

Charting a Course to Energy Independence

Providence, RI
August 9-12, 2009





Federal Data Centers: *Energy Efficiency Initiatives*

Will Lintner

Federal Energy Management Program
U.S. Department of Energy



FEMP facilitates the Federal Government's implementation of sound, cost-effective energy management & investment practices to enhance the nation's energy security & environmental stewardship





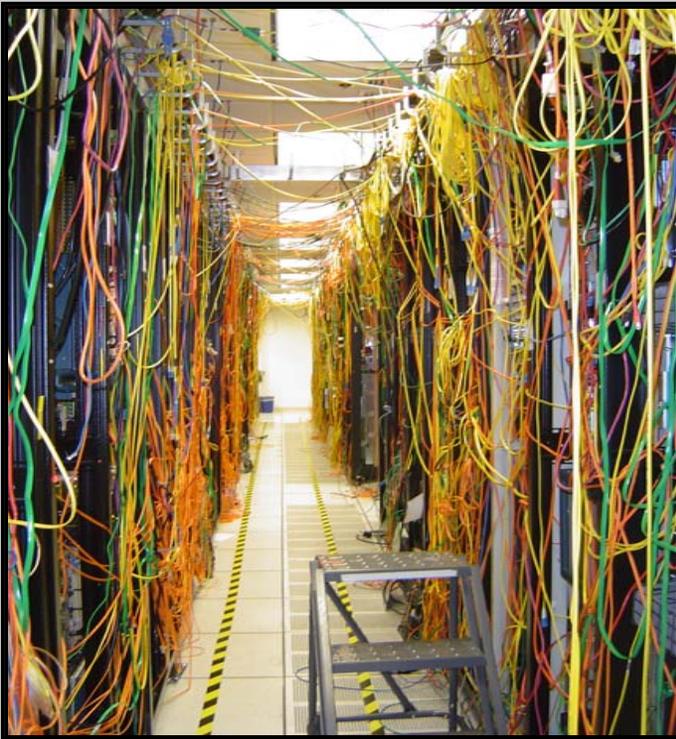
OUTLINE

- The Importance of Data Centers
- Steps to Saving Energy
- Data Center Collaboration



