

AFCOM  
Central Ohio  
Chapter

Energy Star



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**HP Critical Facilities Services, delivered by EYP MCF**

# What is Energy Star?



- Ratings guide
- Created by the US Environmental Protection Agency (EPA), in conjunction with the US Department of Energy (DOE)
- Eco-standard for many products for several years
- Energy performance building rating system

# Enterprise Server and Data Center Energy Efficiency Initiatives

1. National Data Center Energy Efficiency Information Program
2. EPA Report to Congress on Server and Data Center Energy Efficiency
3. ENERGY STAR Enterprise Server Specification Development Process
4. Data Collection Initiative to Develop an ENERGY STAR Rating for Data Centers



# 1. National Data Center Energy Efficiency Information Program

- Provide info, tools and resources
  - DOE Industrial Technologies Program *Save Energy Now* initiative
  - DOE Federal Energy Management Program (FEMP)
  - EPA ENERGY STAR program
  - National Strategy Workshop July 8, 2008 identified next steps for public and private collaboration toward advancing toward the goal of improved energy efficiency in data centers



# 1. National Data Center Energy Efficiency Information Program

- Identified 5 opportunities
  1. Develop Performance Metrics
  2. Tools and Training – DC Pro & Portfolio Manager Tool (infrastructure rating system)
  3. Certification Program – efficiency experts who can assess and assist with implementation
  4. Equipment Performance Specification & Labeling – servers then storage and network
  5. Recognition of Best in Class – Energy Star rating plus 3<sup>rd</sup> party certification to validate improvements



## 2. EPA Report to Congress on Server and Data Center Energy Efficiency

- In response to [Public Law 109-431](#) EPA ENERGY STAR Program released to Congress a report assessing opportunities for energy efficiency improvements for gov't and commercial computer servers and data centers in the US (8/2/07)
- Report's recommendations:
  - Develop a standardized whole-building performance rating system
  - Federal leadership - implement best practices for its own facilities
  - Development of ENERGY STAR specifications for servers
  - Encouraging electric utilities to offer financial incentives
  - CEO Challenge - to assess and improve their DC energy efficiency
  - Public/private research and development



# 3. ENERGY STAR Enterprise Server Specification Development Process

- All interested parties invited to collaborate



## 4. Data Collection Initiative to Develop an ENERGY STAR Rating for Data Centers

- Step 1 – collect data on energy use and operating characteristics from a large number of existing data centers, including both stand-alone facilities as well as data centers located in office and other types of buildings (completed 1/09)
- Progress – six months of data collected from 90 data centers with complete data and 25 with partial data, less than the 125 data centers with complete data needed to develop the rating

## 4. Data Collection Initiative to Develop an ENERGY STAR Rating for Data Centers

- Energy performance ratings in Portfolio Manager run off of the same algorithms as Target Finder (Portfolio Manager rating will be incorporated in Target Finder)
- Hope to release a model in January 2010
- Ratings compare individual buildings to a static population that is representative of the country

# ENERGY STAR® Data Center Infrastructure Rating Development

Preliminary Results  
Web Conference  
November 20, 2008

[http://www.energystar.gov/index.cfm?c=prod\\_dev\\_velopment.server\\_efficiency](http://www.energystar.gov/index.cfm?c=prod_dev_velopment.server_efficiency)



# Data Center Infrastructure Rating Development Goals

- Build on existing ENERGY STAR platform with methodology similar to existing ratings (1-100 scale)
- Usable for both stand-alone data centers and data centers within office or other buildings
- Assess performance at building level -- how a building performs not why
- Provide users with additional resources to help determine next steps after receiving an energy performance rating
- Offer ENERGY STAR label to data centers with rating of 75 or higher



