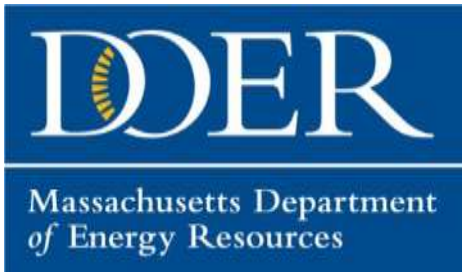
The Commonwealth of Massachusetts



Enterprise Energy Management System for State Facilities (EEMS)

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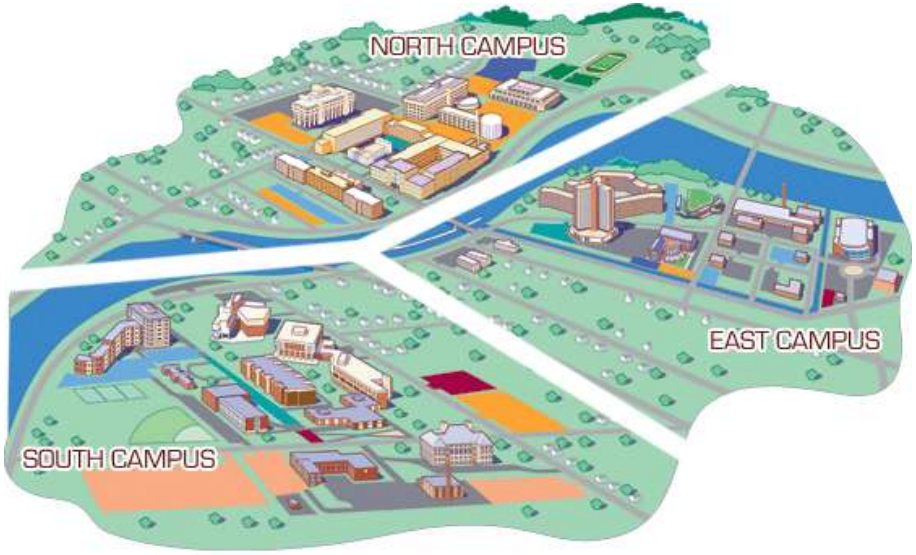
State facilities

- 65 million ft^2 of buildings
- Tracking of energy use inconsistent; monthly utility bills only
- Many sites cannot track at building level: no dedicated meter



Spotlight:

UMass Lowell Campus:

- 2.8 million ft^2
- 3 distinct campuses
- 46 buildings
- 15 electric meters

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EEMS Program

- **First-in-the-nation** Enterprise Energy Management System for State facilities
- **Funding**: $10 million from ARRA funds
- **Goal**: Meter energy consumption at building level; provide real-time energy data to help optimize identification of savings opportunities

Phase 1: 410 buildings/17 million ft^2

Phase 2: Additional 40-50 million ft^2

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33 Sites

18 Prison Facilities	10 College Campuses
4 Hospitals	1 Veterans Home

10 Campuses

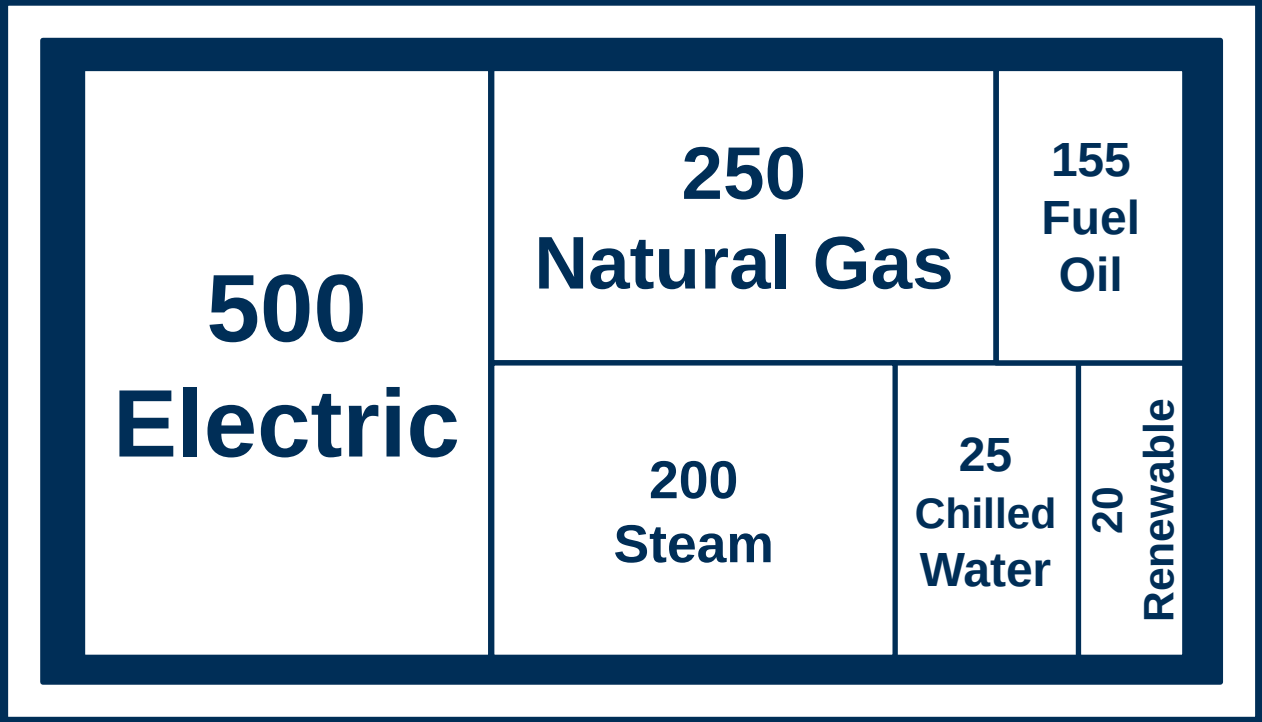
186 Buildings

403 Meters

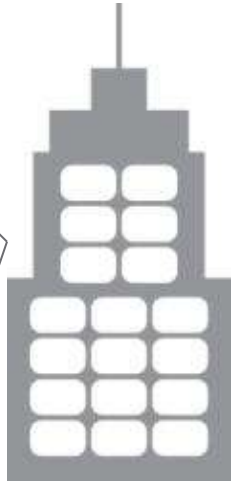
410 Buildings

17 Million Square Feet

1150 Meters


500
Electric
250
Natural Gas
155
Fuel
Oil
200
Steam
25
Chilled
Water
20
Renewable

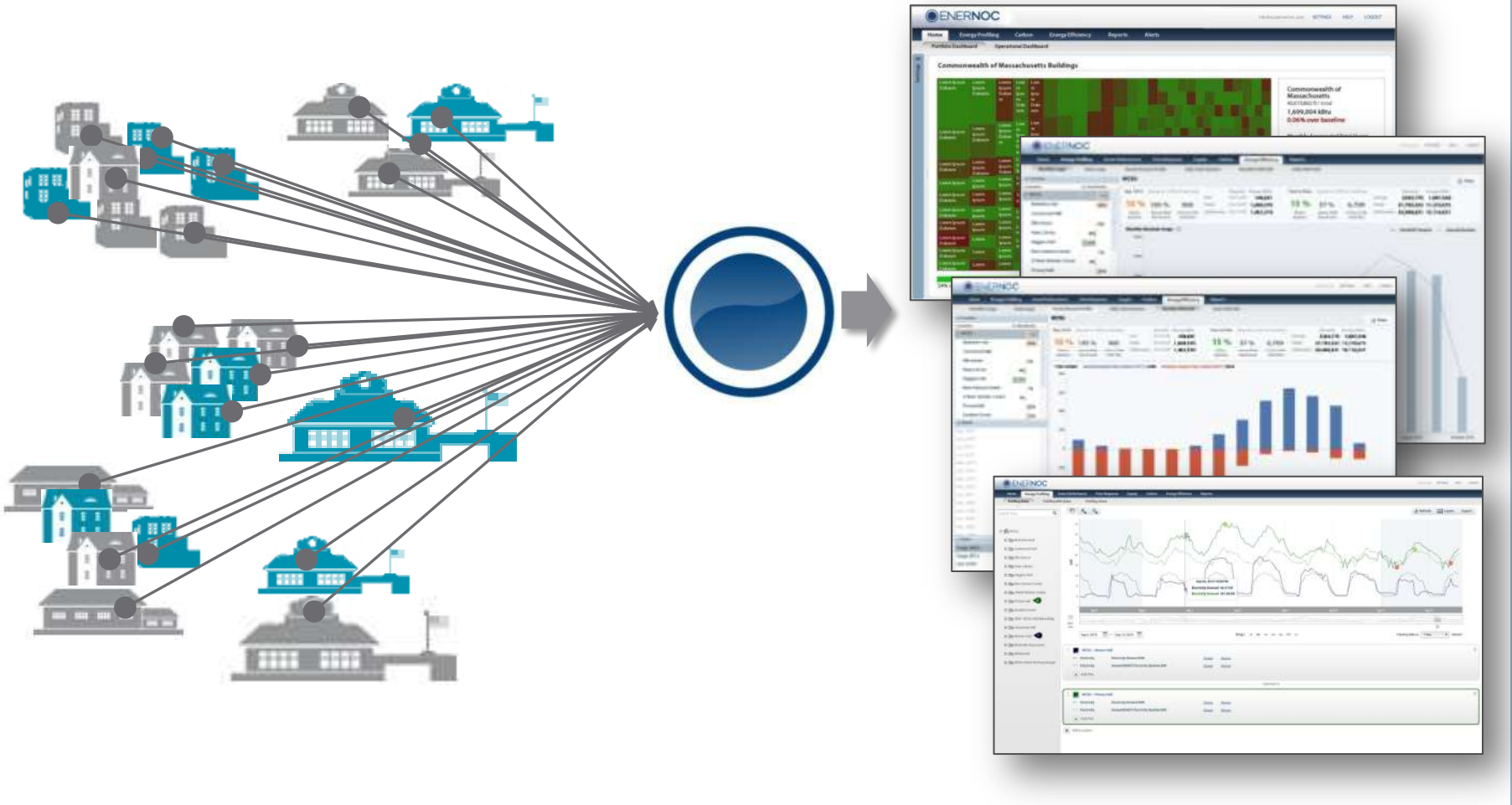
EMS/Building operations



EMS
(or BMS)