The Importance of Data Centers: *The Bottom Line*

*The Federal Government
needs to transition
quickly from inefficient...*

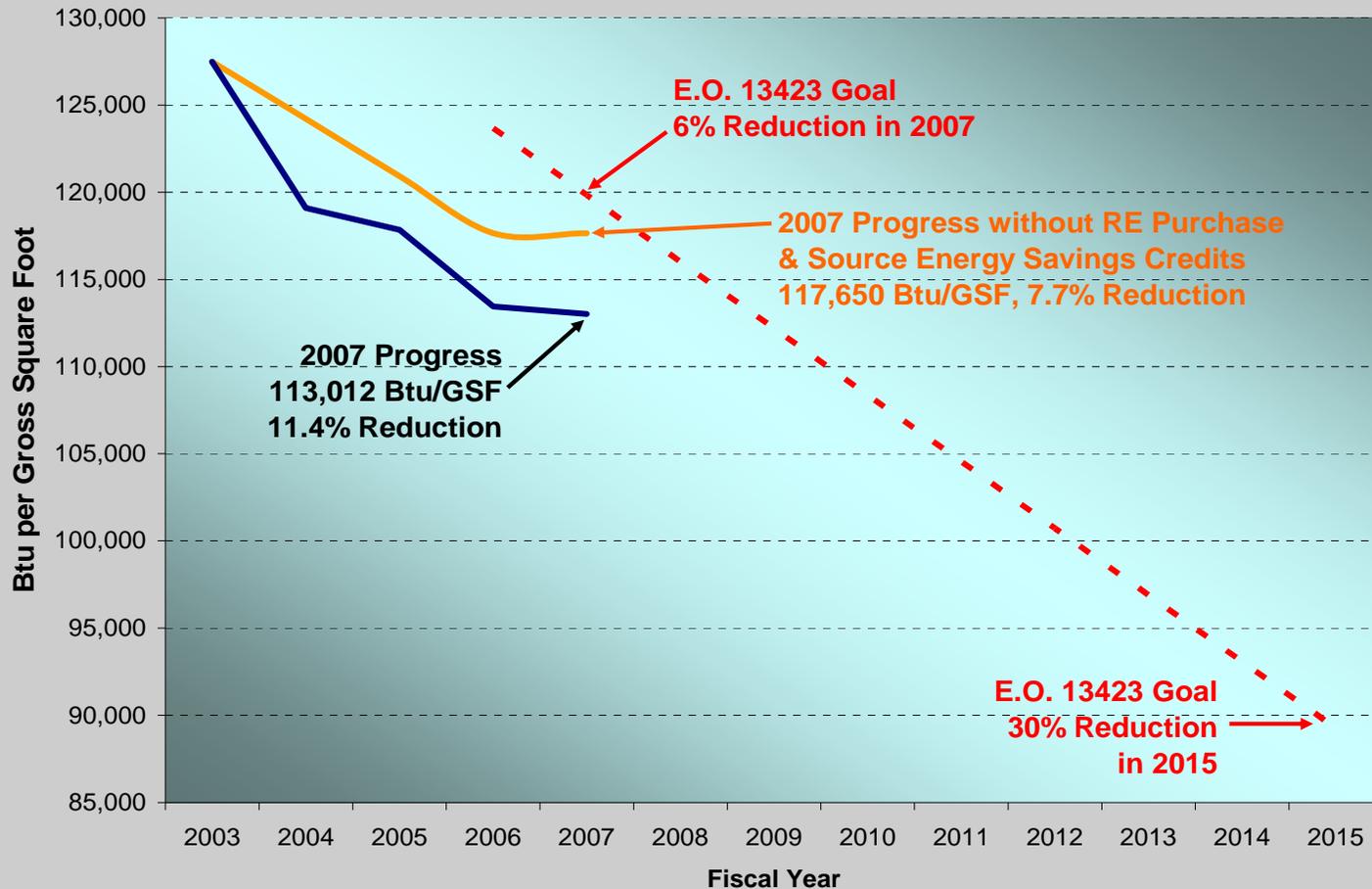


*to energy efficient
