ENERNOC

get more from energy

PLMA Fall 2006 Conference

The Integration of AMI and DR

November 9, 2006

Agenda

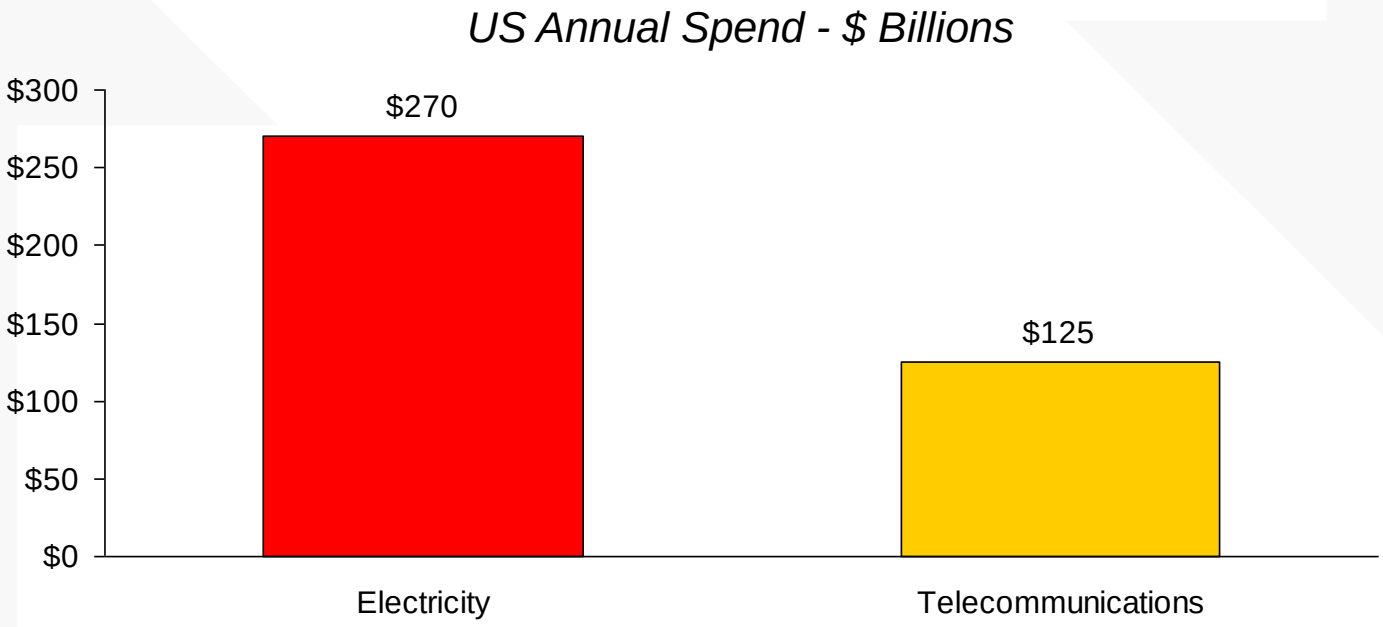
- Themes
- Definitions of “Advanced Metering” and “Demand Response”
- Importance of granular, near-real-time data and two-way data communications
- Importance of open standards and protocols for AMI and DR
- EnerNOC overview

ENERNOC

Themes

Less than 1% of all commercial and industrial companies use advanced technology to measure and manage energy spend.

Nearly 100% use advanced technology to measure and manage telecommunications spend.

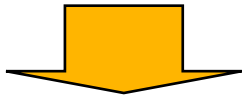


Source: 2004 Chartwell AMR Survey. 2004 Aberdeen Group Survey.

ENERNOC

Themes

- The Energy Savings Opportunity is Massive
- You Can't Manage What You Don't Measure
- Technology Enables the Opportunity
- AMI and Demand Response Are the Gateways



- Do it NOW – It's the Gift That Keeps on Giving!

ENERNOC

Themes

Total energy management starts with advanced, real-time measurement of energy.

You Can't Manage What You Don't Measure!