# ENERGY STAR Rating for Data Center Infrastructure

**Unit of Analysis:** Total Energy/IT Energy

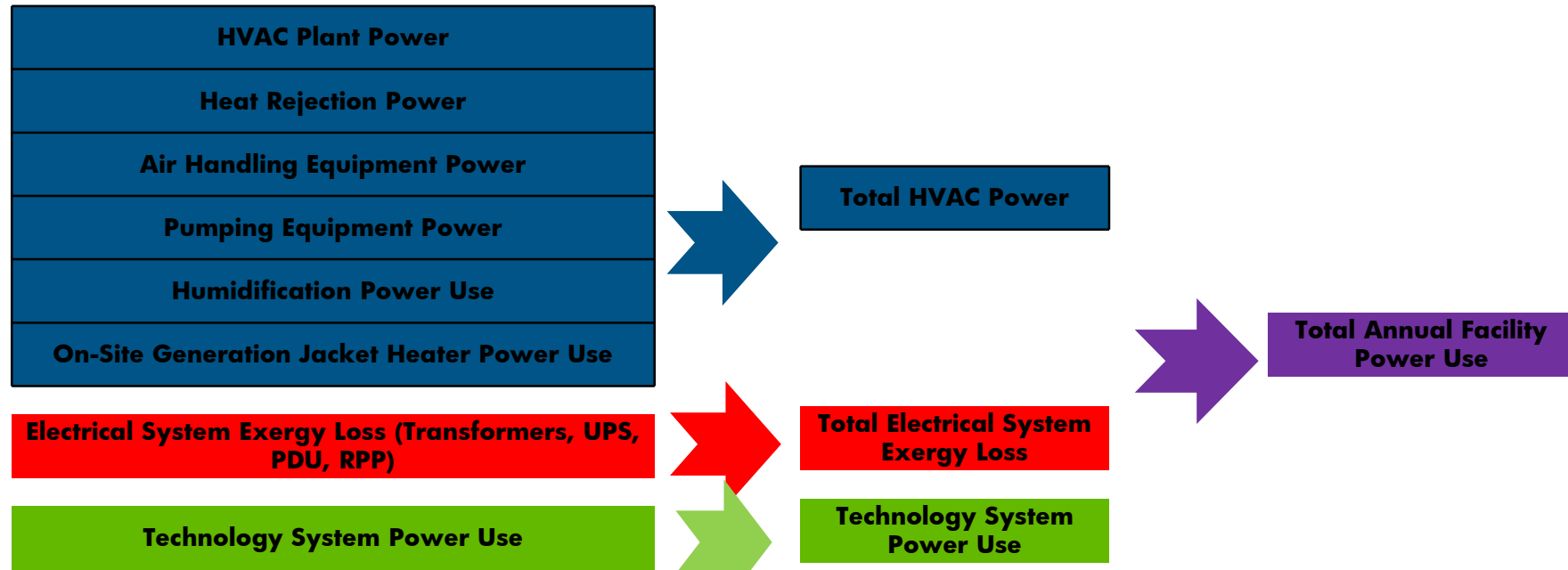
**What:** Measure of infrastructure efficiency

- Captures impact of cooling and support systems
- Does not capture IT efficiency

**Why:** Best available whole building measure *at this time*

- Industry still discussing how to define useful work
- Critical to start tracking and measuring energy consumption
- Cannot manage what you don't measure

# Defining PUE and DCiE



**Power Usage Effectiveness (PUE)**

$$\frac{\text{Total Annual Facility Power Use}}{\text{Technology System Annual Power Use}}$$

**Data Center Infrastructure Efficiency (DCiE)**

$$\frac{\text{Technology System Annual Power Use}}{\text{Total Annual Facility Power Use}}$$

