating that 10% percentage of electricity be renewable by 2010.
- There were previously 2 classes of “renewable” energy in CT: Class I and Class II
- A new law has created a 3rd class (Class III):
 - Energy efficiency measures are now eligible to be monetized as Class III Renewable Energy Certificates (RECs)



Class I

- Solar
- Wind
- Fuel Cells
- Biomass Incineration
- Landfill Gas
- Run-of-the-River Hydro
- Tidal Power
- Ocean Thermal

Class II

- Waste to Energy
- Certain Hydro Facilities
- Certain Biomass Incinerators

Class III

- Combined Heat & Power
- **Conservation & Load Management**
- Demand Response Curtailment

DPUC Rules for Class III RECs

- All load serving entities must create or purchase enough Class III RECs to cover a percentage of electric consumption, as part of the Renewable Portfolio Standard (RPS)

2007	2008	2009	2010
1%	2%	3%	4%

- Mandated growth is designed to encourage efficiency in CT
- O&M measures that involve making physical changes to facilities are eligible for Class III certificates [*Conservation and Load Management*]:
 - reprogramming of energy management systems,
 - instituting energy-saving preventative maintenance,
 - retro-commissioning.



MBCx Qualifies as Class III REC

- On July 25th, The CT DPUC found that EnerNOC's application qualifies as a class III REC
- **Issues Submitted:**
 - Three Air Handling Units were continually overridden
 - PowerTrak identified and recorded the issue, and the customer reinstated the correct schedule
 - Per the application, the energy savings associated with these measures is **96 MWh/yr**
- **Determining the Value of the RECs**
 - 1 REC = 1 MWh of saved energy. Issues submitted represent **96 RECs**.
 - Pricing estimates range from \$20 to \$25 per Class III REC. Present day value: **\$1,920 - \$2,400/yr.**
 - RECs are traded over-the-counter so price transparency is poor
 - Price expected to rise as Class III requirement “ratchets” up through 2010
 - Customer and EnerNOC are splitting the ownership of the RECs 50/50.
- RECs were calculated utilizing UI/CL&P manual for Conservation and Load Management