- Data . . . just numbers until you make it usable
- Information . . . usable data that can be put into context
- Knowledge . . . information put into business context

Need to give customers the ***POWER*** to make proactive, value-based decisions that have a real, bottom-line impact on their business

ENERNOC

FERC Definition of Advance Metering and AMI

- "Advanced metering is a metering system that records customer consumption [and possibly other parameters] hourly or more frequently and that provides for daily or more frequent transmittal of measurements over a communication network to a central collection point."
- "The key concept reflected in this definition is that advanced metering involves more than a meter that can measure consumption in frequent intervals. Advanced metering refers to the full measurement and collection system, and includes customer networks, and data management systems. This full measurement and collection system is commonly referred to as advanced metering infrastructure (AMI).

FERC Definition of Demand Response

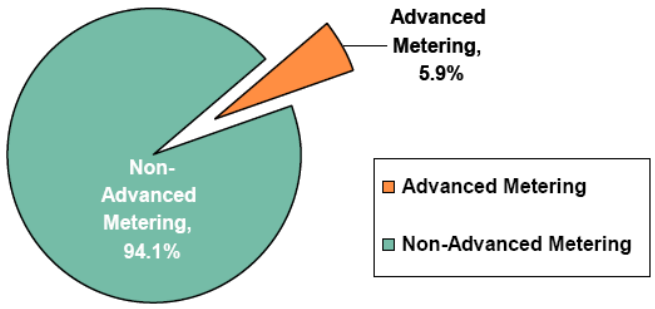
- Changes in electric usage by end-use customers from their normal consumption patterns in response to changes in the price of electricity over time, or to incentive payments designed to induce lower electricity use at times of high wholesale market prices or when system reliability in jeopardized.

ENERNOC

Themes

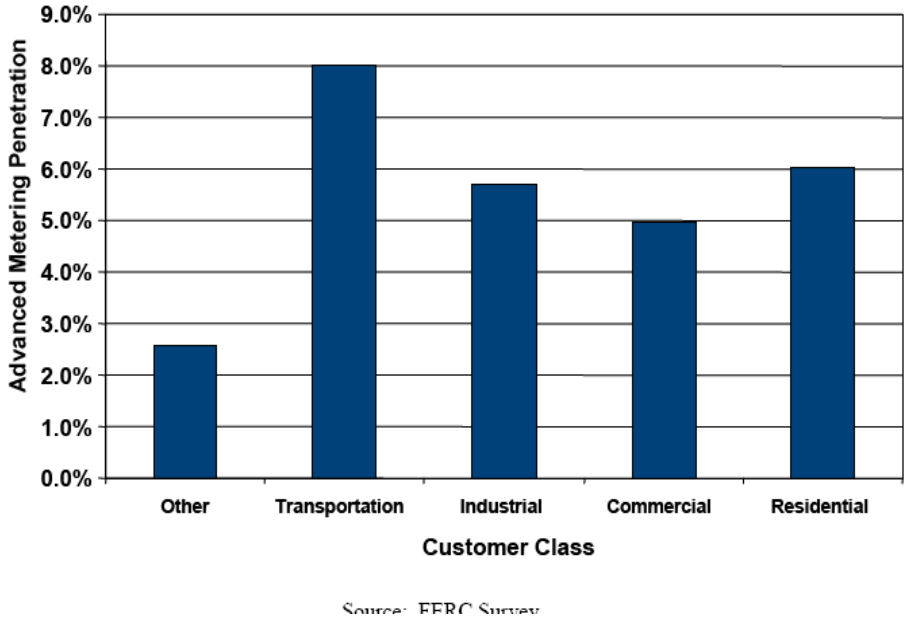
Advanced metering is in early stages of deployment.