data center management!*



The Importance of Data Centers: *Federal Energy Performance*

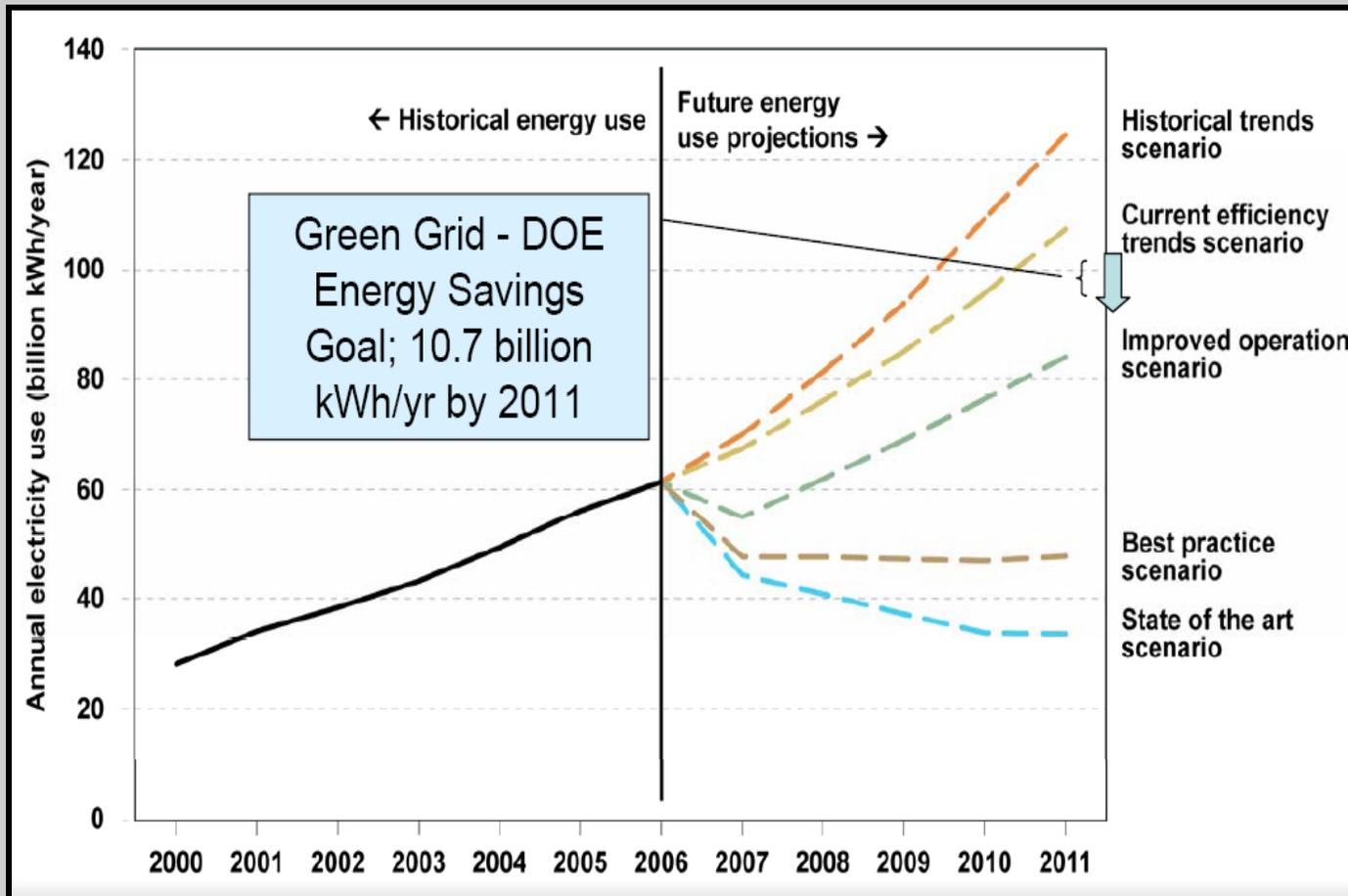
Federal Building Energy Intensity (FY 2003- FY 2007)