ENERNOC

EEMS/Energy Monitoring



ENERNOC

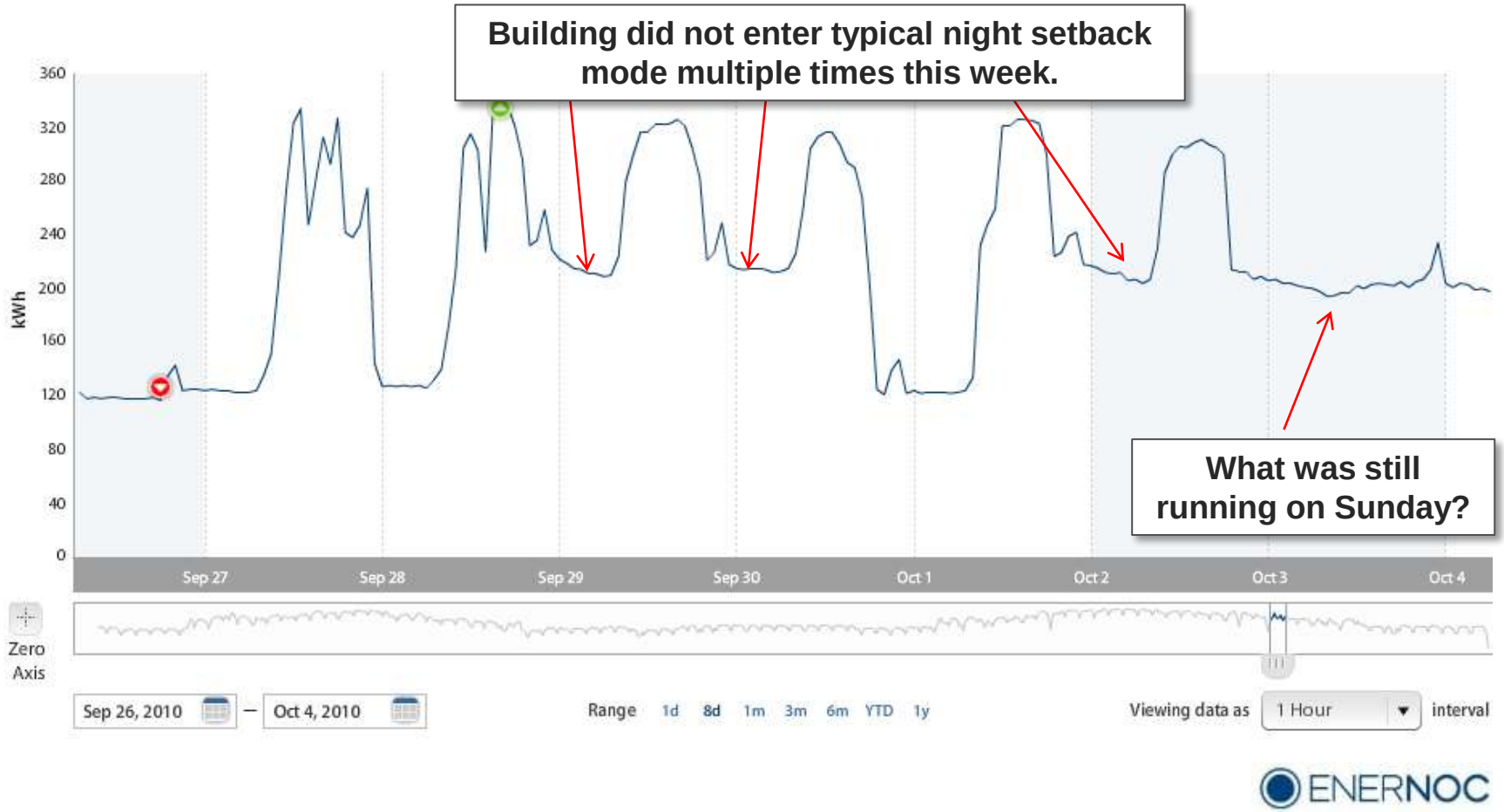
Case Study: Administrative Office Building

Building Type: **Office Building**

Anomaly: **Night & Weekend Set-back**

Savings Potential:

- **3600 kWh per week**
- **$288 per week**
- **11% of electricity spend**



Energy Monitoring:

Measurement, Management, Verification, and Savings

NASEO Annual Meeting

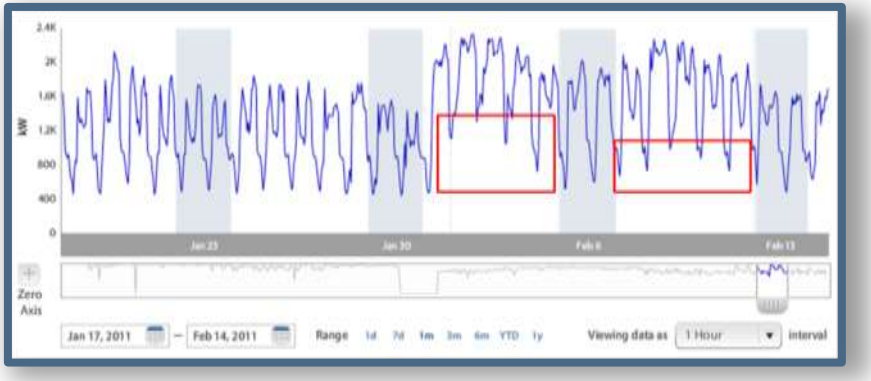
September 13, 2011

Two Paths to Energy Efficiency

Equipment retrofits

Replacement of aging or inefficient systems

- **Capital expense**
- **Payback in 6-10 years**
- **Modest positive cash flow thereafter**



No/Low Cost Savings

Identification and resolution of operational inefficiencies

- **Minimal capital outlay**
- **Payback in 12-24 months**
- **Substantial positive cash flow in just 3 years**

“Energy doesn’t call in the middle of the night and tell you that it’s getting wasted.”

Chris Powell
Director of Sustainable Energy Initiatives
Brown University

Energy Monitoring:
Monthly vs. Real-Time Data

Common Belief:

“We already collect all of our monthly billing data and generate quarterly reports; we really don’t need anything more than that.”

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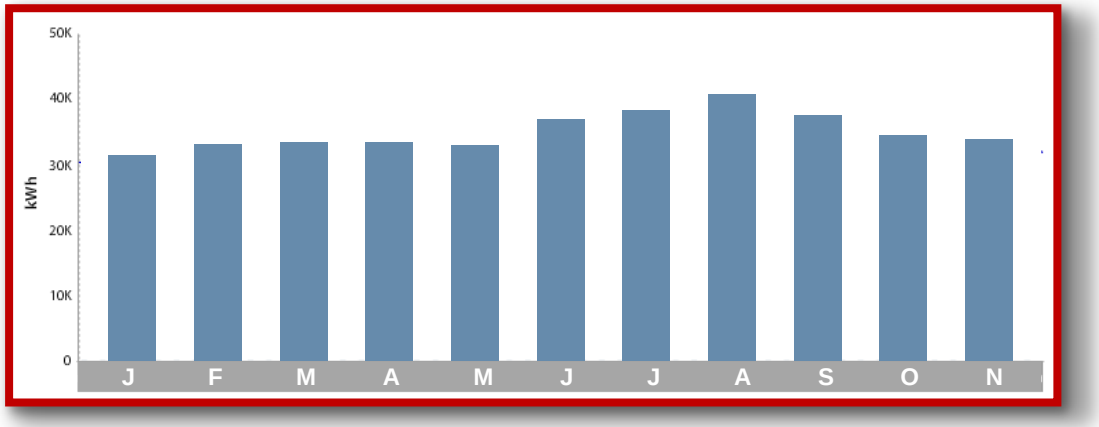
Monthly vs. Real-Time Data

Monthly data:
No insight into where waste is occurring

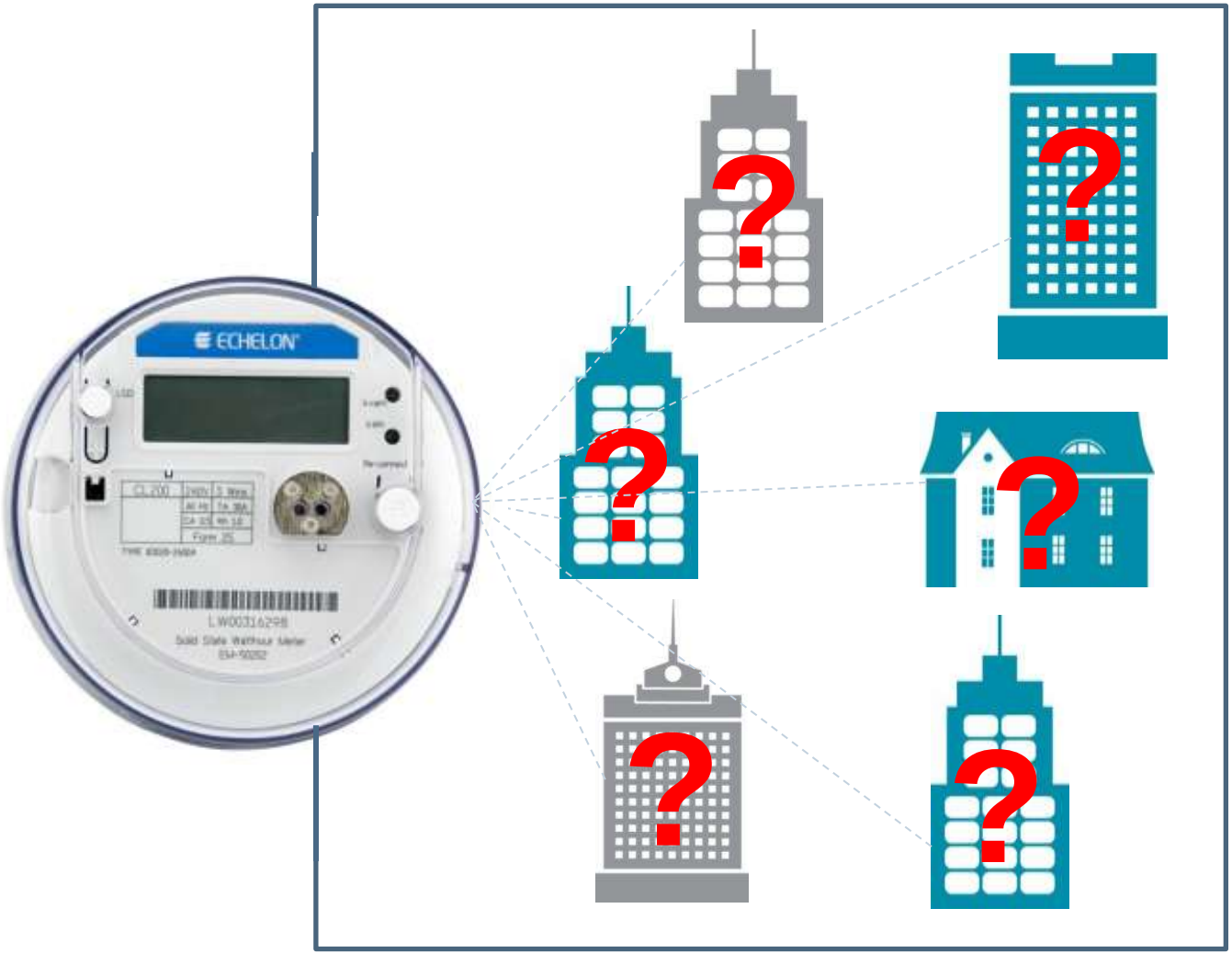


Real-time data:
Clear view of operational inefficiencies

…and a roadmap for allocating scarce resources

Single meter; multiple facilities:

