



DOE's Data Center Initiatives

Driving towards Net-Zero Energy Use



Will Lintner

DOE Federal Energy Management Program

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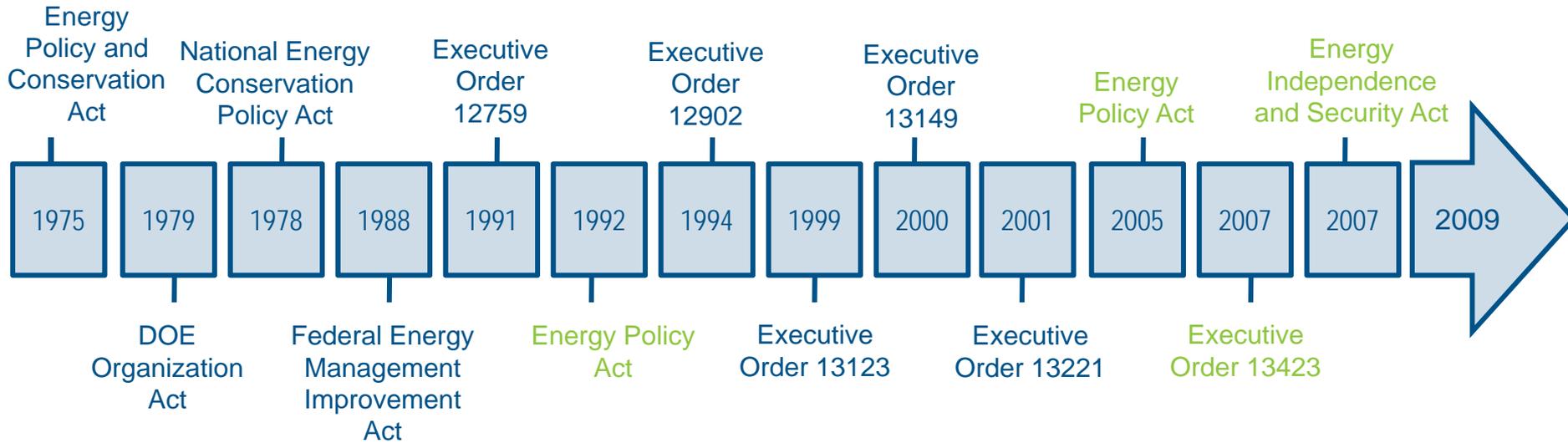


Outline

- Federal mandates
- Data center energy use
- Federal best practice benefits
- Data center best practices
- FEMP services
- Current projects
- Collaborative efforts
- Questions, resources and contact information



Public Laws & Executive Orders



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

*Green indicates law or order is still active



Federal Guidance

EPAAct 2005

Energy management requirements

E.O. 13423

Implementation Instructions

EISA 2007

High Performance Green Buildings



EPA Act 2005 Goals for Green IT

Energy Management Requirements

- All Federal agencies to reduce overall building energy use

Energy Efficient Products

- EnergyStar is working on specifications for servers
- FEMP is working on specification for UPS

Energy Efficient Buildings

Energy for process loads excluded from requirement to save 30% over 90.1 2004 Standard



Executive Order 13423 GOALS

- Increase energy efficiency & renewable energy use
- Reduce water consumption
- Procure sustainable and efficient products (EPEAT and EnergyStar)
- Extend useful life of agency electronic equipment
- Ensure new construction follows Guiding Principles
 - Employ Integrated Design Principles
 - Optimize Energy Performance
 - Enhance Indoor Environmental Quality
 - Reduce Environmental Impact of Materials