The Importance of Data Centers: *Data Center Energy Performance*

U.S. Data Center Energy Use (Five Scenarios Projected through 2011)

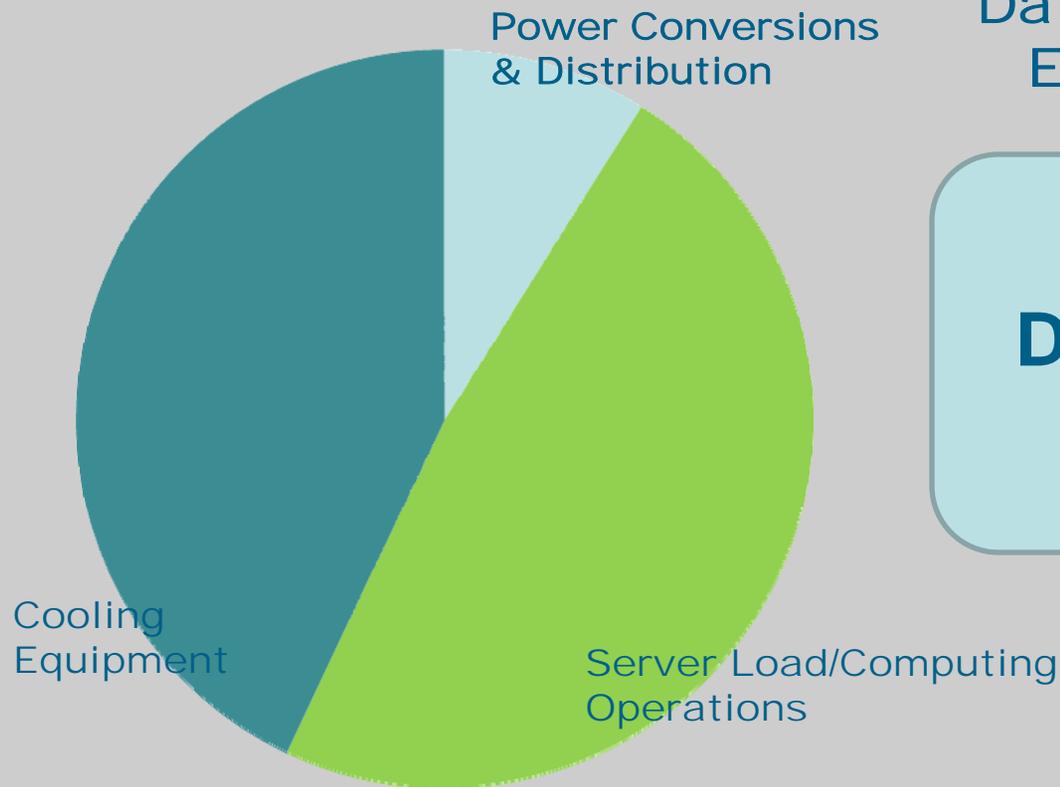


Today, Federal data centers account for *at least 10%* of all data center energy use