Zero visibility into energy use by any given facility



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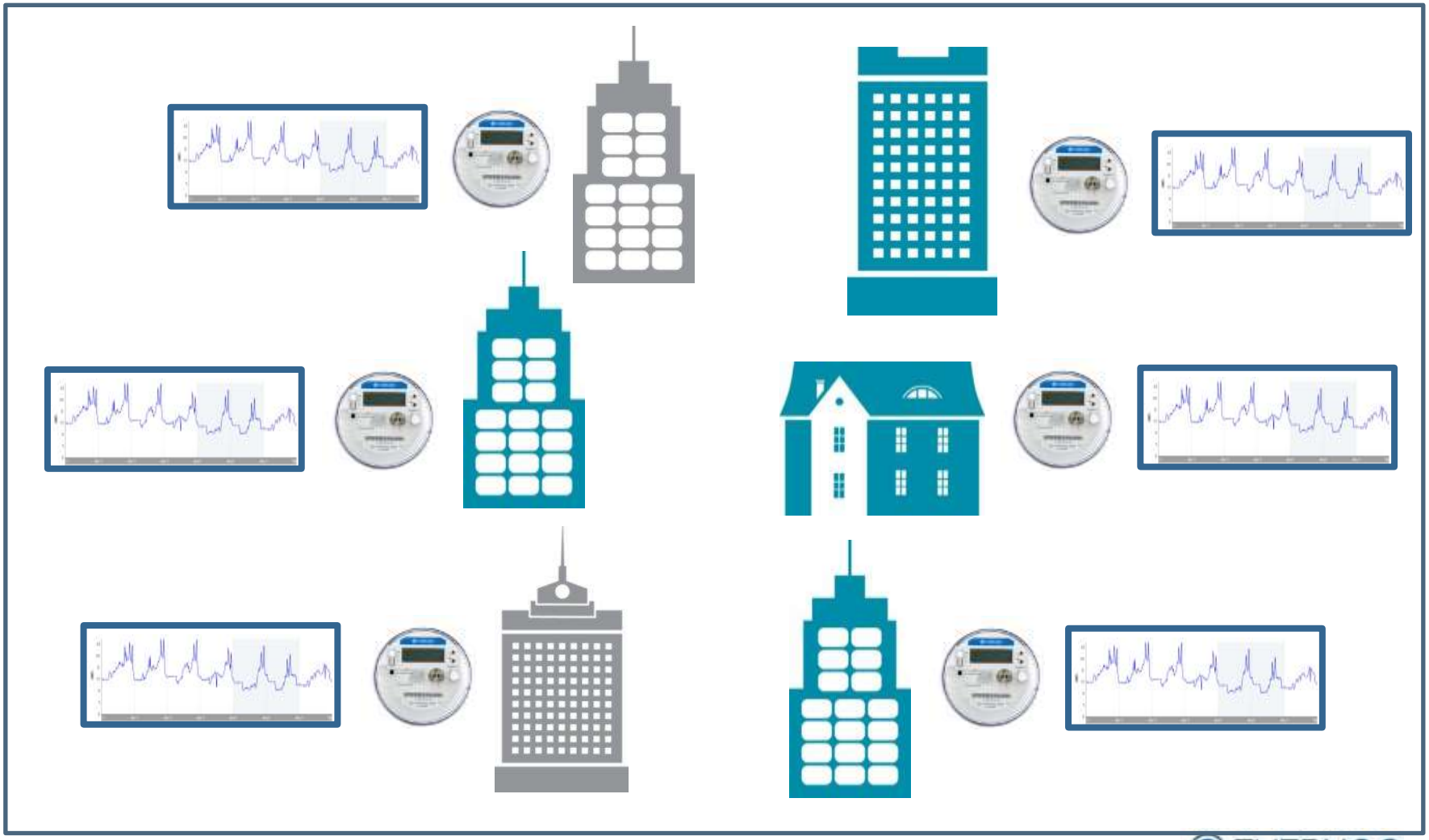
One meter per facility:

Clear understanding of each building's energy consumption



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Benefits of Energy Monitoring:

Hidden Savings Opportunities

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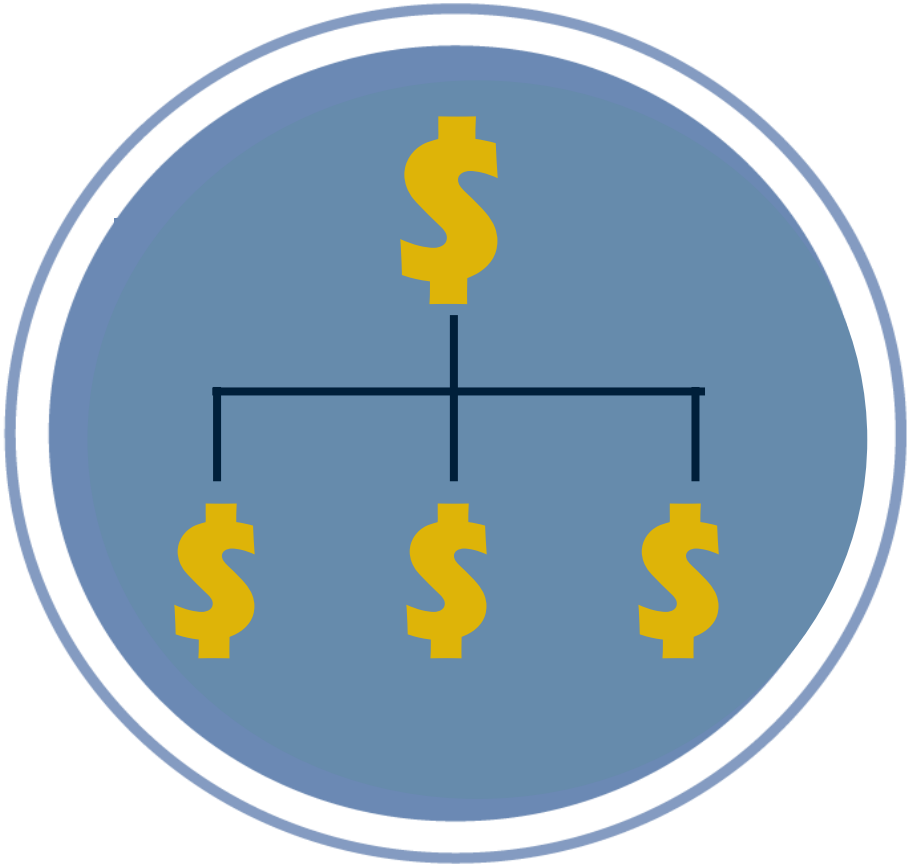
Benefits of Energy Monitoring:

Reduced Demand Charges

ENERNOC

Benefits of Energy Monitoring:

Accurate Cost Allocation



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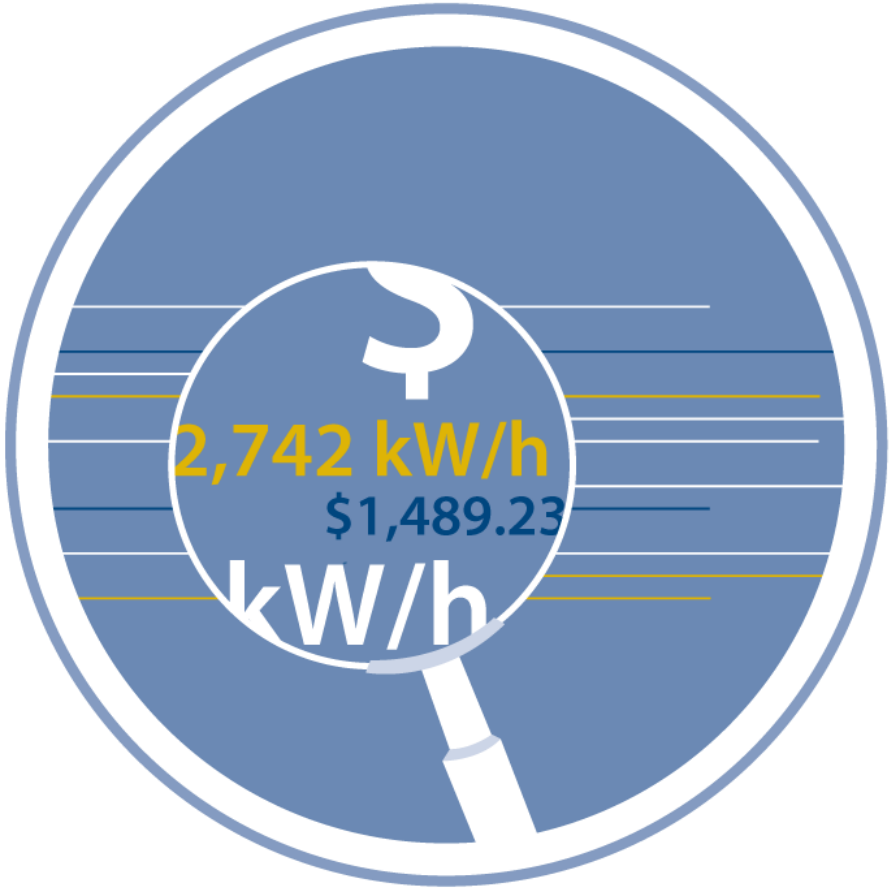
The Benefits of Energy Monitoring:

Enhanced M&V



ENERNOC

Benefits of Energy Monitoring:

Prioritize Energy Efficiency Investments

ENERNOC

Energy Monitoring:
Ingredients

System Components

After the installation of meters and energy data transmission hardware, Insight aggregates all meter data, and delivers a powerful set of web-based interactive dashboards and reports with which to rapidly analyze energy consumption. EnerNOC analyst support ensures your team finds real savings opportunities.

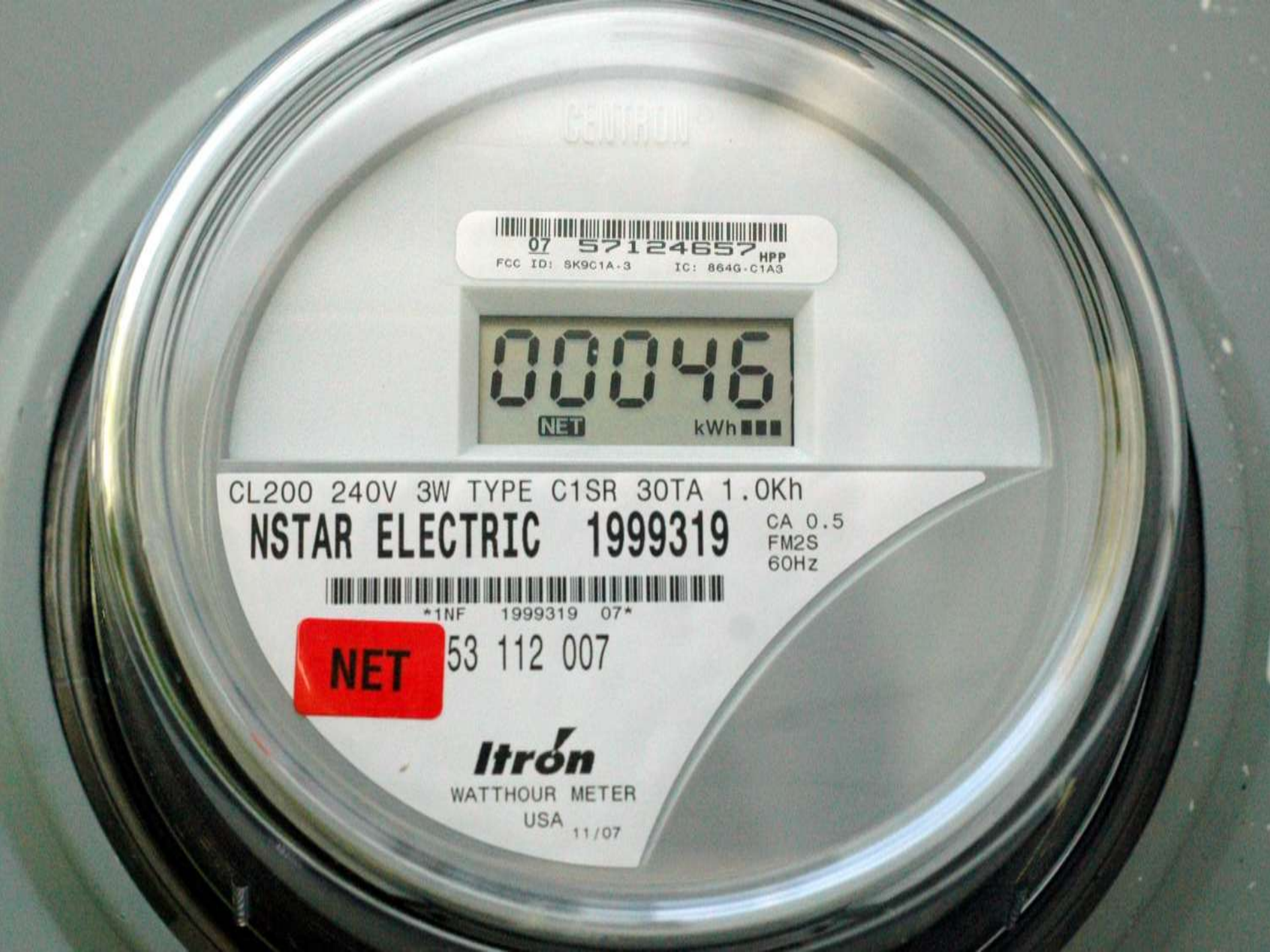
#1 Real-time Metering:
Data collection
and aggregation