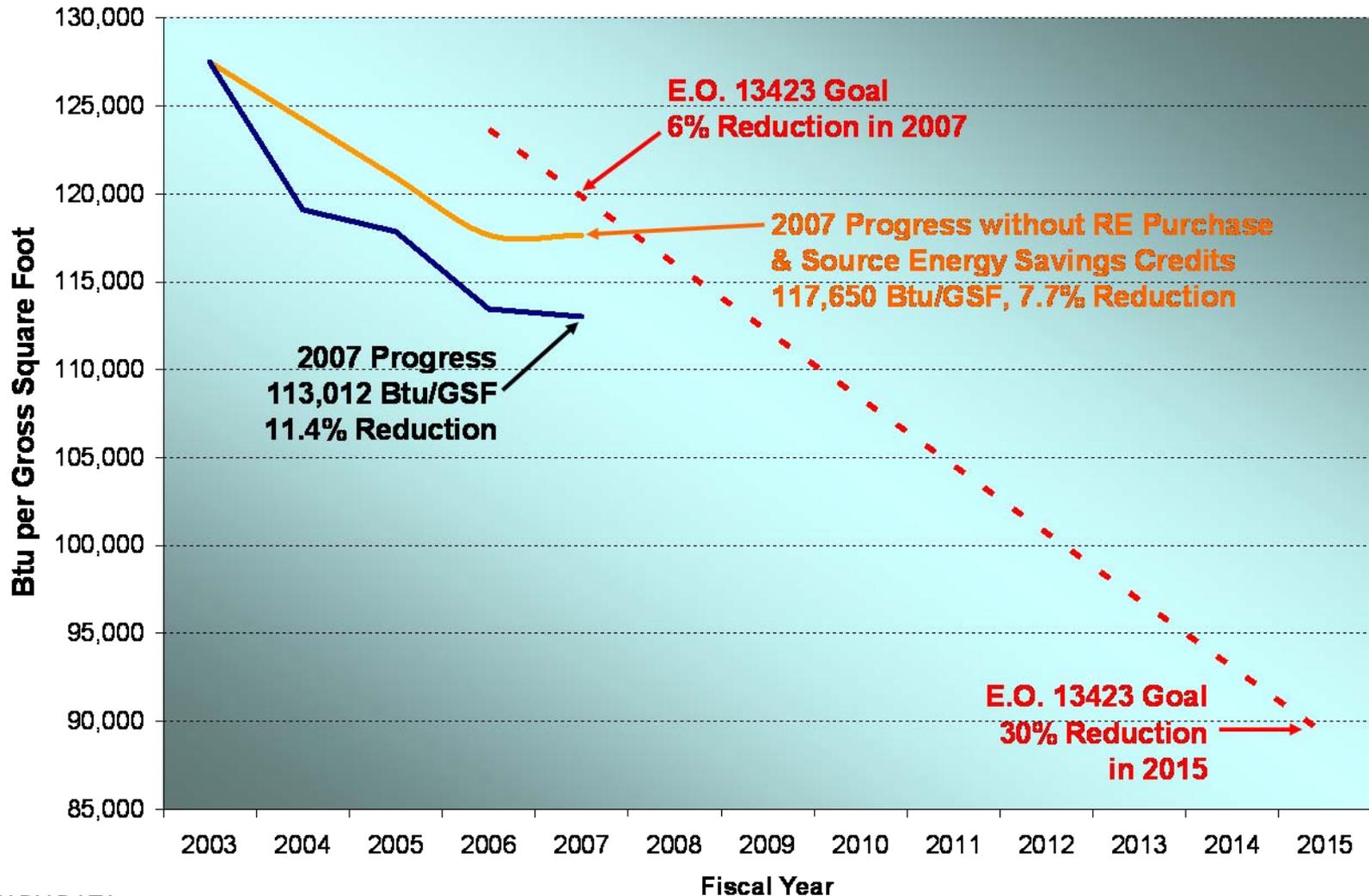


EISA 2007 For Green IT

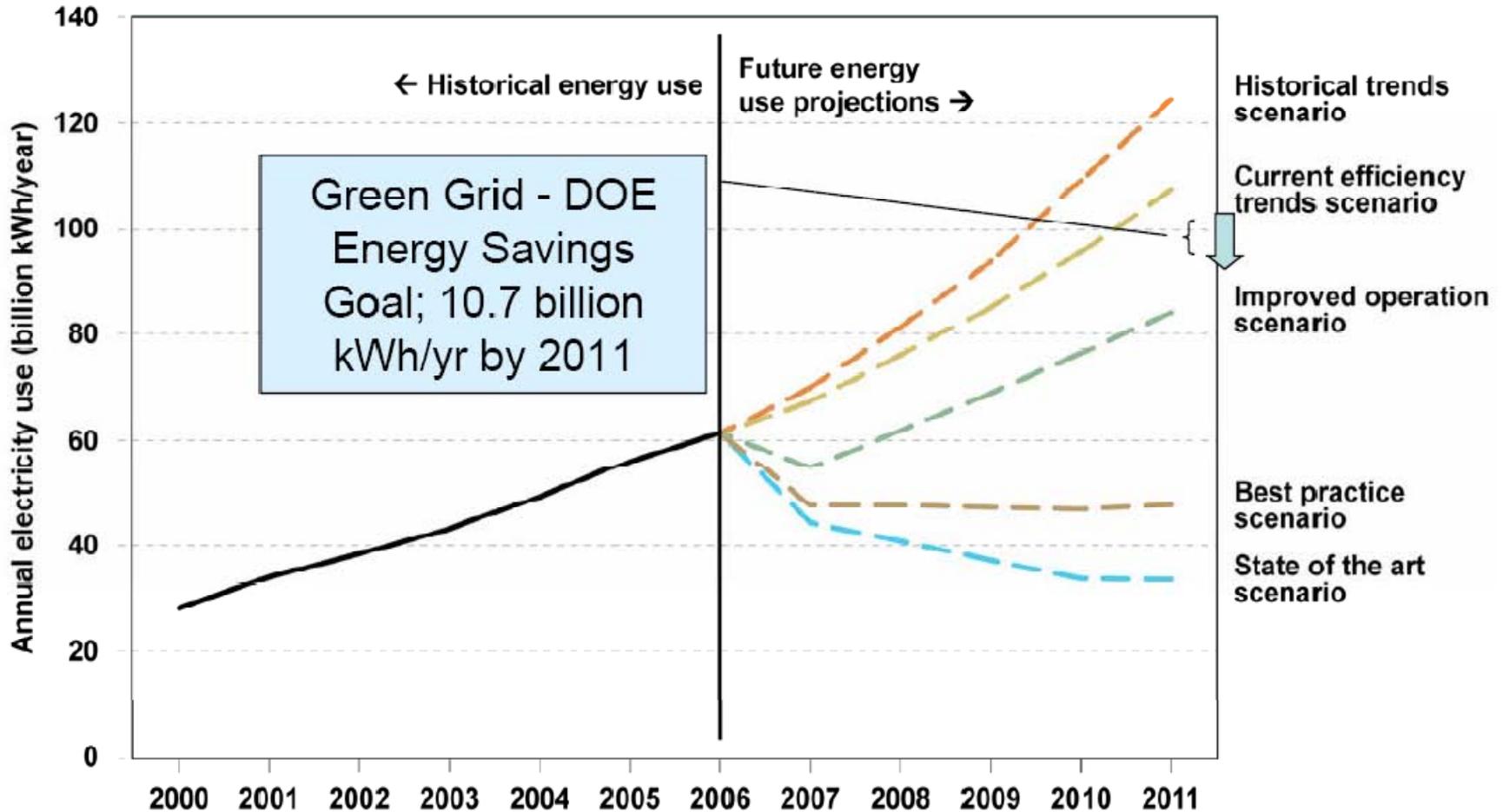
- *Energy Management Requirements*
 - All Federal agencies to reduce overall building energy usage (by 3% annually)
- *Fossil Fuel Consumption Reduction in Buildings*
 - All Federal buildings to be designed to use less fossil fuel energy, including fossil fuel to generate electricity.
 - Energy used for process loads (including servers) to be included
 - 55% initial reduction, rising to 100% fossil fuel reduction by 2030



Government Building Energy Intensity FY 2003 – FY 2007



U.S. Data Center Energy Use (Five scenarios projected through 2011)





Federal Data Center Efficiency Benefits

Increase Energy Savings and Security

Adopting best practices could save the U.S. government 6 billion kWh annually in 2011!