Figure III-4. United States penetration of advanced metering



Source: FERC Survey

Figure III-5. Penetration of advanced metering by customer class



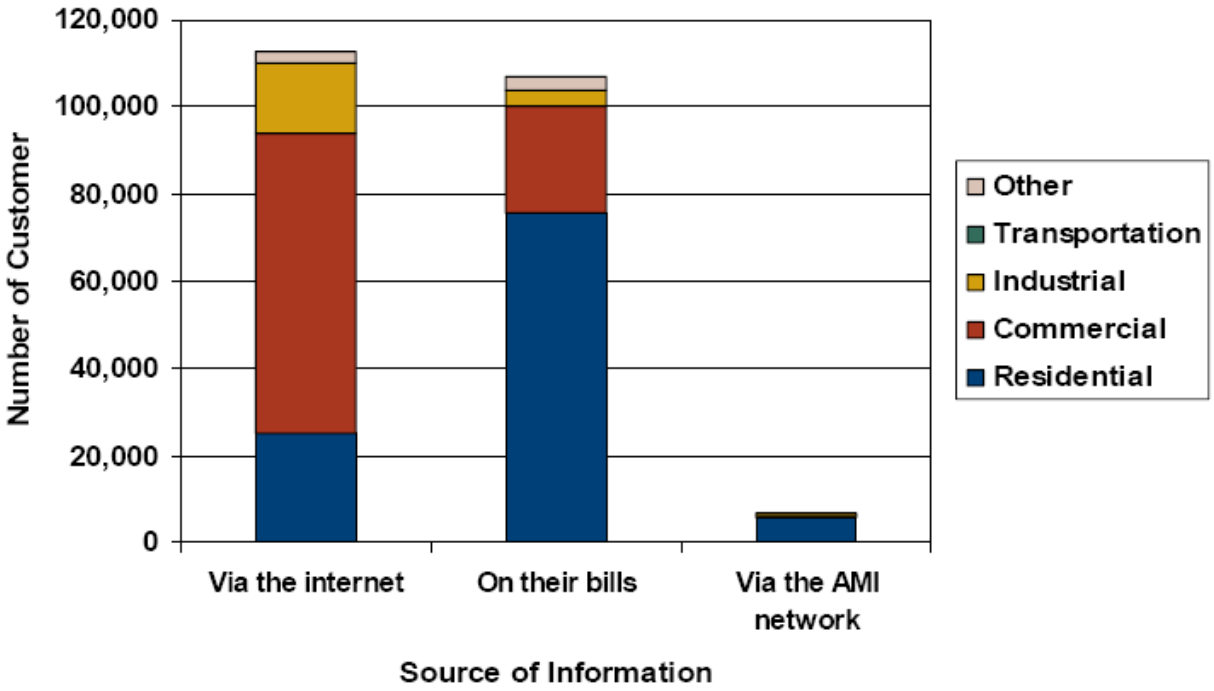
Source: FERC Survey

ENERNOC

Themes

Advanced metering is in early stages of deployment.

Figure III-14. Number of customers receiving interval usage information by customer class and source of information