#2 Energy Monitoring:
Web-based energy data
visualization

#3 Analyst Support:
Data analysis &
recommendations

EfficiencySMART insight

ENERNOC


07 57124657 HPP
FCC ID: SK9C1A-3 IC: 864G-C1A3
00046
NET
kWh
CL200 240V 3W TYPE C1SR 30TA 1.0Kh
NSTAR ELECTRIC 1999319
CA 0.5
FM2S
60Hz
1NF 1999319 07
NET
53 112 007
Itron
WATTHOUR METER
USA 11/07

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Portfolio View

Energy Efficiency Dashboard

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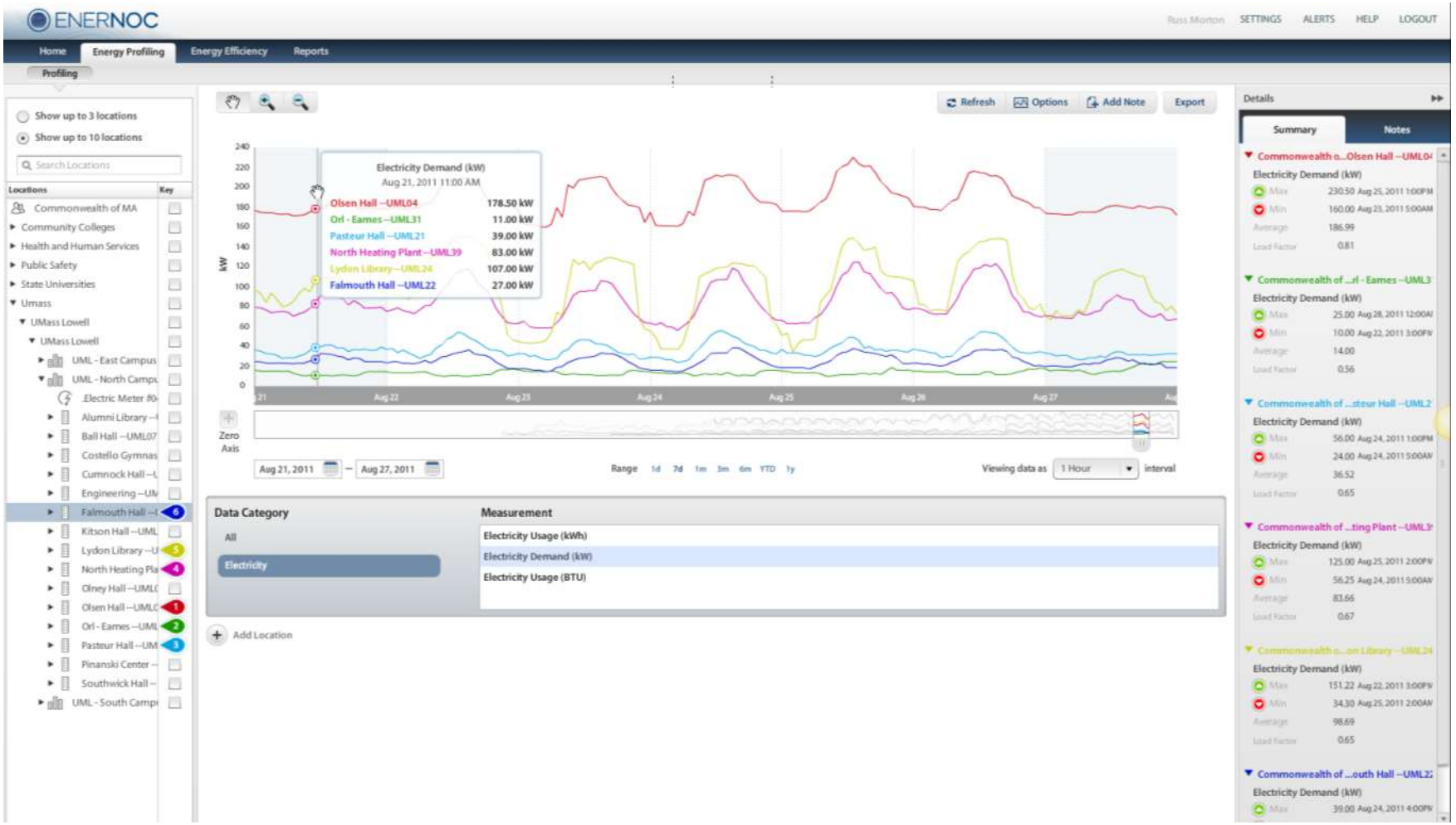
Energy Profiling



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Insight Analyst Support

Using interval data streaming from customer meters/sites, Insight Analysts will work with the customer on an ongoing basis to explore a range of data and metrics, including the following:

Monthly
Max/min usage
Rolling averages
Load duration curves
Baseload
Energy density / Energy intensity
Energy consumption

Daily
Max/min comparison
Weekday/weekend max/min
Weekend/holiday usage

Hourly
Load profile
Start-up conditions

Baseline data
Value expectations
Current consumption
Components

Cost data
Power Factor (kVAR)
Peak Demand Charge
Load factor

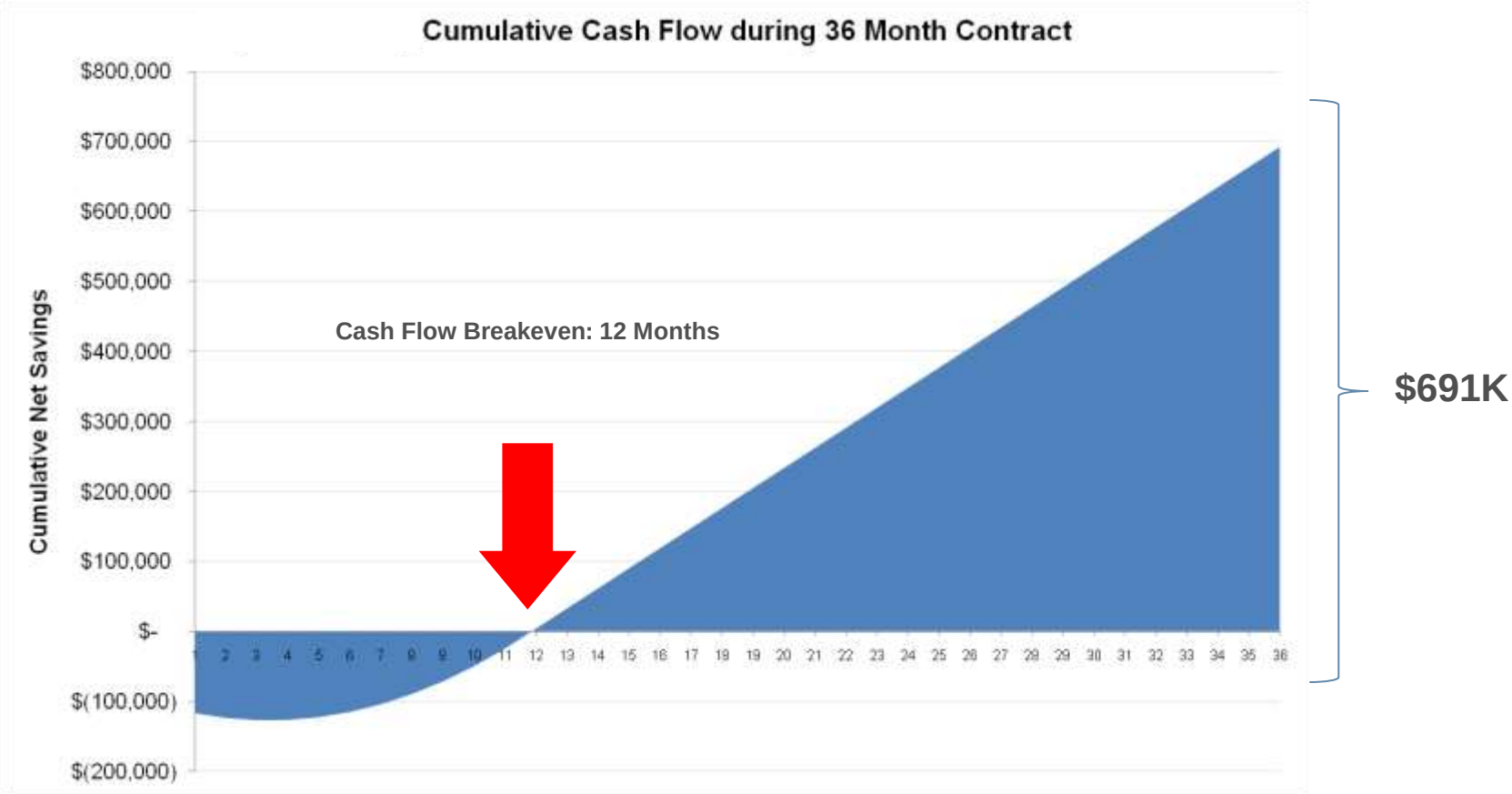
ENERNOC

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.