The Importance of Data Centers: *Data Center Energy Performance*

Typical Data Center Energy End Use



Data Center Infrastructure Efficiency Index (DCIE)

$$\text{DCIE} = \frac{\text{IT Power}}{\text{Total Data Center Power}}$$

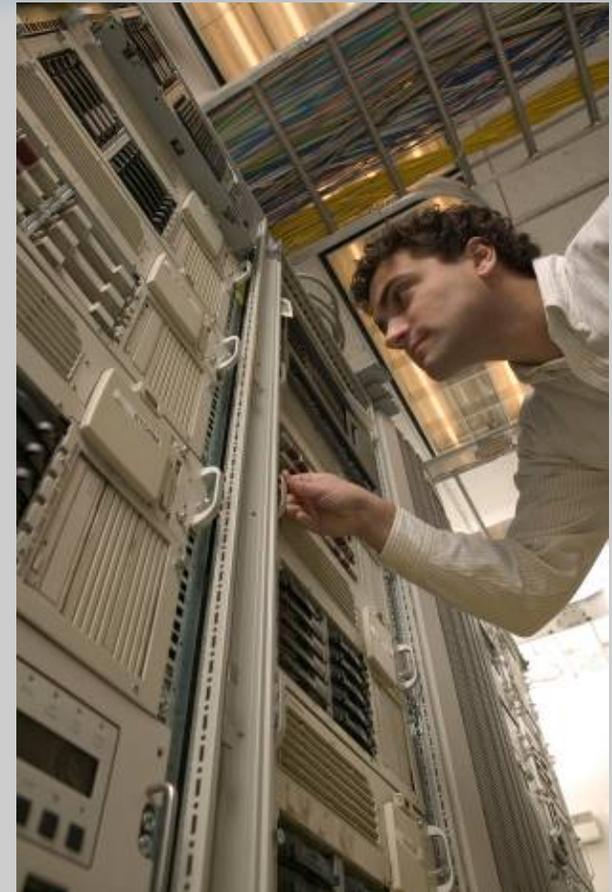


The Importance of Data Centers: *Federal Savings Potential*

Increase Federal Energy Savings and Security - Adopting best practices could save 6 billion kWh annually by 2011!

Lower Federal energy bills - Adopting best practices could save 410 million dollars annually by 2011!

Avoid Federal GHG emissions - Adopting best practices would avoid 3.8 MMT of CO₂ emission in 2011!

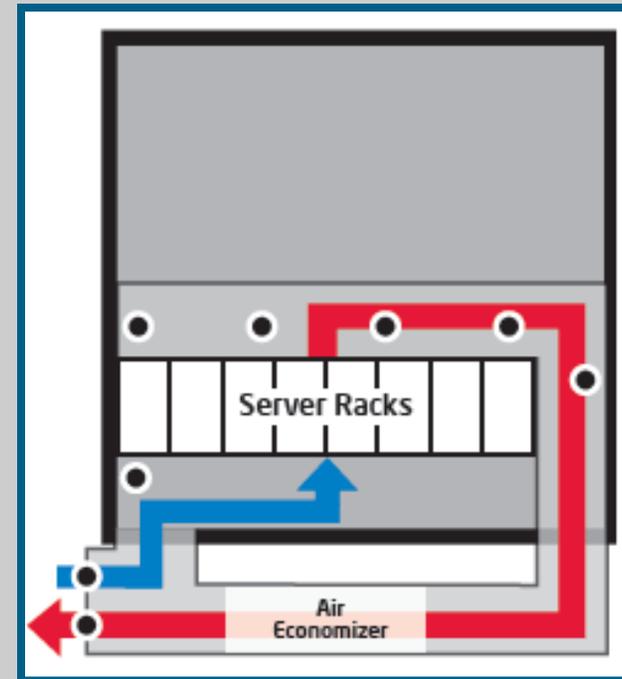
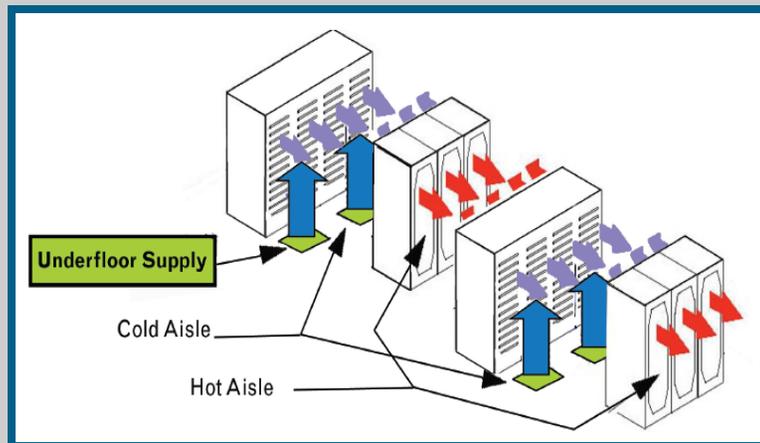