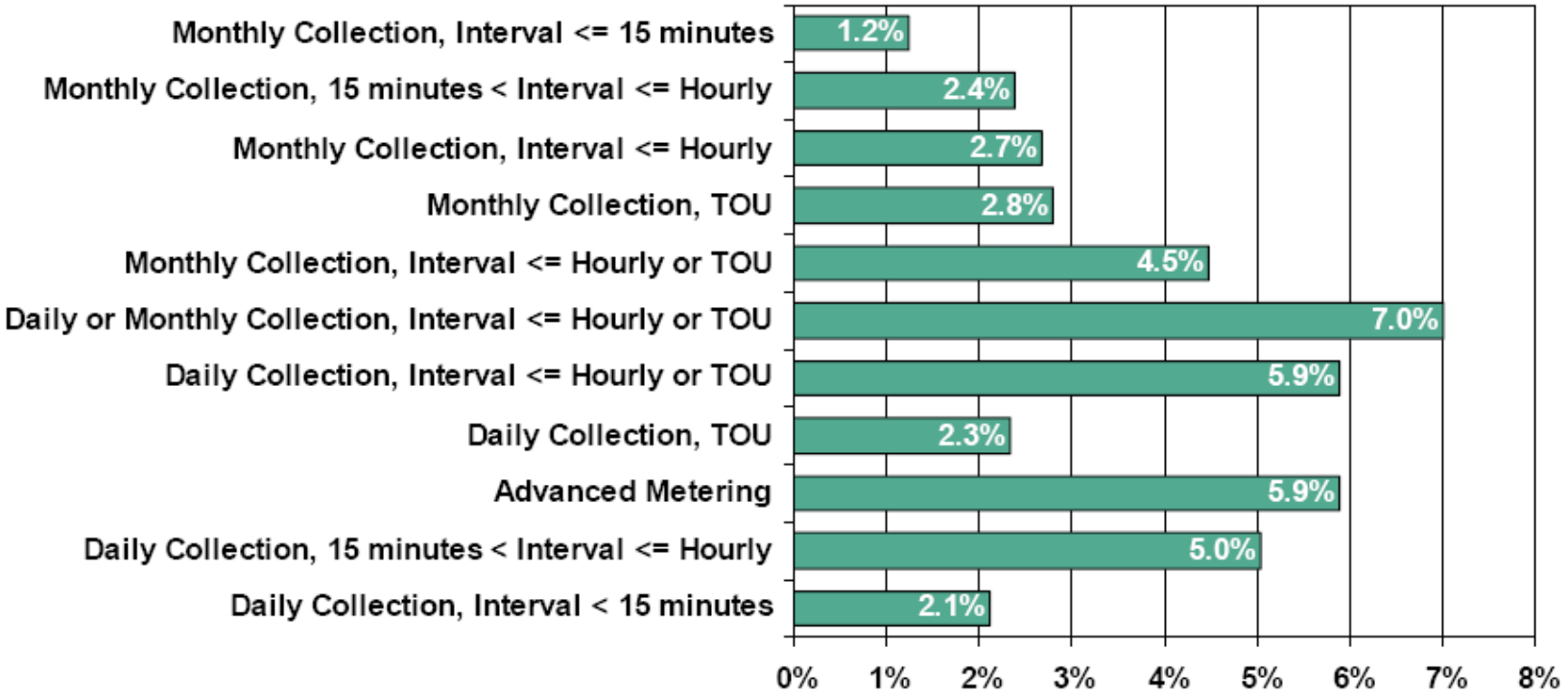


Source: FERC Survey

Themes

Advanced metering to date has not included enough data granularity or timely exchange; less than 3.5% utilize <=15 minute interval data.

Figure III-8. Advanced metering data interval and collection frequency penetration estimates



