Data Center Efficiency

Program Development Process

October 14, 2008

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Value Proposition

Xcel Energy

- **Add a new program to MN-CIP and CO-DSM to target new and existing data centers in order to improve energy efficiency and provide annual energy conservation to help meet increasing goals.**

Customer

- **Provide data centers with financial incentives to increase energy efficiency and lower its energy costs in an environmentally responsible manner.**

Market Size

- **Energy usage by Data Centers**

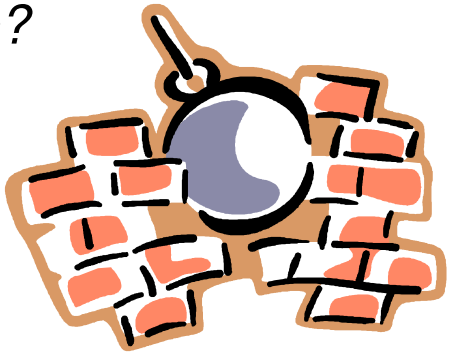
	2006	2011	Growth
Minnesota	342 GWh	570 GWh	67%
Colorado	276 GWh	460 GWh	67%

  - 2006 usage is based on 1.5% in Xcel Energy territory
  - 2011 usage is forecasted to grow to 2.5%

- **Potential energy savings beyond current trends between 20% and 55% by 2011 (EPA estimate)**
  - **Minnesota = 114-314 GWh**
  - **Colorado = 92-253 GWh**
- **Assume an annual program penetration of 10%**
  - **Minnesota = 11-31 GWh annually**
  - **Colorado = 9-25 GWh annually**

Program Barriers

- **Lack of definitions for equipment and data center efficiency**
  - Service output difficult to measure, varies by application
  - Need for metrics and more data:
    How do we account for computing performance?
- **Differing priorities**
  - I/T and facilities managers
- **Risk aversion**
  - Reliability concerns; energy efficiency perceived as a change with uncertain value and risk



Slide content from DOE presentation to CEE Data Centers workgroup 12/10/07

Research Project Objectives

- Understand the potential to develop DSM program for data centers.
- Understand the role energy conservation plays in decision making regarding data centers.
- Understand the interplay between facility managers and IT regarding energy conservation.
- Obtain reaction to a beginning concept about energy conservation for data centers.
- Focus Groups with Data Center Facility Managers
- One-on-one interviews with I/T Managers

Facility Manager Findings

- Reliability always number one
- Very involved and engaged with data center energy requirements
  - Energy requirements often lost among requirements of entire facility
  - Little or no control over the server load requirements
  - More areas for energy conservation outside the data center
- Cooling systems not optimized
- Many upgrades indirectly driven by energy conservation
- Easier to design energy efficiency into new data center

CIO & IT Manager Findings

They realize…

- The energy costs required to maintain cooler temperatures in server rooms are as much as the energy costs that go toward powering servers
- Any decision made within the data center or at an IT firm cannot negatively impact reliability
- Heat exchange poses the biggest threat to reliability
- They don't need incentives to do virtualization
- Energy efficiency is growing in importance because data center managers are always having to do more with less because of budget cuts – and energy costs are growing
- Silos between IT and facilities are real

I/T Company vs. Company w/ Large Data Center

Commonalities

- Reliability is paramount
- Consultative approach from Xcel Energy is viewed more favorably than from a third-party (with something to gain from the relationship)
- No specifications for energy consumption within their purchasing specifications.

I/T Company vs. Company w/ Large Data Center

Energy Efficiency Attitudes

Companies w/ large D.C.s (banking, insurance, etc.)	I/T Companies (Sun, IBM, Dell)
▪ Energy conservation not on the radar screen ▪ Tend to purchase within current family of equipment ▪ View energy efficiency further down in the decision-making process	▪ Energy efficiency is an important factor in the decision making process ▪ Interested in savings available for alternative approaches ▪ More familiar with existing and emerging DSM programs

I/T Company vs. Company w/ Large Data Center

Sales Process

Companies w/ large D.C.s (banking, insurance, etc.)	I/T Companies (Sun, IBM, Dell)
▪ "Top Down" approach in decision making ▪ Costs are passed through to the profit centers ▪ Managers tend to make the same purchase decisions as in the past ▪ Biggest obstacle in the sales process is changing behavior	▪ Decentralized approach to decision making ▪ Driving costs out of the data center is important

Recommendations

- **Education and Marketing**
  - Create a quick “hit list” of things data center facility managers should be aware of to aid in conservation of energy.
  - Create materials to help data centers in buying energy efficient equipment.
  - Connect reliability to energy efficiency.
    - Create materials that show how a carefully managed and energy conserving data center may be more reliable than one that is not.
  - Provide energy awareness stickers for products, processes or operations.

Recommendations

- **Program Offering**
  - Create audit programs specific to Data Centers that utilize experts in data center design and operation.
  - Refine audit programs so they are more dynamic and better reflect the nature of the data center.

Program Components

- **Education - Marketing materials**
  - "Quick Hit List" of energy efficiency ideas
  - Criteria/Product lists of energy efficient equipment
  - Marketing materials to tie reliability to energy efficiency
  - Seminar to educate customers on energy efficiency opportunities

Program Components

- Study/Implementation

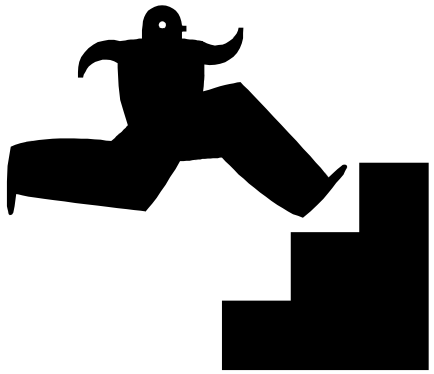
	New Construction – included in building participating in EDA	New Construction – not part of EDA or significant remodel	Existing Data Center
Study Provider	Xcel Energy contractor specializing in data center design – partners with EDA contractor	Customer selected contractor based on Xcel Energy list	
Study Rebates	Free to customer	Up to 50% of study cost, not to exceed $15,000	
Implementation Rebates	Utilize current EDA rebate structure	▪Utilize existing prescriptive rebates ▪$400/kW saved for custom rebates; projects are pre-approved if qualified contractor is used	

Challenges

- Energy Efficiency is not on the Data Center Manager's radar
- Energy costs get buried in total facility costs
- Virtualization may have too quick of payback
- There are no equipment baselines
- No information yet from ENERGY STAR on server specification
- Difficult to determine average project size and components
- Free Rider concerns with server upgrades

Next Steps

- Release RFP/RFQ for contractors
- Receive approval from MN Department of Commerce and CO PUC to launch program
- Develop collateral
- Launch 1Q09



Questions?