ENERGY STAR for Data Centers

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Agenda

- ENERGY STAR Overview
- Portfolio Manager
  - Data Requirements
  - Market Growth
- Collaboration with IT Industry
- Obstacles to Energy Efficiency Measurements

ENERGY STAR

ENERGY STAR for Buildings Overview

- Energy management program that provides proven solutions to help building owners and managers reduce their energy consumption
  - Help businesses protect the environment through superior energy efficiency
- Numerous technical and managerial resources
  - EPA's ENERGY STAR energy performance scale for buildings to benchmark and track energy use
  - Energy management guidelines
  - Advice on design for energy efficient buildings
  - Online case studies and best practice stories
  - Calculators to track returns on energy efficiency investments
  - Training opportunities
- Opportunities for national recognition

ENERGY STAR for Buildings Overview

- Work in markets with a focus on:
  - Commercial Property (offices, retail, hotels)
  - Public Sector (government, education)
  - Healthcare
  - Small businesses and congregations
- Provide Portfolio Manager, a free online tool for measurement and tracking of energy performance over time
  - Over 200,000 buildings are benchmarking
- Offer a 1-to-100 scale for certain building types, to provide a peer group comparison
  - Buildings that earn a 75 or higher can earn the prestigious ENERGY STAR label
  - Over 14,000 buildings had earned the ENERGY STAR

ENERGY STAR for Buildings Overview

- ENERGY STAR Score Objectives
  - Help businesses protect the environment through superior energy efficiency
  - Motivate organizations to develop a strategic approach to energy management
  - Convey information about energy performance in a simple metric that can be understood by all levels of the organization

ENERGY STAR for Buildings Overview

- ENERGY STAR score characteristics
  - Monitor actual as-billed energy data
  - Create a whole building indicator
    - Capture the interactions of building systems not individual equipment efficiency
    - Track energy use accounting for weather and operational changes over time
  - Provide a peer group comparison
    - Compare a building's energy performance to its national peer group
    - Track how changes at a building level alter the building's standing relative to its peer group

Eligible to Receive an ENERGY STAR Score

Bank/Financial Institutions

Courthouses

Data Centers

Dormitories

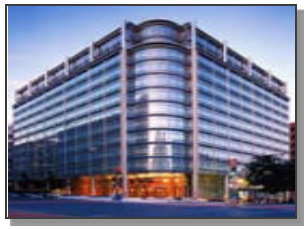
Hospitals

Hotels

Houses of Worship

K-12 Schools

Medical Offices



Office Buildings

Retail Stores

Senior Care Communities

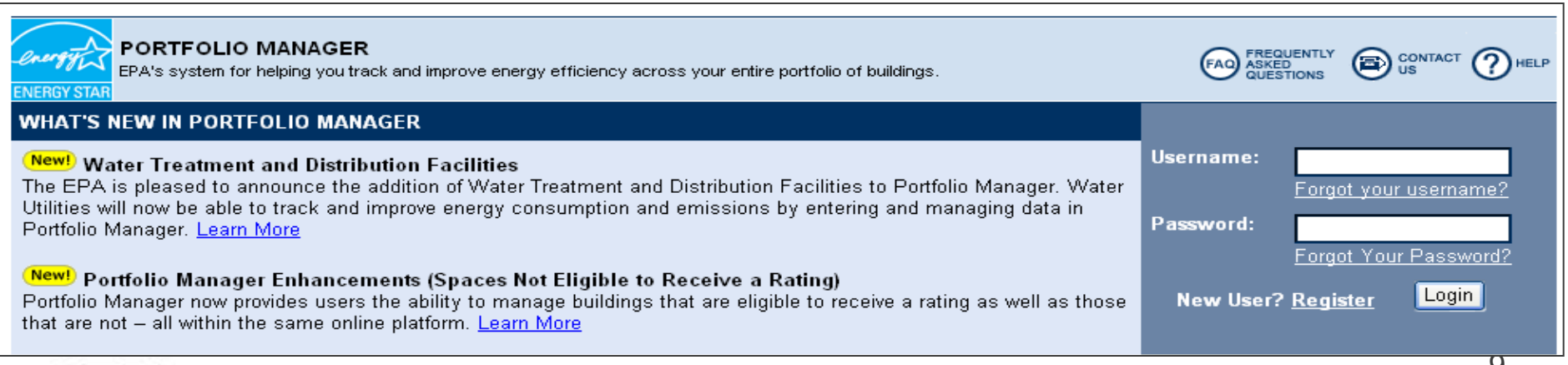
Supermarkets

Warehouses

Wastewater Treatment Plants

Portfolio Manager

- Free, online benchmarking tool
- ***The*** industry standard in commercial real estate
- Track changes in energy, water, GHG emissions over time within a single building or entire portfolio
- Understood and used by many owners, management companies, local governments, potential buyers and lenders
- Learn more: www.energystar.gov/benchmark