Lower energy bills

Adopting best practices could save \$410,000,000 annually by 2011!

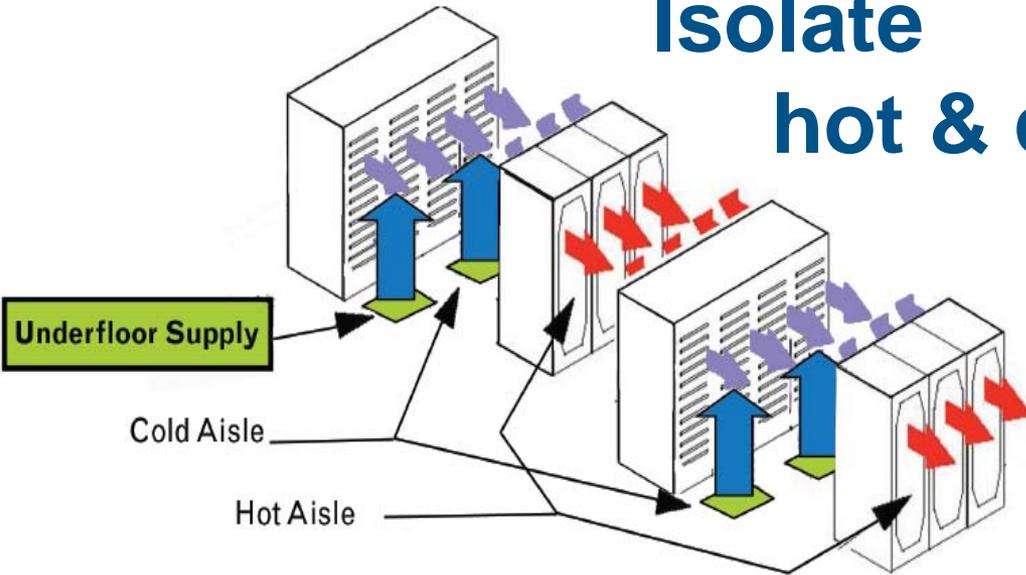
Avoid GHG emission

Adopting best practices would avoid 3.8 Million Metric Tons of CO₂ emissions in 2011!