Energy Monitoring: Payback/ROI

Costs		Savings	
Meters:	**25**	Energy Spend:	$8.5 M
Meter Deployment?	Yes	Savings Target:	5%

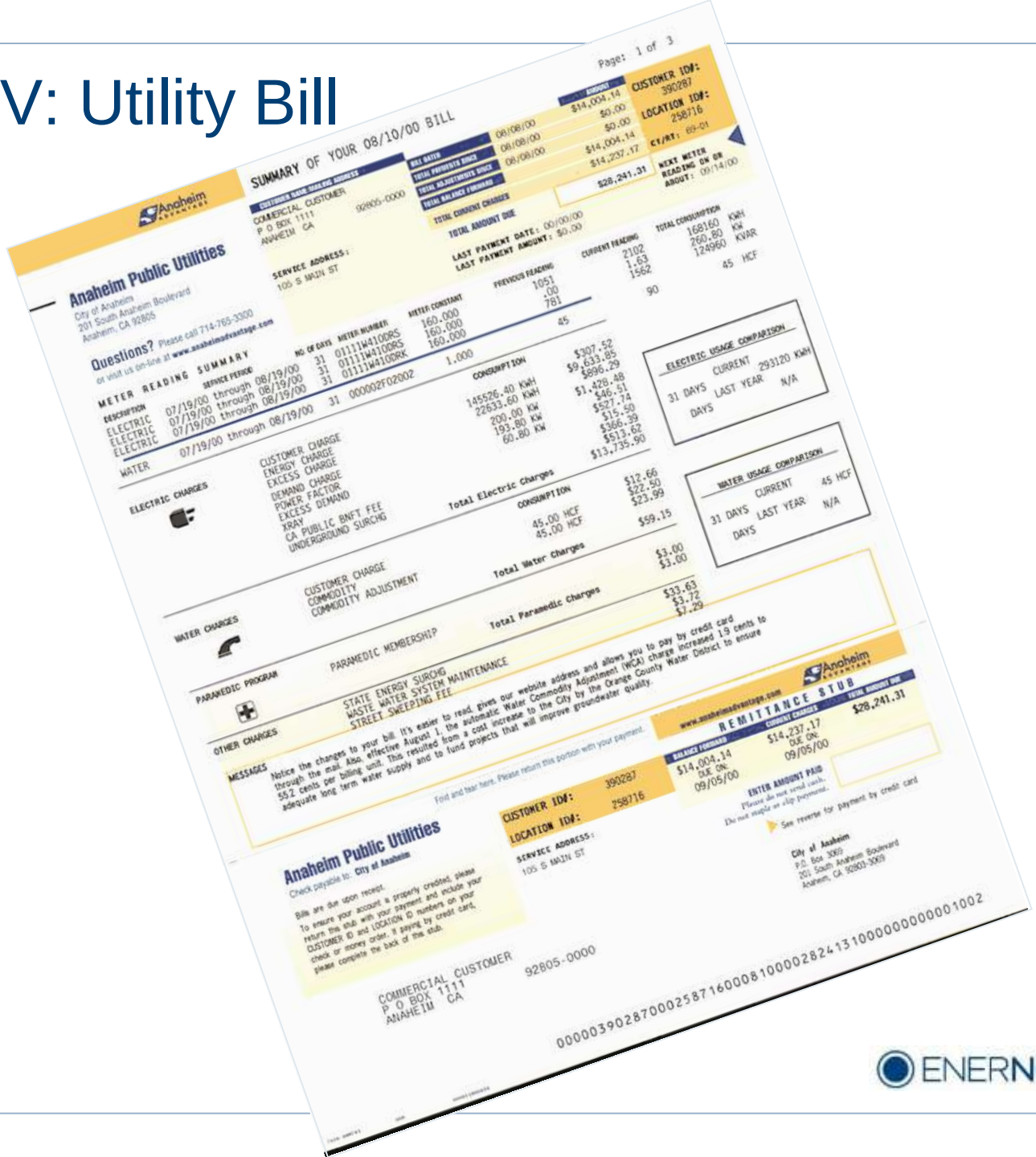


Energy Monitoring:
A powerful tool for ESPCs

ESPC M&V: Data Logger

ENERNOC

ESPC M&V: Utility Bill



Anaheim Public Utilities
City of Anaheim
201 South Anaheim Boulevard
Anaheim, CA 92805

Questions? Please call 714-765-3300
or visit us on-line at www.anaheimadvantage.com

SUMMARY OF YOUR 08/10/00 BILL

Page: 1 of 3

COMMERCIAL CUSTOMER
P O BOX 1111
ANAHEIM CA 92805-0000

SERVICE ADDRESS:
105 S MAIN ST

		Amount
BILL DATED	08/08/00	$14,004.14
TOTAL PAYMENTS SINCE	08/08/00	$0.00
TOTAL ADJUSTMENTS SINCE	08/08/00	$0.00
TOTAL BALANCE FORWARD		$14,004.14
TOTAL CURRENT CHARGES		$14,237.17
TOTAL AMOUNT DUE		$28,241.31

CUSTOMER ID#: 390287
LOCATION ID#: 258716
CY/RT: 69-01
NEXT METER READING ON OR ABOUT: 09/14/00

LAST PAYMENT DATE: 00/00/00
LAST PAYMENT AMOUNT: $0.00

METER READING SUMMARY

DESCRIPTION	SERVICE PERIOD	NO OF DAYS	METER NUMBER	METER CONSTANT	PREVIOUS READING	CURRENT READING	TOTAL CONSUMPTION
ELECTRIC	07/19/00 through 08/19/00	31	01111W410DRS	160.000	1051	2102	168160 KWH
ELECTRIC	07/19/00 through 08/19/00	31	01111W410DRS	160.000	.00	1.63	260.80 KW
ELECTRIC	07/19/00 through 08/19/00	31	01111W410DRK	160.000	781	1562	124960 KVAR
WATER	07/19/00 through 08/19/00	31	000002F02002	1.000		90	45 HCF

ELECTRIC USAGE COMPARISON
31 DAYS CURRENT 293120 KWH
DAYS LAST YEAR N/A

WATER USAGE COMPARISON
31 DAYS CURRENT 45 HCF
DAYS LAST YEAR N/A

ELECTRIC CHARGES

	CONSUMPTION	
CUSTOMER CHARGE		$307.52
ENERGY CHARGE	145526.40 KWH	$9,633.85
EXCESS CHARGE	22633.60 KWH	$896.29
DEMAND CHARGE	200.00 KW	$1,428.48
POWER FACTOR	193.80 KW	$46.51
EXCESS DEMAND	60.80 KW	$527.74
XRAY		$15.50
CA PUBLIC BNFT FEE		$366.39
UNDERGROUND SURCHG		$513.62
Total Electric Charges		$13,735.90

WATER CHARGES

	CONSUMPTION	
CUSTOMER CHARGE		$12.66
COMMODITY	45.00 HCF	$22.50
COMMODITY ADJUSTMENT	45.00 HCF	$23.99
Total Water Charges		$59.15

PARAMEDIC PROGRAM

PARAMEDIC MEMBERSHIP	$3.00
Total Paramedic Charges	$3.00

OTHER CHARGES

STATE ENERGY SURCHG	$33.63
WASTE WATER SYSTEM MAINTENANCE	$3.72
STREET SWEEPING FEE	$7.29

MESSAGES
Notice the changes to your bill. It's easier to read, gives our website address and allows you to pay by credit card through the mail. Also, effective August 1, the automatic Water Commodity Adjustment (WCA) charge increased 1.9 cents to $5.2 cents per billing unit. This resulted from a cost increase to the City by the Orange County Water District to ensure adequate long term water supply and to fund projects that will improve groundwater quality.

Find and tear here. Please return this portion with your payment.

Anaheim Public Utilities
Check payable to: City of Anaheim

Bills are due upon receipt.
To ensure your account is properly credited, please return this stub with your payment and include your CUSTOMER ID and LOCATION ID numbers on your check or money order. If paying by credit card, please complete the back of this stub.

CUSTOMER ID#: 390287
LOCATION ID#: 258716
SERVICE ADDRESS:
105 S MAIN ST

COMMERCIAL CUSTOMER
P O BOX 1111
ANAHEIM CA 92805-0000

Anaheim
www.anaheimadvantage.com

REMITTANCE STUB

BALANCE FORWARD	CURRENT CHARGES	TOTAL AMOUNT DUE
$14,004.14	$14,237.17	$28,241.31
DUE ON: 09/05/00	DUE ON: 09/05/00	

ENTER AMOUNT PAID
Please do not send cash.
Do not staple or clip payments.