Source: FERC Survey

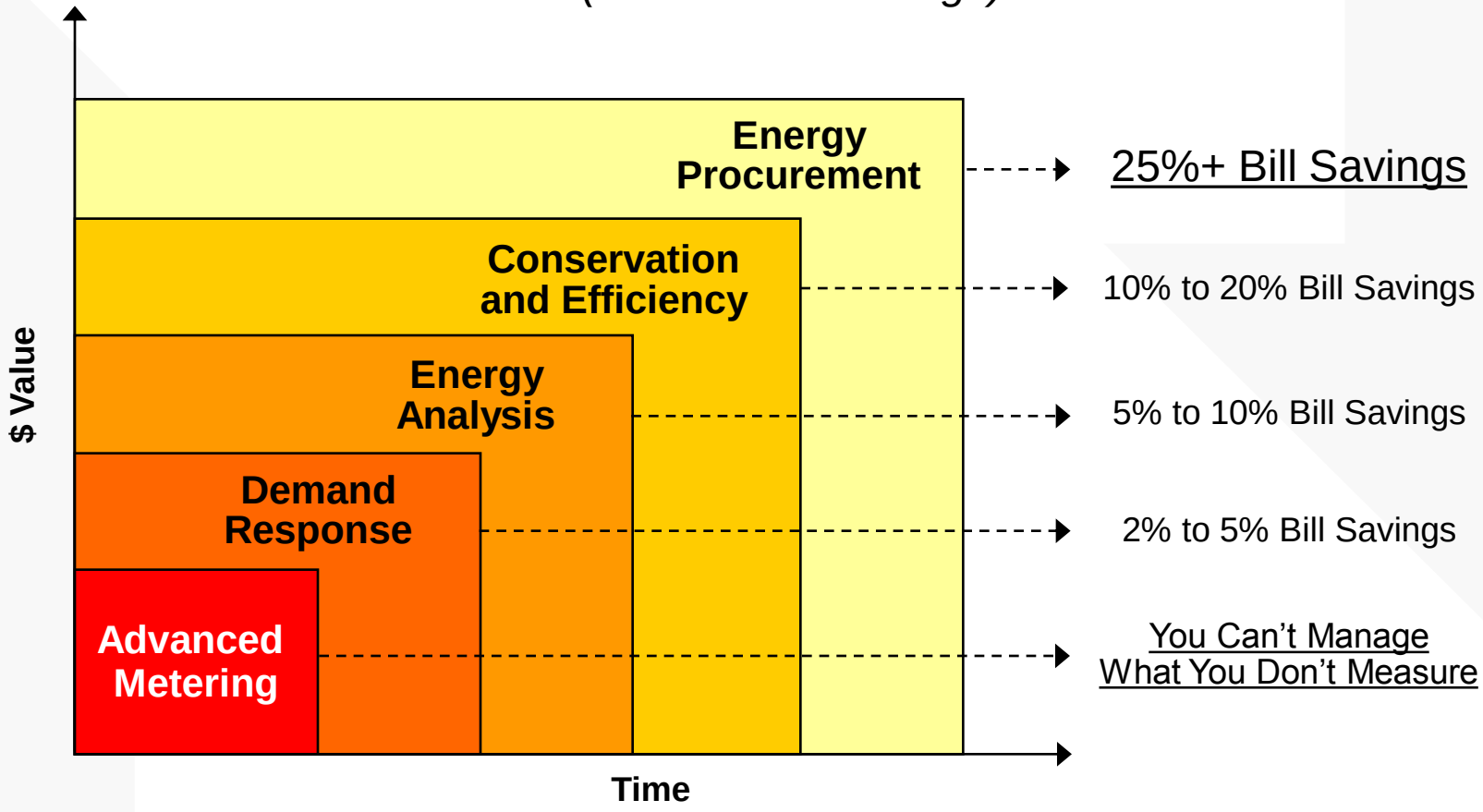
ENERNOC

Total Energy Management

Energy savings are largely untapped within C&I businesses and offer competitive advantage to those that capitalize on the opportunity with a trusted partner.

Total Energy Management with EnerNOC

(Cumulative Savings)



Total Energy Management Examples

Most energy savings opportunities require little to no capital investment relative to the size of the opportunity and speed of payback.

Advanced Metering

- Commercial office customer installed real-time main meter and eliminated 73 utility sub-meters – eliminated $18,400 per month in utility metering fees, totaling $220,800 per year.

- Installed advanced sub-meters for tenants and billed tenants directly. Evangelized building-wide energy efficiency program that reduced energy consumption by more than 10% per customer. Savings of $8,200 per year realized per customer across 73 customers, totaling $600,000.

- Common area energy consumption was consequently reduced by 15%, contributing another $80,000 per year in savings. Total program savings = $819,400 per year.

- Cost of advanced submetering = $426,800. Cost of monthly billing administration, technology operation = $9,600. Cost of energy awareness education = $34,000. Simple time to payback = 8 months. 14% annual savings off entire electricity bill.

ENERNOC

Total Energy Management Examples

Most energy savings opportunities require little to no capital investment relative to the size of the opportunity and speed of payback.

Demand Response

- Grocery customer entered into demand response program – received free advanced metering and energy information system in each store to participate
- 120 stores provide approximately 100 kW of demand response capacity per store, totaling 12,000 kW of enrolled market capacity
- Capacity enrolled includes 1/3 lights, anti-sweat heaters, HVAC, water heating electrical circuits
- Customer receives $3.00/kW-month or $300/month per store, $36,000 per month, and $432,000 annually, amounting to a 3% savings on entire energy bill.
- Time to payback - instantaneous

ENERNOC

Total Energy Management Examples

Most energy savings opportunities require little to no capital investment relative to the size of the opportunity and speed of payback.