***By adopting best practices, you can reduce
data center energy use by 20% - 40%***



Steps to Saving Energy: *Best Practices*

Isolate Hot & Cold Aisle

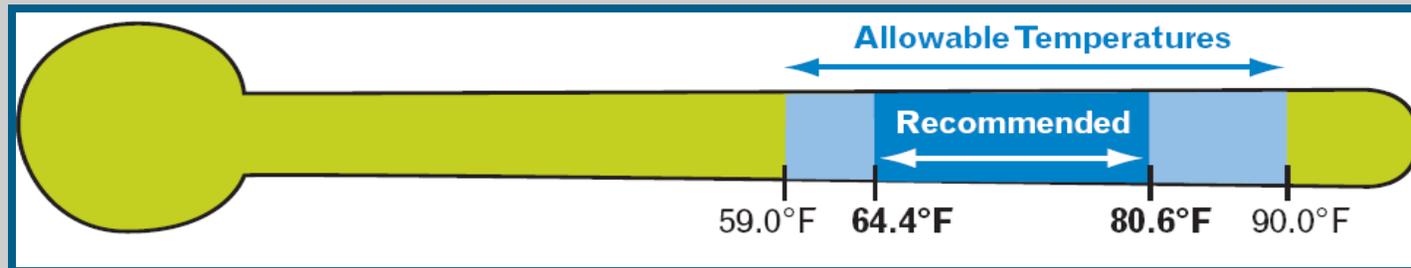


**Use outside air economizers
or water side economizers**



Steps to Saving Energy: *Best Practices*

**Purchase energy
efficient servers**

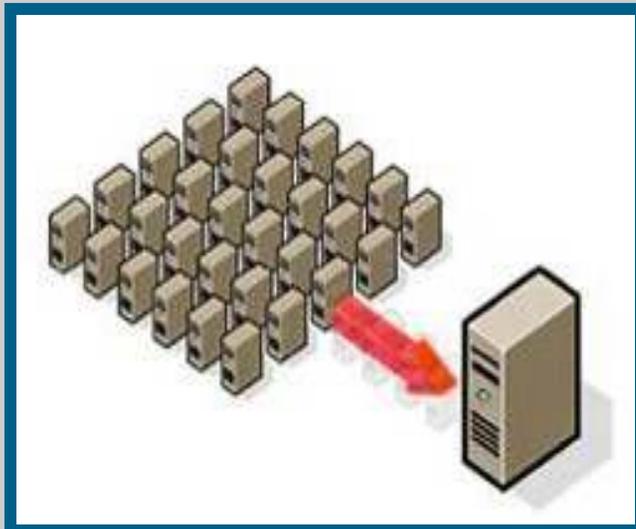


**Follow ASHRAE Temperature & Humidity
Recommendations**

Steps to Saving Energy: *Best Practices*



**Install high-efficiency
power supplies**



Practice virtualization

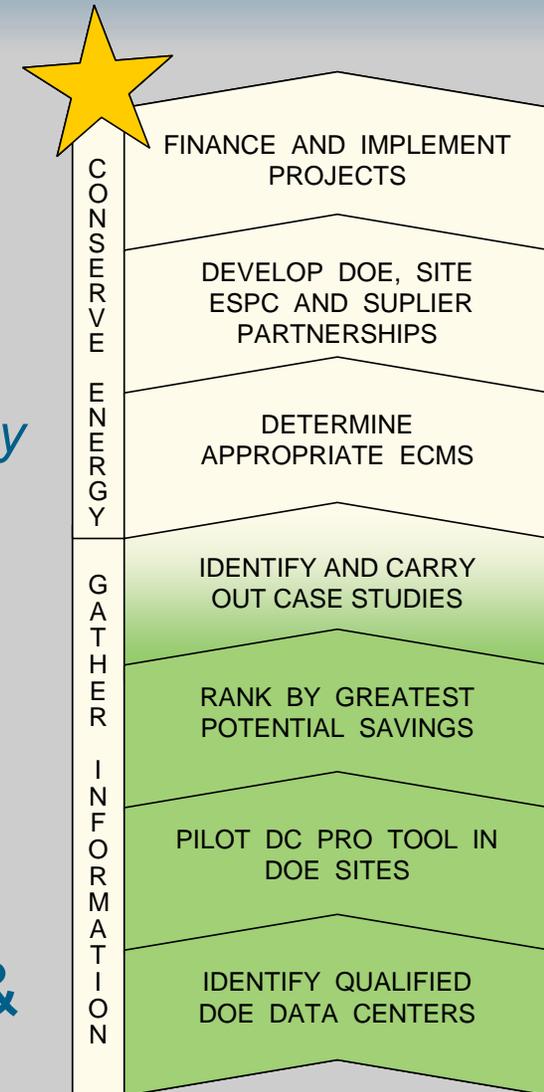


Steps to Saving Energy *FEMP's Strategy*

Reduce Federal data centers energy use & GHG emissions by:

- *Benchmarking all sites to establish an energy use baseline*
- *Assessing savings potential associated with best practices*
- *Implementing projects to promote best practices and use of new technology*
- *Track projects to verify savings*

Serve as a model for the public & private sectors





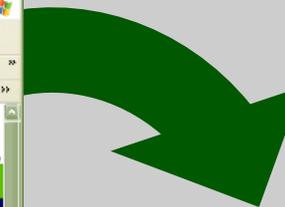
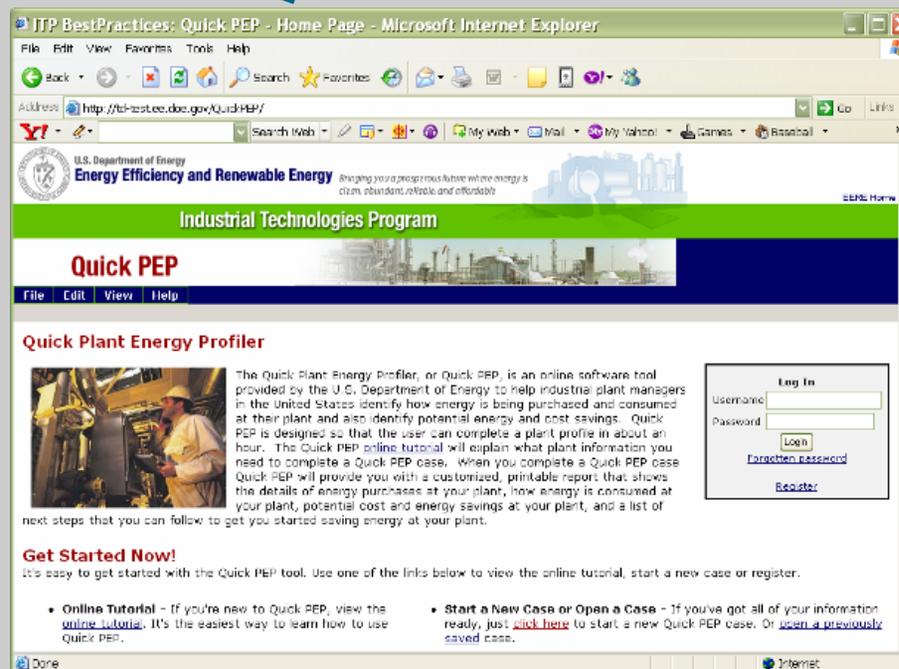
Steps to Saving Energy: *Benchmarking*

INPUTS

- Description
- Utility bill data
- System information
 - IT
 - Cooling
 - Power
 - On-site generation