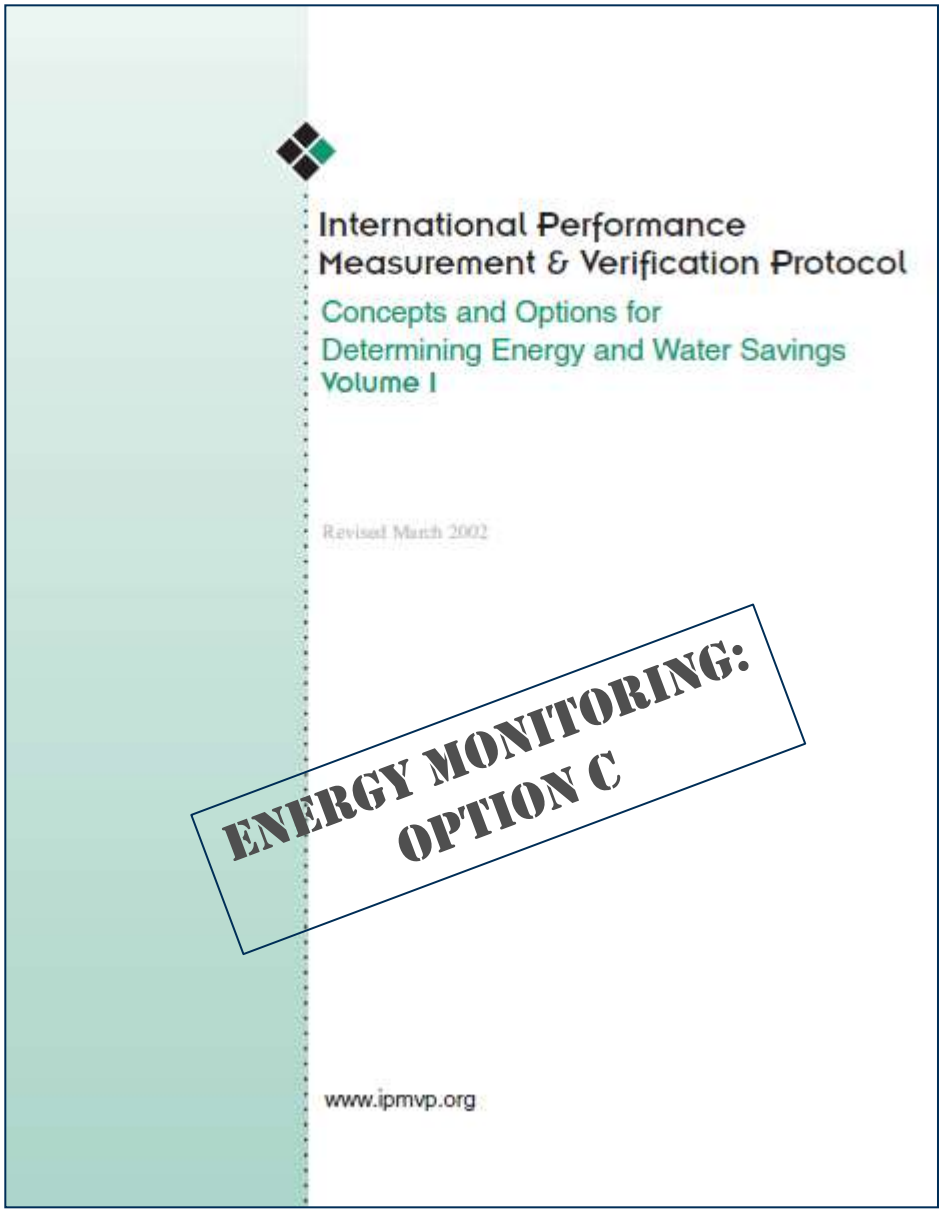
See reverse for payment by credit card

City of Anaheim
P.O. Box 3069
201 South Anaheim Boulevard
Anaheim, CA 92803-3069

00000390287000258716000810000282413100000000001002

ENERNOC

IPMVP



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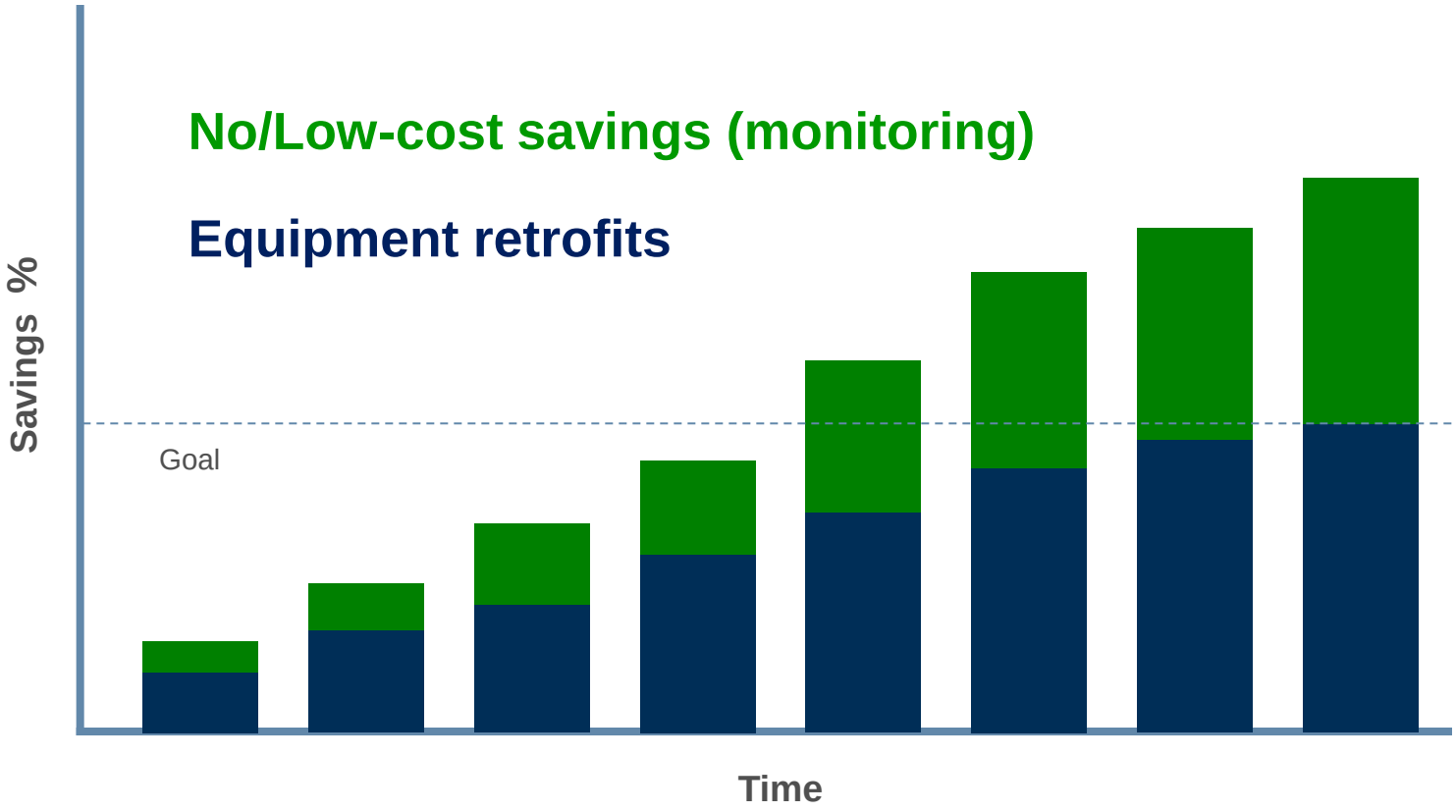
ESPCs & Energy Monitoring

Substantial increase in savings at minimal cost



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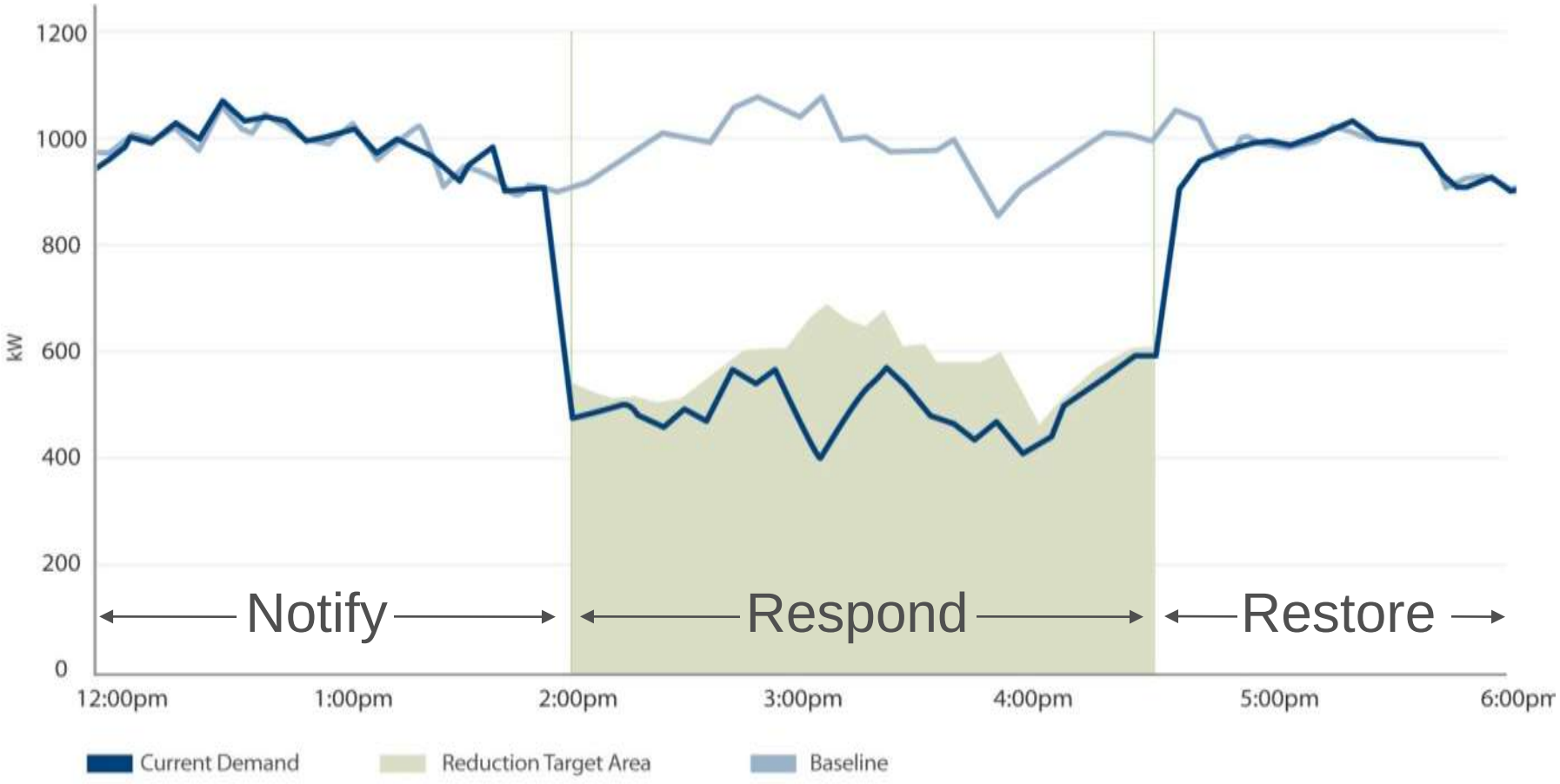
Energy Monitoring:
Other funding possibilities

Funding via Demand Response payment



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Customer Spotlight:

Memphis City Schools

Memphis City Schools deploys EfficiencySMART Insight to meet budget crunch

As one of the largest school districts in the nation, MCS needed to find a way to decrease operating expenses – operational energy efficiency was key

"Memphis City Schools is committed to reducing costs across all of our facilities, and energy plays a big role in those efforts. By working with EnerNOC, we can provide cost avoidance, manage utility resources more effectively and reduce our energy usage in the process."

Bobby Barlow, *Energy Manager, Memphis City Schools*

Industry
Education

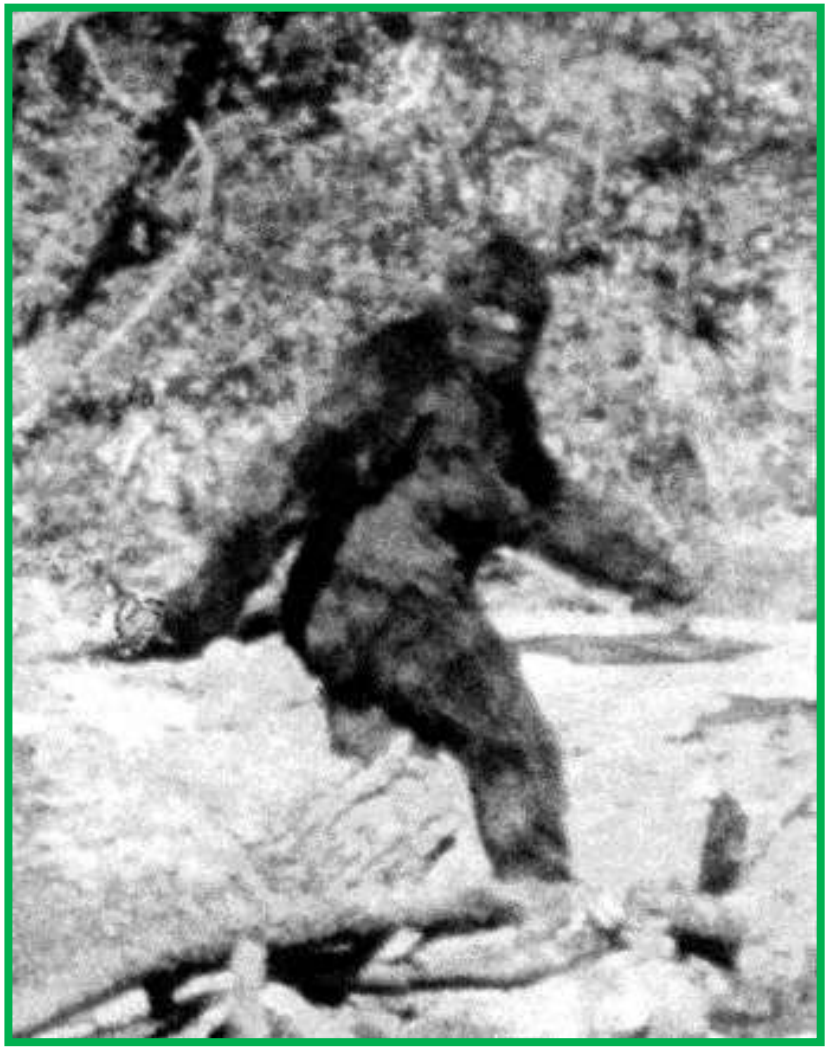
Geography
Memphis, TN

Number of Locations
25 schools

Applications
EfficiencySMART Insight

Early Findings
Once data began streaming to EnerNOC's analysts, it was quickly determined that 15 schools had significant potential to shutdown farther during off-hours, resulting in annual **energy savings potential of over $180,000** in those schools alone!