Energy Analysis

- Big box retail customer enrolls capacity in demand response program, gets DR benefits including free real-time advanced metering technology.
- Advanced metering technology monitors upper control limits of kW demand in real-time. Preset alarm notifies customer (by email) that demand has exceeded 120 kW at 10:00 p.m. when lighting and HVAC setbacks are supposed to reduce demand below this level.
- Next day (6th day of the month), store manager reads email, discovers that stocking crew overrode setbacks and failed to reset. Educates stocking crew. Avoided cost = $921 ($0.12/kWh x 40 kW x 8 hours x 24 remaining days in month).
- 300 additional stores not participating in this program. How many are not avoiding these costs? Conservative analysis of how often this happens shows a behavioral change savings potential of more than $1,100,000 per year.
- <u>Time to payback - instantaneous</u>

ENERNOC

Total Energy Management Examples

Most energy savings opportunities require little to no capital investment relative to the size of the opportunity and speed of payback.

Advanced Control and Energy Procurement

- Using detailed annual interval data across all 120 stores, a grocery customer structures an RFP to competitive retail electricity providers.
- Combining the ability to control demand through its demand response technology, grocer is able to adjust consumption on a monthly basis to allow retailer to purchase on wholesale market with greater control over short and long positions.
- Grocer expects to receive a portion of this value in the form of a unique, highly competitive offering.
- Grocer agrees to reduce demand by a minimum of 5,000 kW up to twice per month for 2 hour events when called upon.
- Most competitive offer reduces energy supply rate by 6% over the entire portfolio of stores, amounting to a $1,458,000.
- Time to payback - instantaneous

ENERNOC

Total Energy Management Examples

Most energy savings opportunities require little to no capital investment relative to the size of the opportunity and speed of payback.

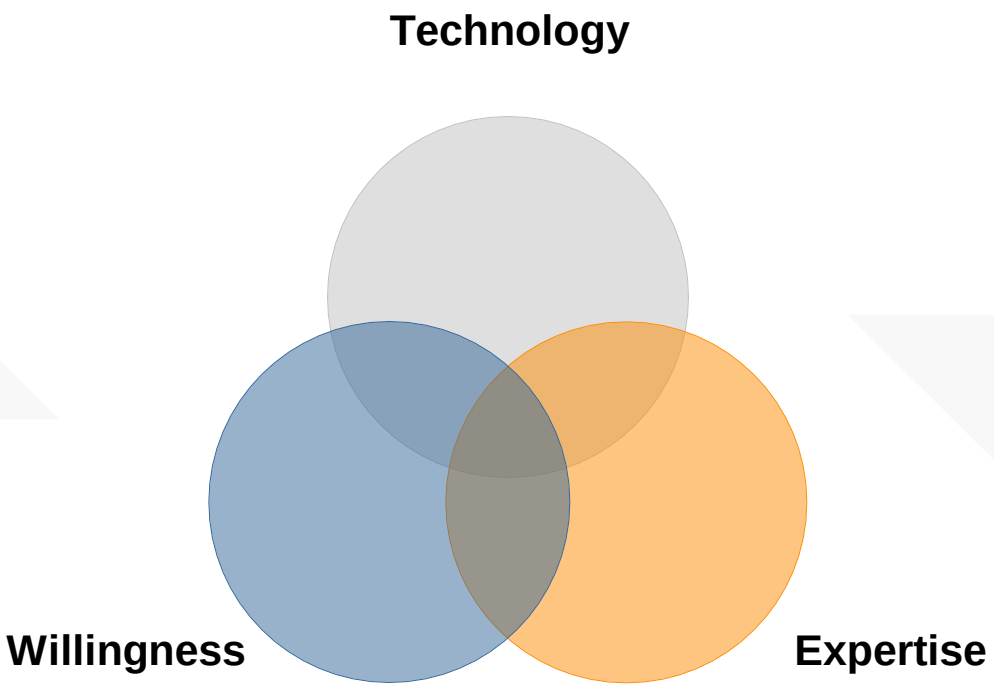
Asset Management

- Data center customer with 18 data centers enrolls all backup generators in demand response program
- On top of the demand response revenue generated, customer agrees to allow provider to create a master services agreement to remotely monitor, cycle, and maintain gensets
- Annual per generator service cost is reduced from $4,500 per generator to $3,000 per generator, netting an additional $27,000 per year in savings and greater operational reliability of units
- Time to payback - instantaneous

ENERNOC

Total Energy Management Examples

End-users typically cannot accomplish these benefits alone. Combining technology with end-user willingness with a partner's expertise WILL unlock the full value.