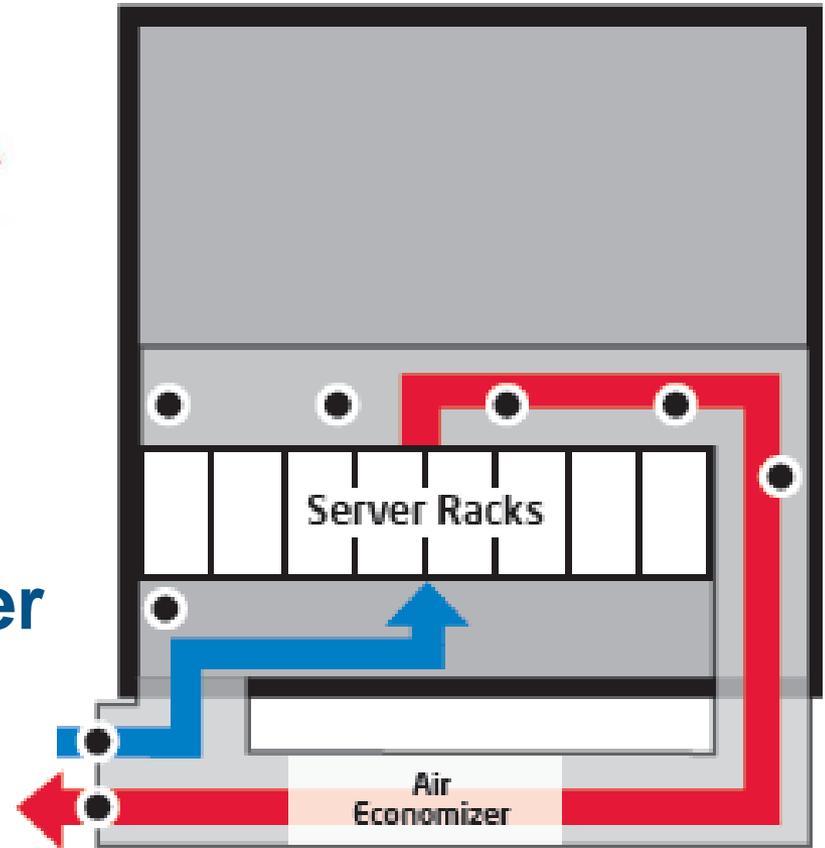




Isolate hot & cold aisles

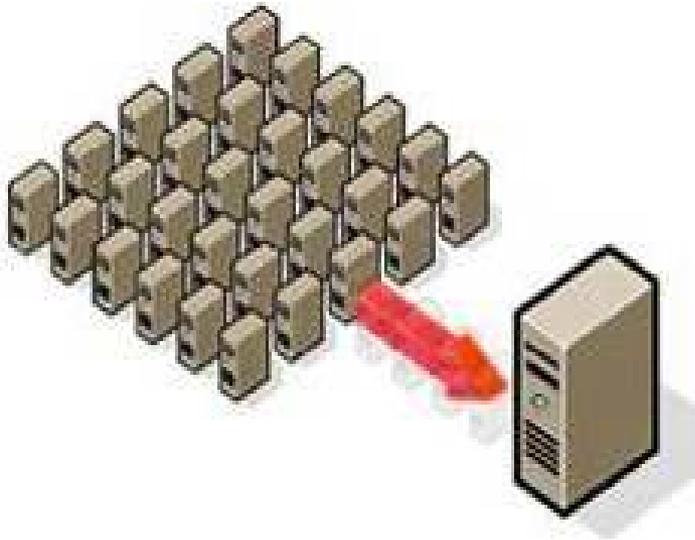


Use outside air
economizers or water
side economizers





Install high-efficiency power supplies

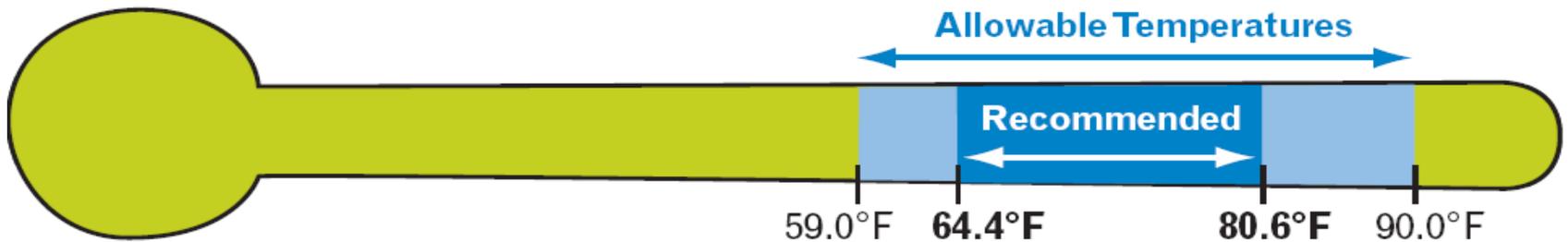


Practice virtualization



Purchase energy efficient servers

Follow ASHRAE Temperature & Humidity Recommendations





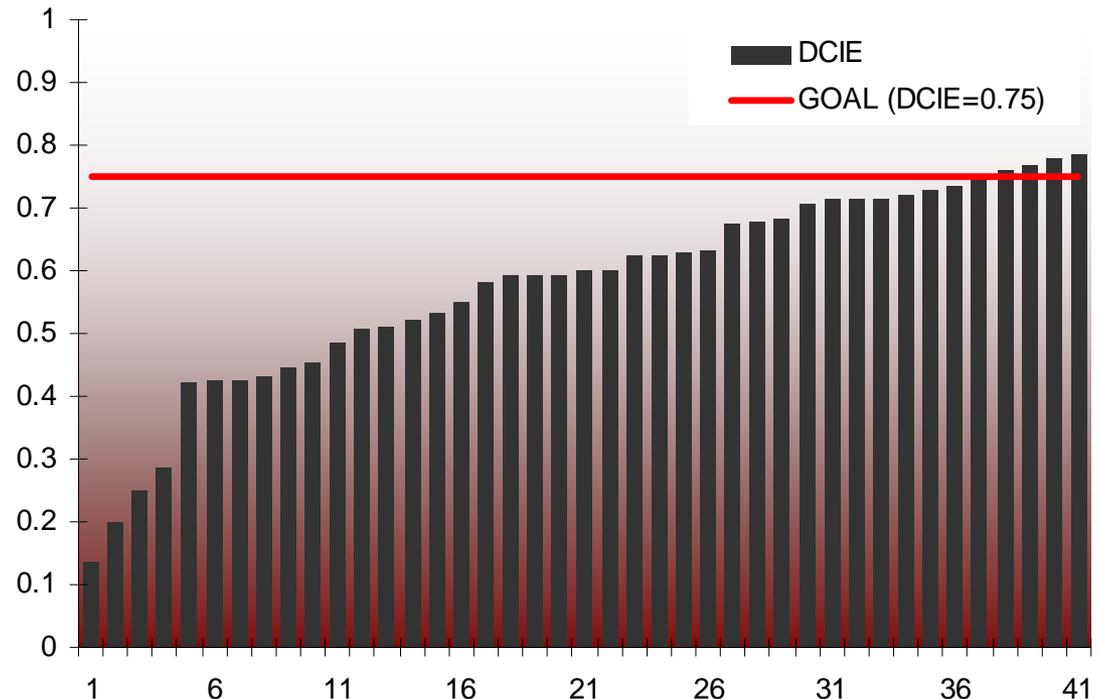
Federal Energy Management Program Data Center Services:

- Assistance
 - Implementation of DC Pro Tool Suite
 - Project planning and early design
- Training (in partnership with GSA and others)
 - Webinars
 - Workshops at GovEnergy and Labs21 Conferences
- Access to funding sources
 - Energy savings performance contracts
 - Utility energy savings contracts
- Development of best practice case studies and other tools



DOE DCIE - Actual and Target

- Gathered energy use data from 41 data centers to see where we stand
- Encouraged sites to use DC Pro
- Set Goal: Increase DCIE from 0.57 to 0.75