Funding via “use it or lose it” ARRA funds



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Energy Monitoring:
Anomalies & inefficiencies

Holiday Set-back, Compare to Past

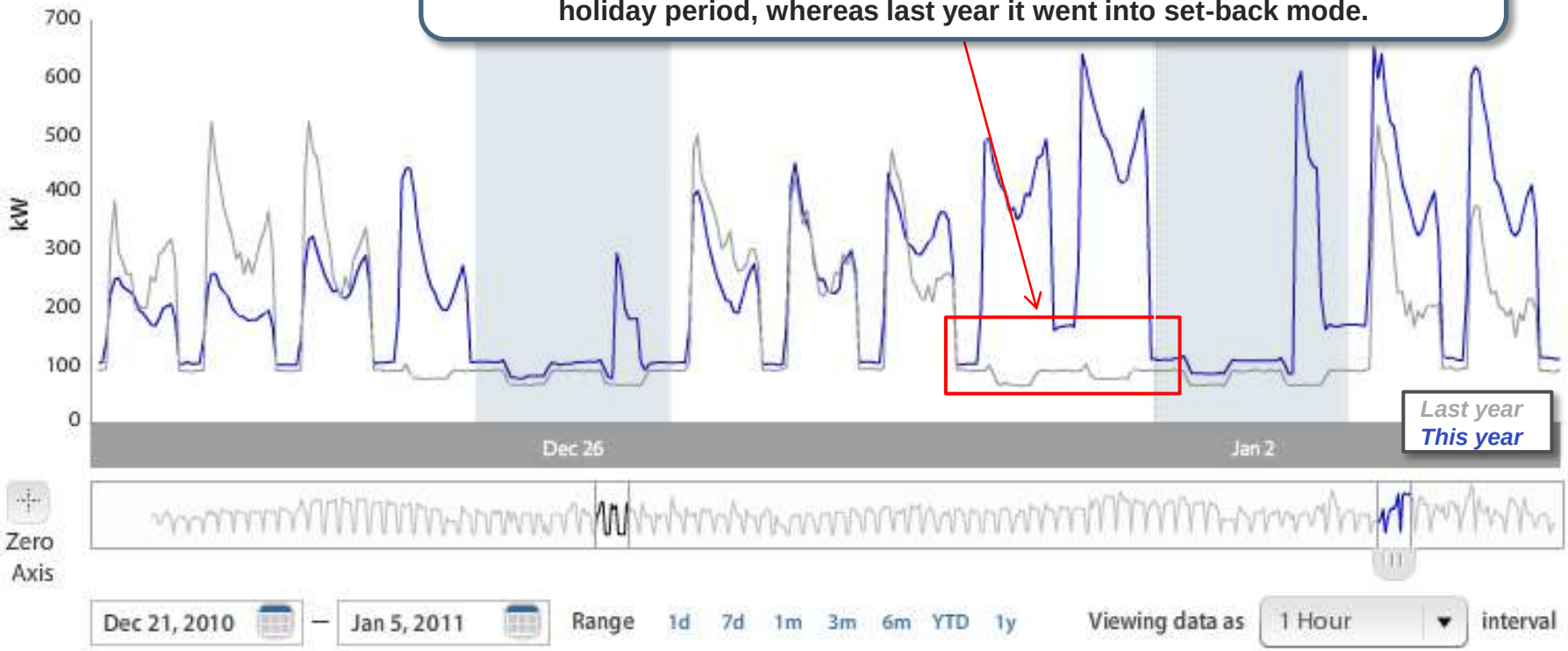
SAVINGS POTENTIAL
Day hours Savings:*300 kW per hour*
Night hours Savings: *90 kW per hour*
Total $ Savings = ***$1,113****
**savings from these two anomalous days alone*

DETAILS
Industry: *Government*
Data Type: *Meter Level*

Judging from this year and last year's data, this facility should not be operating on the three days after Christmas.

Thursday Dec. 30. 2010 12:00AM – Saturday Jan. 1, 2011 12:00AM

This facility is operating under its normal energy demand schedule during a holiday period, whereas last year it went into set-back mode.



EfficiencySMART insight

ENERNOC

Thanksgiving Holiday

SAVINGS POTENTIAL

kW Savings = *between 180 kW and 670 kW*

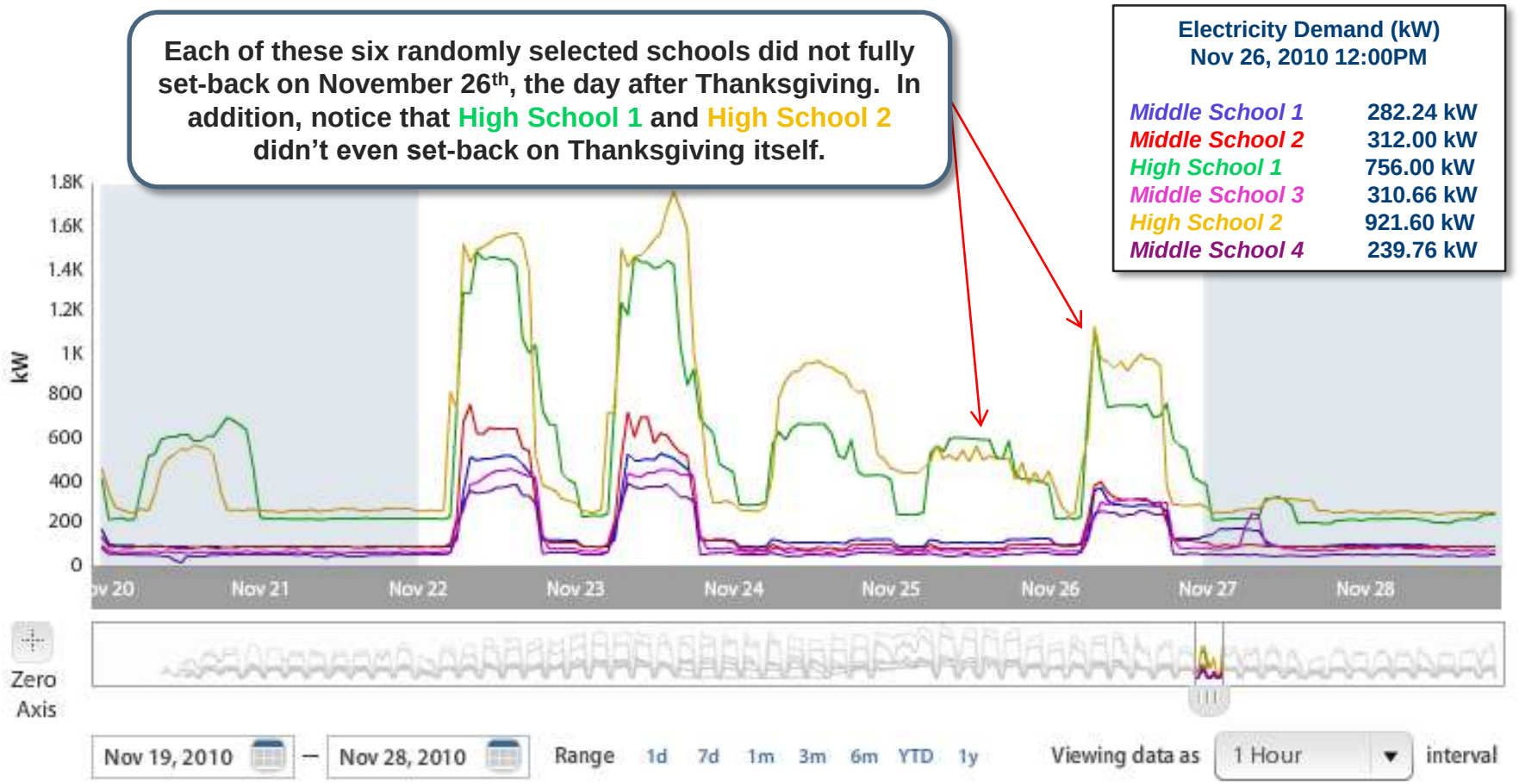
$ Savings = ***$2,626****

**DETAILS*total savings on Friday, February 26th alone*

Industry: *Education*

Data Type: *Meter Level*

Each of these six randomly selected schools did not fully set-back on November 26th, the day after Thanksgiving. In addition, notice that High School 1 and High School 2 didn't even set-back on Thanksgiving itself.



EfficiencySMART insight

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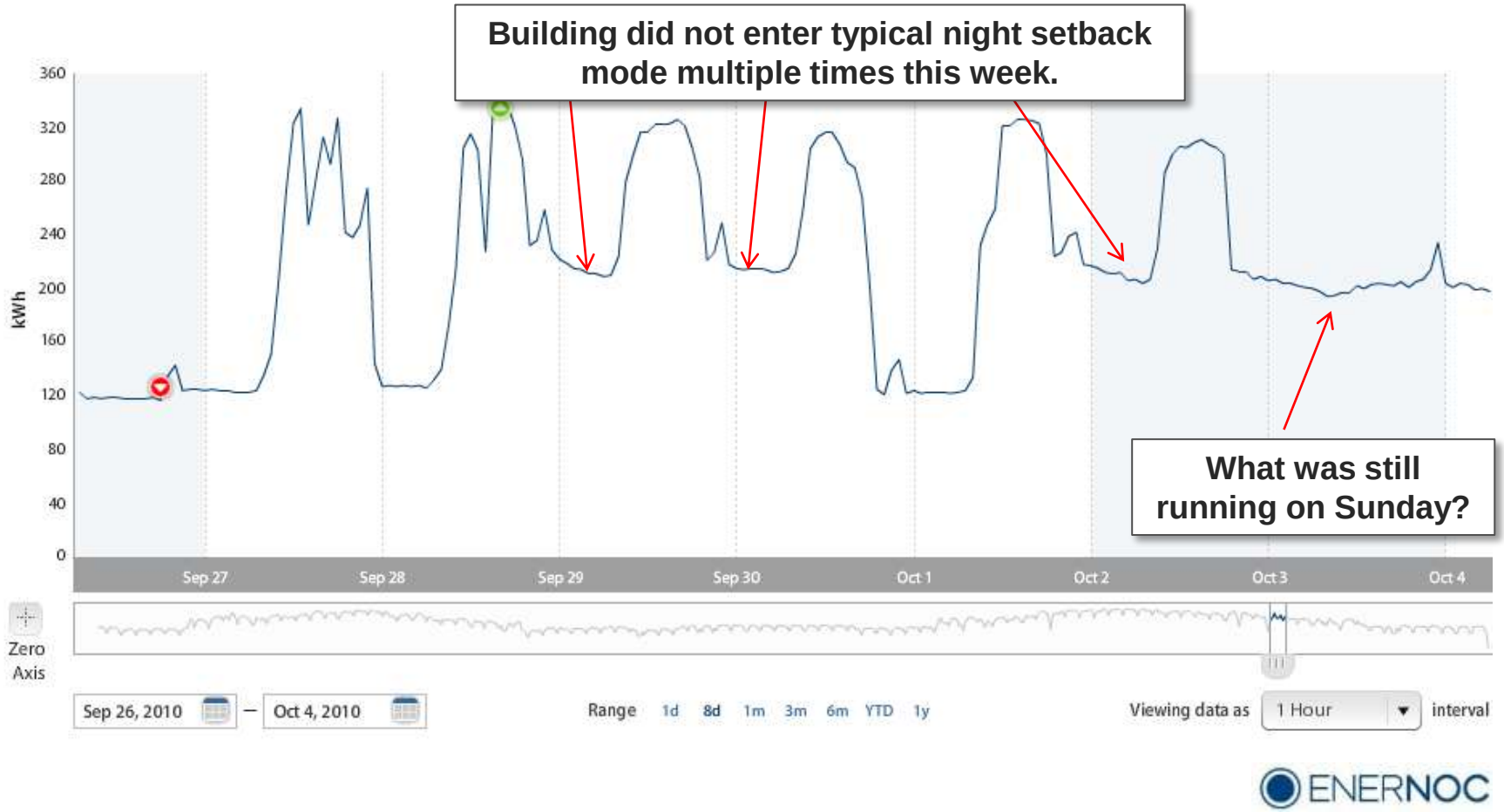
Case Study: Administrative Office Building