Total Energy Management: The Bottom Line

- When implementing AMI initiatives, include demand response planning and capabilities
  - Utilize non-proprietary, open protocols and stadards
  - Enable granular interval data (<=15 min) and near-real-time, two-way data communications
- First step: Demand Response
  - Identify opportunities for improvements in energy efficiency
  - Increase grid reliability
- Manage Energy Effectively
  - Optimize energy usage
  - Reduce peak demand
  - Lower energy bills
  - Increase grid reliability
  - Limit environmental effects of electricity consumption and generation

And prevent or defer ***unnecessary***:

- New generation
- Transmission lines
- Distribution infrastructure
- Equipment upgrades

ENERNOC

Web 2.0 – Continued Evolution of Web Services

- Web 2.0 generally refers to Web services that allow the supply chain to collaborate and share information openly
- In the context of Energy Information Systems:
  - More distributed computing
  - Transforming the electric grid into a truly customer-managed service network
  - Electricity demand and usage integrated with real-time information allows providers to build customized services that are tailored to meet customer needs
    - A transformed energy network enables new intelligent services that place new levels of comfort, convenience, speed, efficiency, and adaptive intelligence at the customer's fingertips.
      - e.g., a chiller linked to the Internet, could negotiate for its energy requirements and call in for service
      - Real-time information and the technology to exploit it are the key assets.

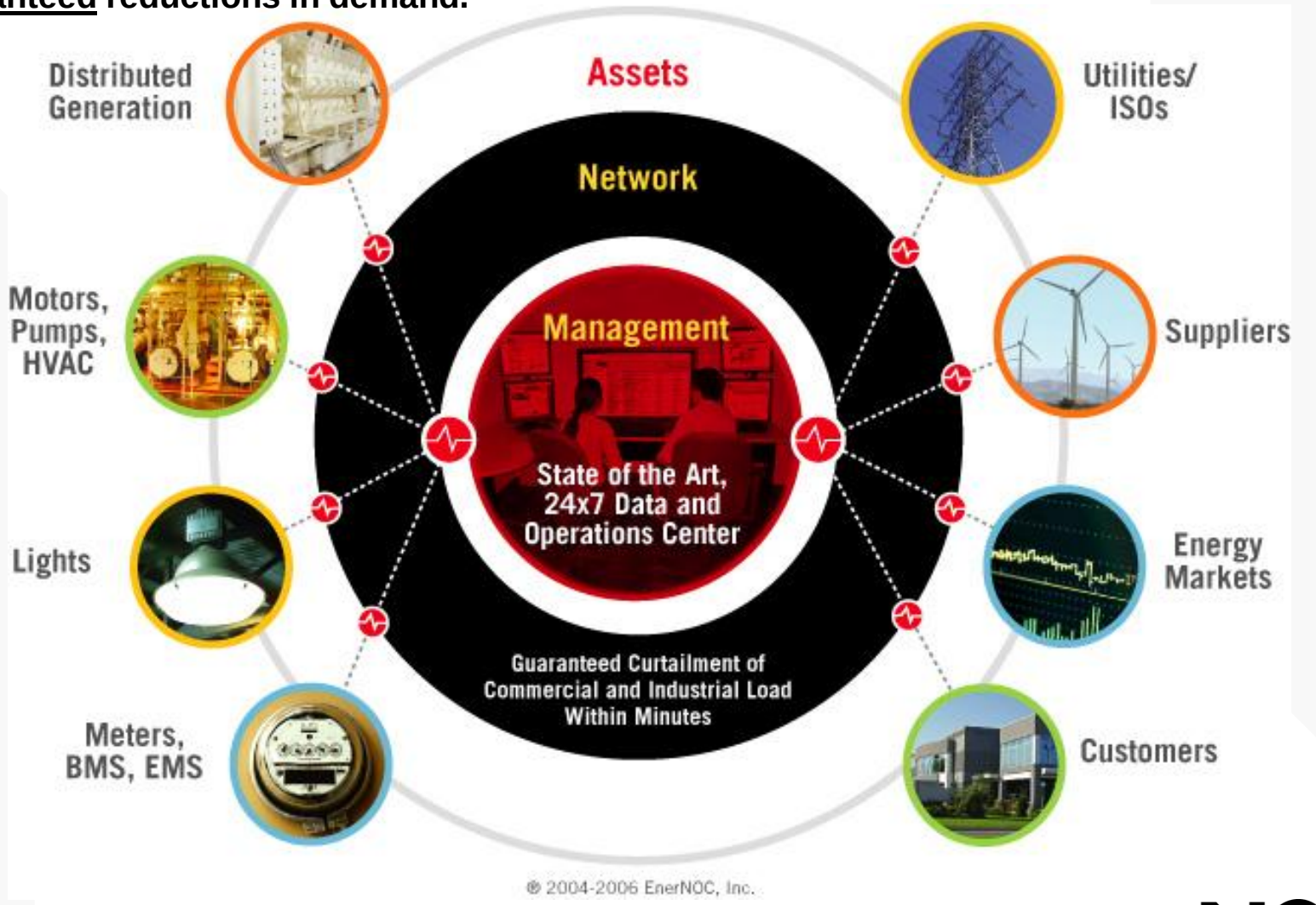
The Role of Open Source in Energy Technology