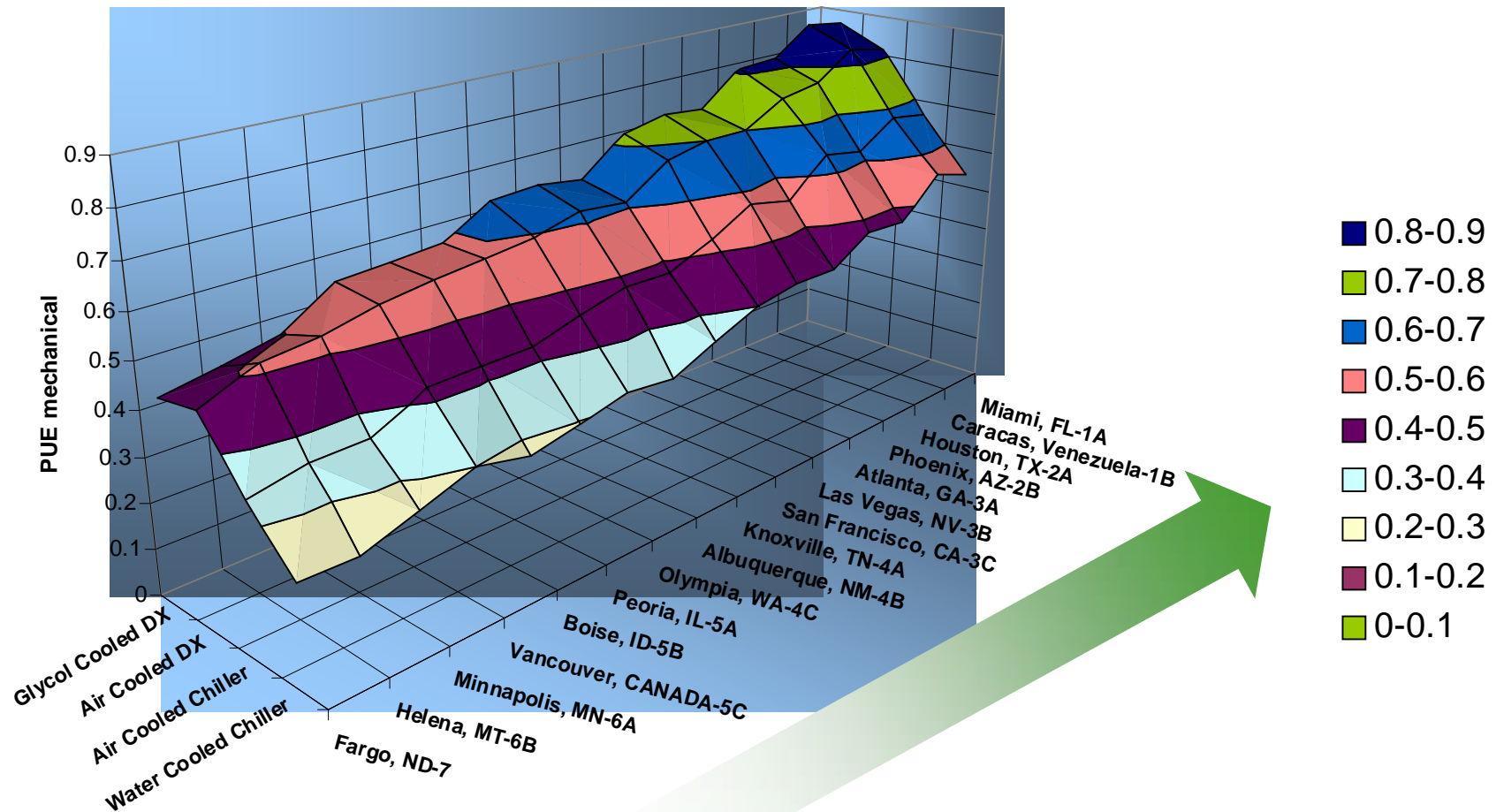


# ENERGY STAR Rating for Data Center Infrastructure

**How:** Express ratio (Total Energy/IT Energy) as ENERGY STAR 1-to-100 rating

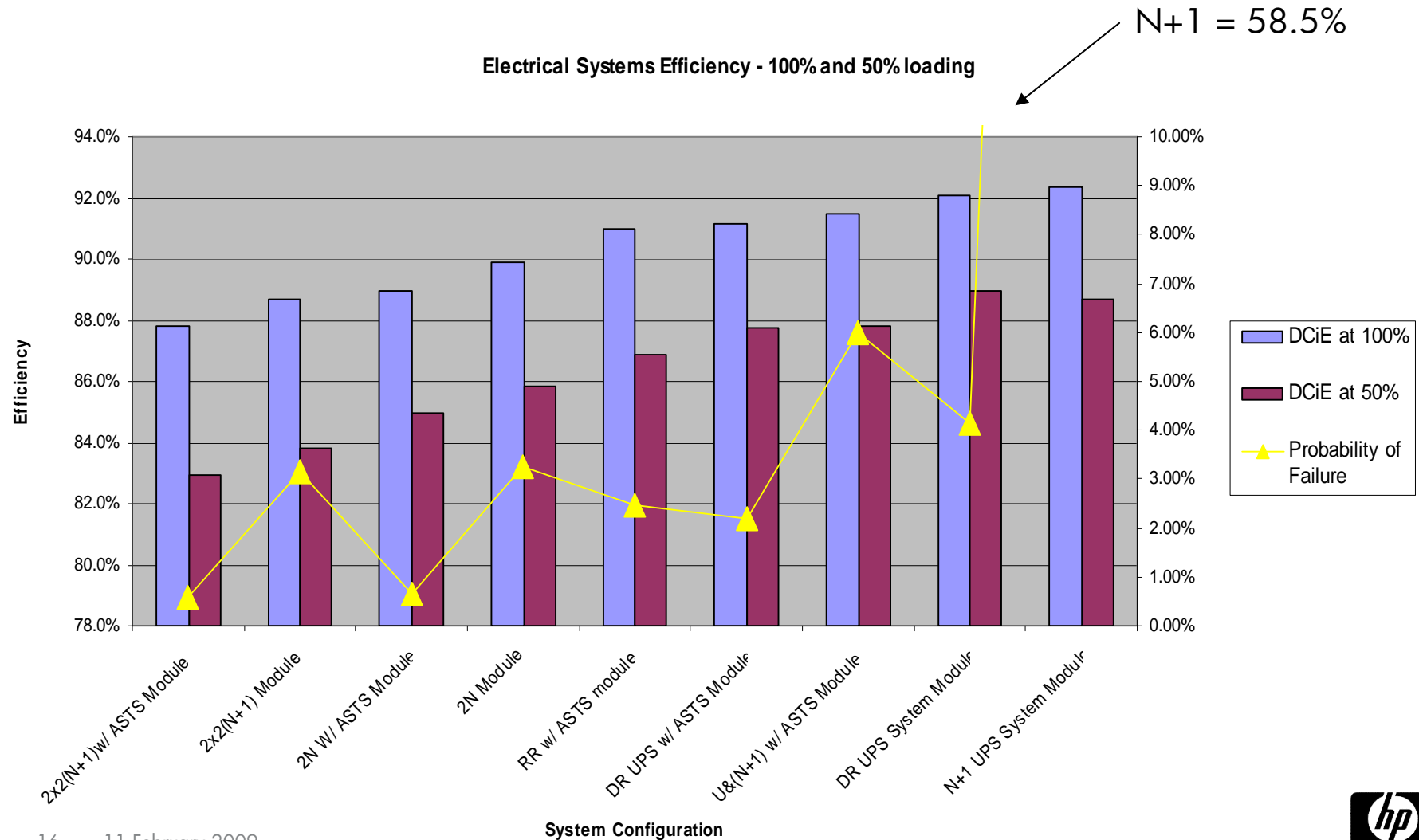
- Each point on rating scale = 1 percentile of performance
- Adjust for operating constraints outside of operator control (e.g. climate or tier level)
- Factors for adjustment based on results of data collection and analysis

# Impact of Mechanical system and Climate Zone on PUE



# Optimizing Efficiency and Reliability

## Analysis of electrical system configurations



# Rating Development Process Overview

- Consult with industry stakeholders to develop consensus on the use of a Total Energy/IT Energy ratio
- Develop data collection template, instructions, and support materials
- Gather complete data on actual energy use from at least 125 existing data centers - IN PROCESS
- Analyze data to develop rating models - IN PROCESS
- Launch ENERGY STAR Data Center Infrastructure Rating in Portfolio Manager



# Data Collection Participation To Date

## **EPA does not have enough data for rating**

242 data centers expressed interest to participate

Preliminary data:

- Complete data submitted: 90 data centers
- Some data submitted, but missing a few data elements: 25 data centers
- No data from ~50% of data centers expressing interest
- Need complete data for at least 125 data centers to develop a rating

# Upcoming Schedule

Assuming additional data centers submit data:

- Next data submission: January 15, 2009
- Data collection update webinar: Spring 2009
- Final data submission: June 15, 2009
- Data analysis and rating development: Summer 2009
- Webinar to introduce the rating: Fall 2009
- Launch the rating in Portfolio Manager: January 2010



Technology for better business outcomes