DC Pro Tool



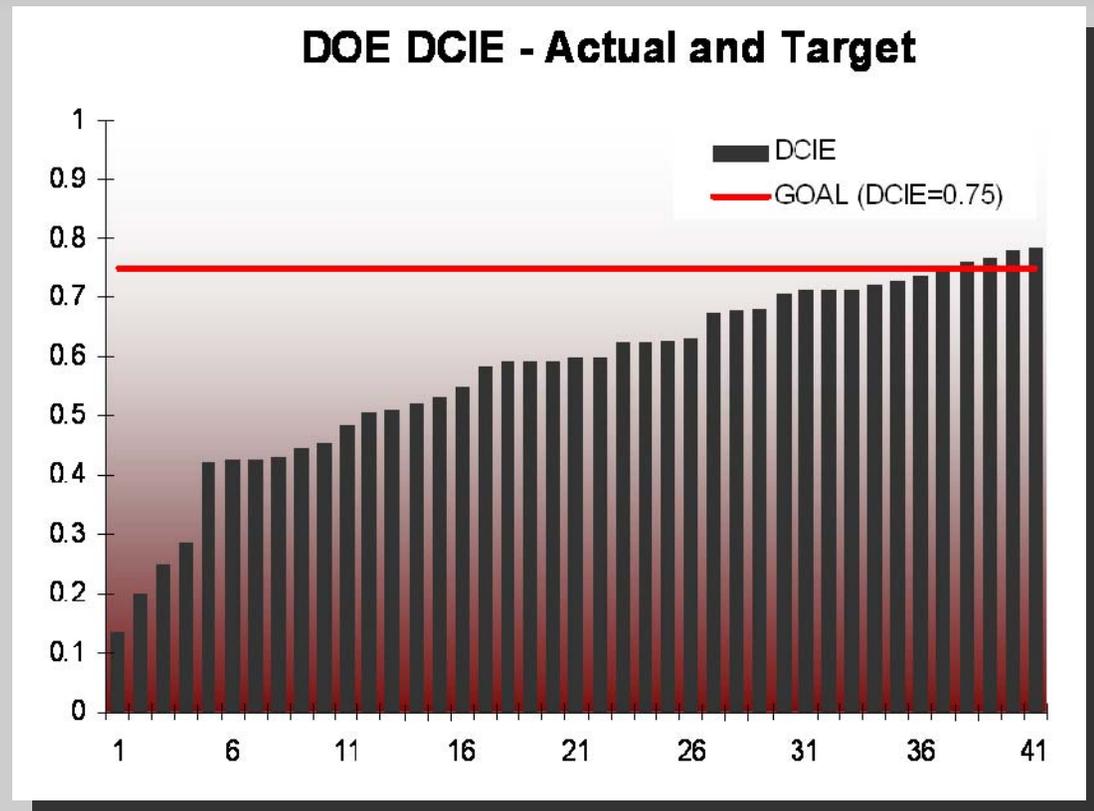
OUTPUTS

- Overall picture of energy use and efficiency
- End-use breakout
- Potential areas for energy efficiency improvement
- Overall energy use reduction potential