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



Save Energy Now On-line Profiling Tool: Data Center Pro

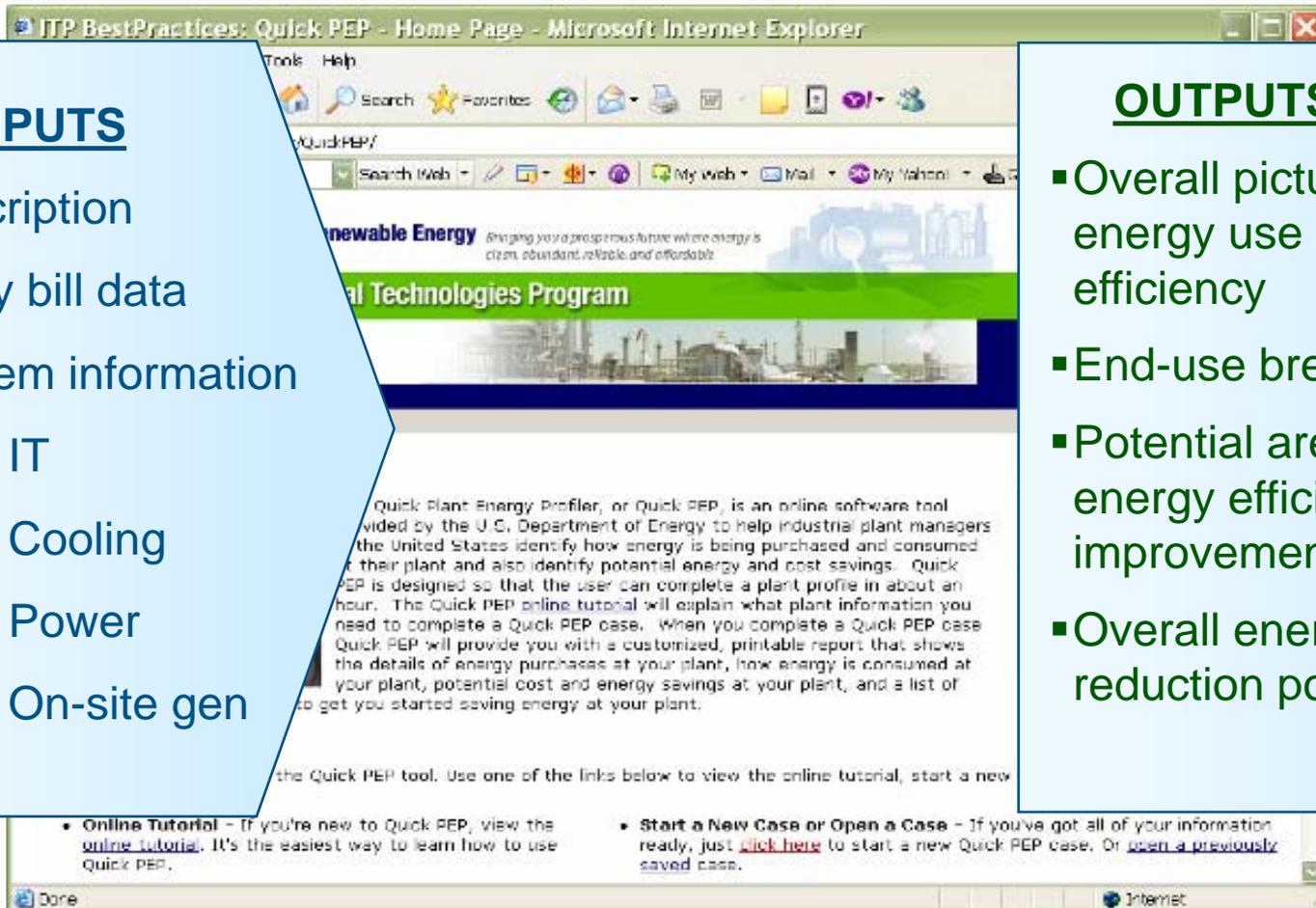


INPUTS

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

OUTPUTS

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



LBLN Air Management Improvements:

- Wireless monitoring system
- Hot and cold aisles
- Blanking panels
- Tune floor tiles

Results:

- 21% increase in IT load
- CRAC unit set 3°F warmer
- Fewer hot spots
- 15 kW CRAC turned off





Headquarters Assessments

- Consolidation of data centers/server closets
- Configuration of servers within the data centers
- Wireless sensors and controls demonstration

Best Practice Guide

- Guide to the most effective ways to increase energy efficiency
- Anticipated to morph to a design guide

Case Studies

- One enterprise-level data center
- One scientific computing center

Fuel Cell

- Evaluating feasibility of a hydrogen fuel cell in Germantown facility

Data Center Working Groups

The Federal Partnership for Green Data Centers

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

DOE Data Center Energy Efficiency Working Group

- **A group working to increase the DCIE of DOE 's data centers to 0.75**
- **Consists of DOE program offices with data centers and those responsible for structuring energy policy**

High Performance Computing Working Group

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



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

- Workshops
- Federal case studies
- Federal policy guidance
- Information exchange & outreach
- Access to financing opportunities



GSA

- Workshops
- Quick Start Efficiency 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





Useful Resources

FEMP Home Page

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

FEMP Data Centers Page

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

ITP's Save Energy Now for Data Centers

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



For more information and to get involved:

Will Lintner, P.E.
Data Center Initiative Coordinator

Federal Energy Management Program
Energy Efficiency and Renewable Energy
Department of Energy
Tel: 202.586.3120
william.lintner@ee.doe.gov