Building Type: **Office Building**

Anomaly: **Night & Weekend Set-back**

Savings Potential:

- **3600 kWh per week**
- **$288 per week**
- **11% of electricity spend**

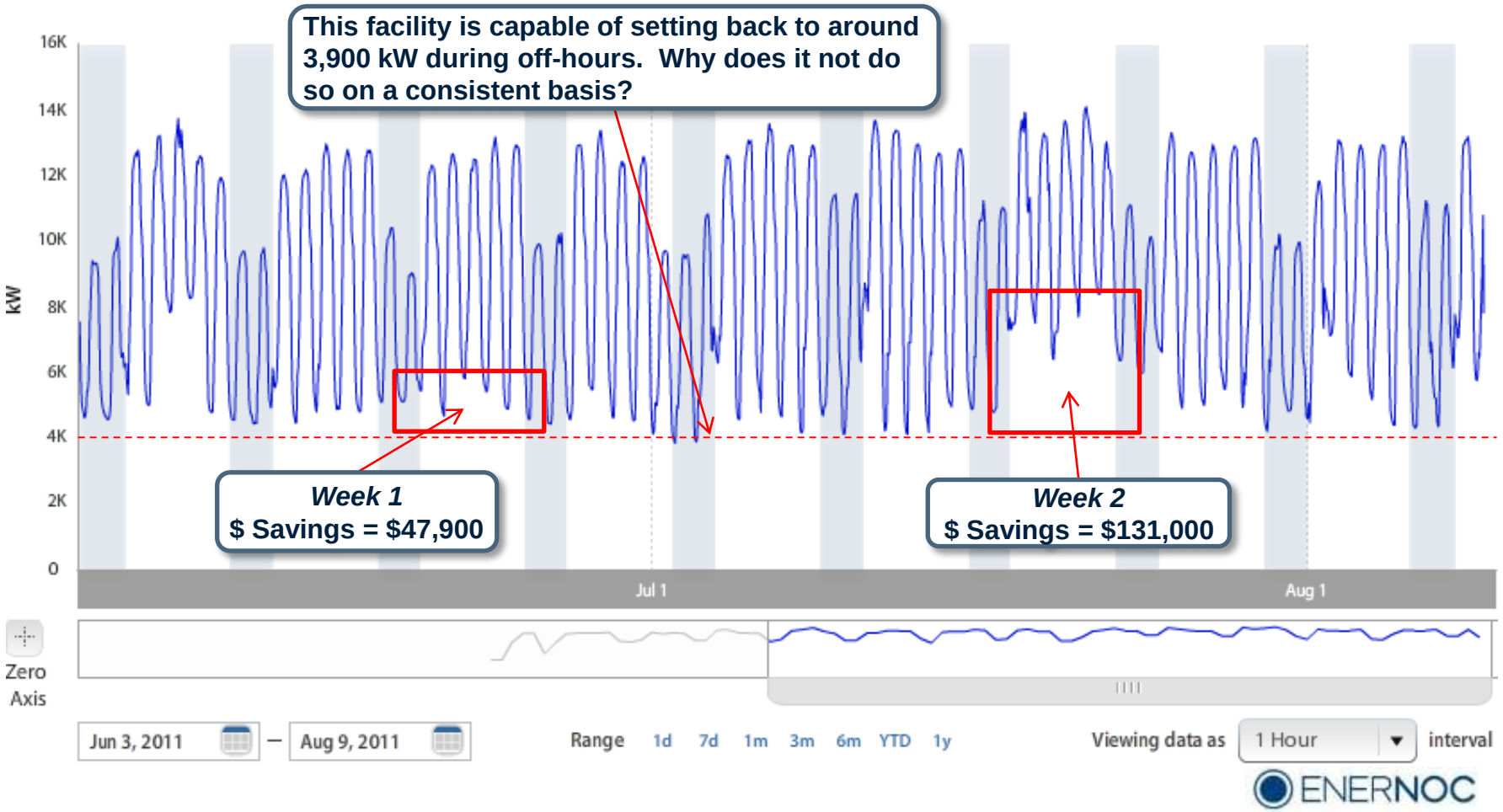


Inconsistent Set-backs

SAVINGS POTENTIAL
Week 1 kW Savings = *8,400 kW*
Week 2 kW Savings = *23,400 kW*

➔

Week 1 $ Savings = **$47,900**
Week 2 $ Savings = **$131,000**



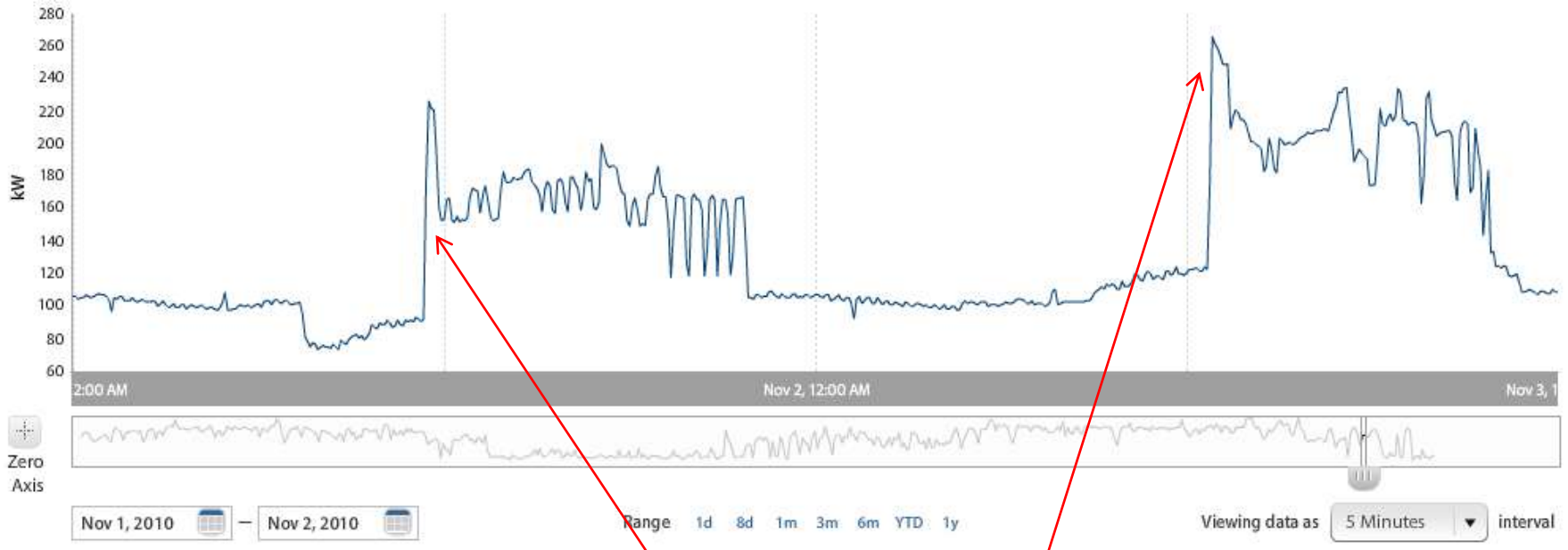
Case Study: Office building

Building Type: **Office building**

Anomaly: **Morning Start-up Schedule**

Savings Potential:

- **30 kW in peak demand**
- **$300 per month in demand charges**
- **$3600 per year**



Morning start-up results in demand spike at least 30kw above daily peak demand.

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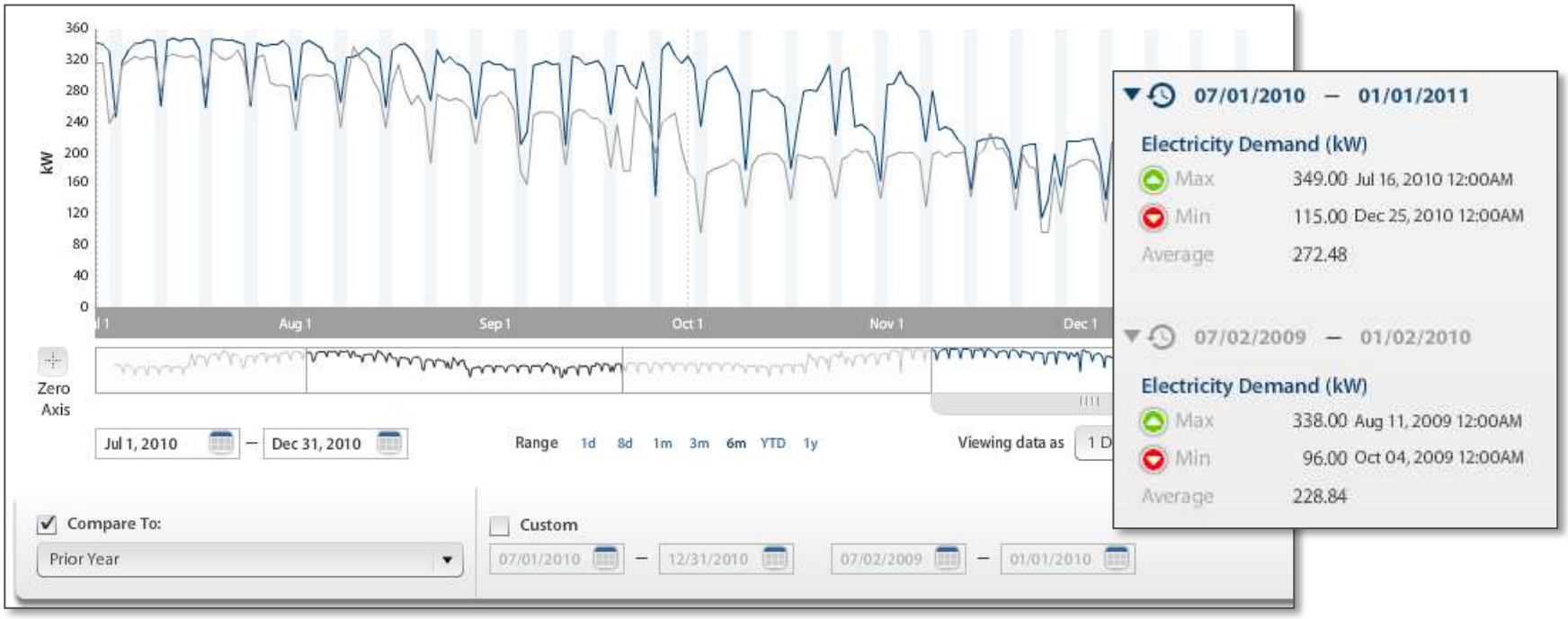
Case Study: M&V at office building (1 of 2)

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



Despite this project, electricity demand actually increased from 2009 to 2010.

ENERNOC

Case Study: M&V at office building (2 of 2)

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: October 2010 compared to October 2009

The increase in demand in 2010 was especially notable in October.

ENERNOC

Nick d’Arbeloff
Vice President
Energy Efficiency Solutions
ndarbeloff@enernoc.com
617.858.0077

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