Steps to Saving Energy: *Benchmarking*

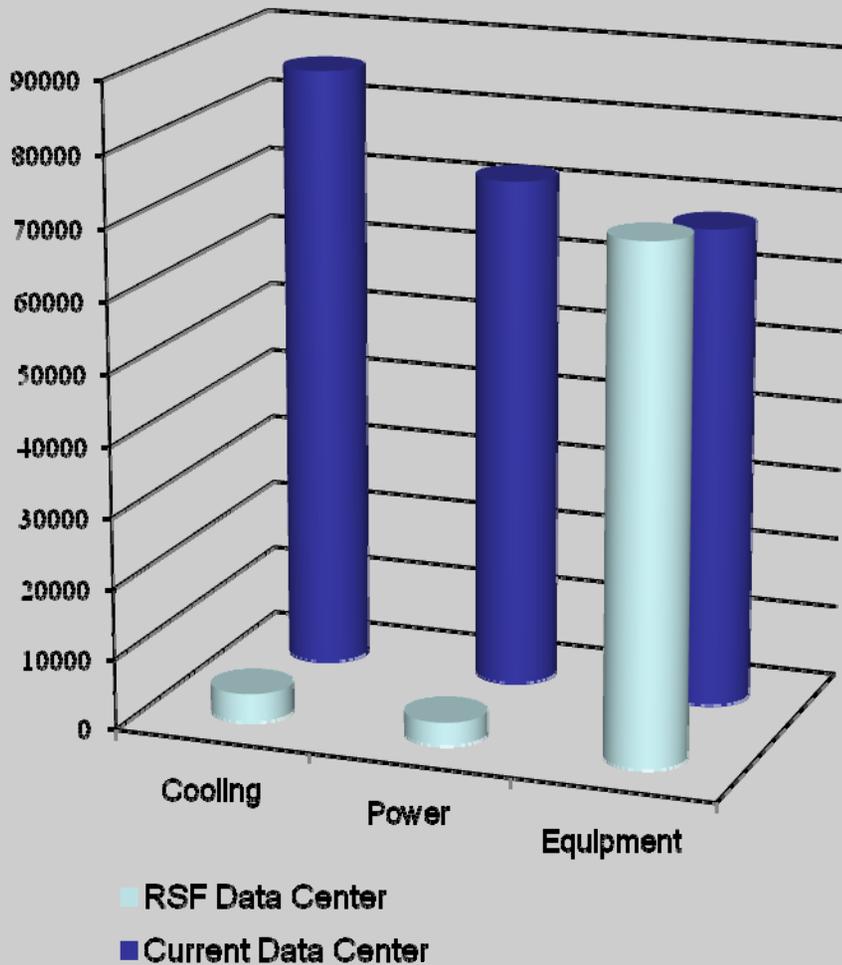
- Energy use data collected from 41 data centers
- Sites encouraged to use DC Pro
- Goal: Increase DCIE from 0.57 to 0.75



*Data centers throughout the Federal Government
need to adopt similar goals!*



Steps to Saving Energy: *Expected Results in New NREL Data Center*



Efficiency Improvements

- 65% reduction in data center power over old data center
- Old DCIE: 0.4
- Target DCIE: 0.91

Energy Conservation Measures

- “Free Cooling”
- Hybrid cooling system uses air-side economizer, water-side economizer & chilled water
- UPS designed for scalability
- Virtualization
- Storage consolidation
- Energy efficient lighting



Steps to Saving Energy: *Upcoming DOE Projects*

Headquarters Assessments

- Consolidate data centers/server closets
- Benchmark using DC Pro
- Configure servers within the data centers
- Demonstrate wireless sensors & controls

Best Practice Guide

- Create guide to most effective ways to increase energy efficiency
- Develop into a design guide

Case Studies

- Enterprise-level data center
- Scientific computing center



Data Center Collaboration: *Working Groups*

The Federal Partnership for Green Data Centers

- Inter-Agency forum to exchange ideas, develop policy guidance & tools to improve data center performance

DOE Data Center Energy Efficiency Working Group

- Group working to increase energy efficiency of DOE 's data centers.
- Consists of DOE program offices with data centers and those responsible for structuring energy policy

High Performance Computing Working Group

- Forum for sharing information on best practices in scientific computing
- Includes members from the public and private sectors





Data Center Collaboration: *Who is Currently Involved?*



Industrial Technologies Program

- Tool suite & metrics for baselining
- Training
- Qualified specialists
- Case studies
- Recognition of high energy savers
- Best practice information



Federal Energy Management Program



- Best practices showcased at Federal data centers
- Pilot adoption of Best-in-Class guidelines at Federal data centers
- Adoption of to-be-developed industry standard for Best-in-Class at newly constructed Federal data centers

GSA

- Partnering for workshops
- Quick Start Guide



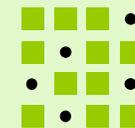
EPA

- Metrics
- Server performance rating & ENERGY STAR® label
- Data center benchmarking



Industry

- Tools
- Metrics
- Training
- Best practice information
- Best-in-Class guidelines
- IT work productivity standard





Questions?

Visit the FEMP
Website for:



- Program Activity Information
- News Updates, Announcements & Policy Initiatives
- Upcoming Workshops & Training Events

<http://www.eere.energy.gov/femp/>

Data Centers Links:

http://www.eere.energy.gov/team/data_centers.html

http://www1.eere.energy.gov/industry/saveenergynow/partnering_data_centers.html



Contact

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