- **Open source's most important role is to commoditize processes so people can extract them and re-purpose them for core competency.**
  - **Collaborative development at lower costs**
- **Flexible APIs that offer compatible interfaces that support value-add and sustainable competitive differentiation**
- **Lower overall cost of ownership**
- **Standardize:**
  - **Reduce the variety and variability of processes delivering similar outputs to further reduce costs and minimize risks**
- **Modularize:**
  - **Re-engineer processes to eliminate unneeded steps to enable lower cost sub-system to complex systems integration**
- **Automate:**
  - **engineer processes into software where possible to improve quality and reliability and reduce costs. Use commercial packages as available**

ENERNOC

EnerNOC Overview

The "NOC" in EnerNOC stands for Network Operations Center. EnerNOC enables existing assets with inexpensive, scalable technology to accomplish significant and guaranteed reductions in demand.



EnerNOC Overview

Founded in 2001, EnerNOC is a technology-enabled, C&I-focused demand response solutions provider.

- ***Proven and growing track record*** – Approximately 400 MW of demand response capacity from 800 customer sites whose load peaks at over 1,000 MW – adding approximately 10 MW per week
- ***Compelling offering*** – Full service demand response solutions provider – research, education, permitting, financing, metering, aggregation, enrollment, installation, data and payment reconciliation, maintenance – remove complexity; technology and services platform for comprehensive energy management solutions
- ***Certified provider*** – Certified to provide demand response services in demand response market throughout the US
- ***Distinguished technology*** – Provide 24/7, real-time metering and web-based device monitoring and control through open architecture technology that leverages customers existing assets
- ***Significant resources***
  - ***Human capital*** – Deep team experience in energy and technology management – 85 employees with more than 140 engineering and management degrees
  - ***Financial*** – Strong balance sheet and impressive financial track record

ENERNOC

get more from energy

EnerNOC, Inc.
75 Federal Street, Suite 300
Boston, MA 02110
617.224.9900 – Phone
617.224.9910 – Fax

EnerNOC, Inc.
24 West 40th Street, 16th Floor
New York, NY 10018
212.624.0000 – Phone
212.624.0001 – Fax

EnerNOC, Inc.
2100 Geng Road, Suite 102
Palo Alto, CA 94303
650.288.8316 – Phone
650.251.9833 – Fax

ENERNOC