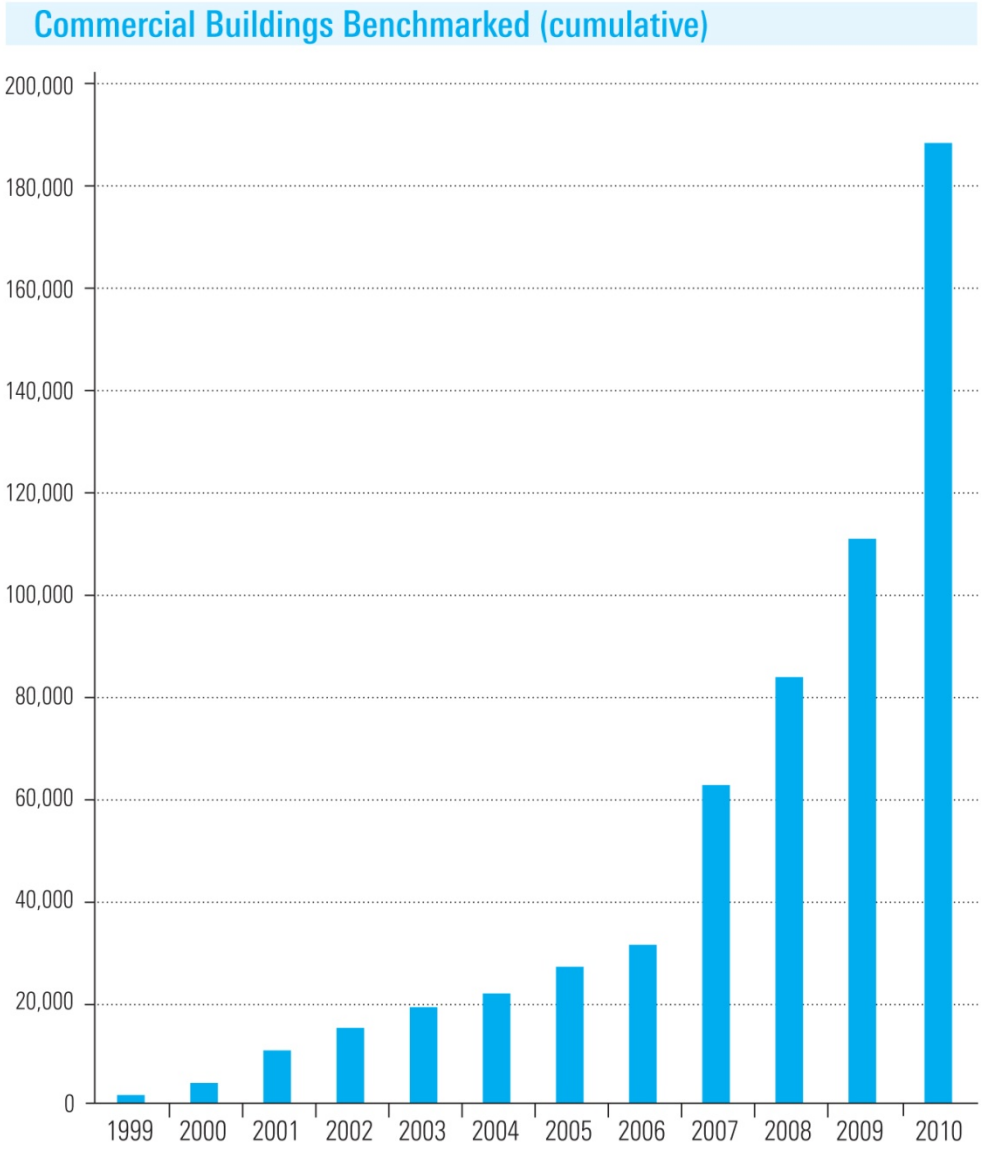


EPA

Portfolio Manger
Required Data: Buildings with Data Centers

General	Space	Energy
• Address: city, state, zip code • Year built	•Gross Floor Area •IT Energy Configuration ***•IT Energy Meter*** ***• UPS Output Meter – 12 months of energy data*** •*Optional* • *IT Equipment Redundancy* • *Cooling Equipment Redundancy*	• Utility Bills • 12 consecutive months for each energy source (electricity, purchased chilled water, etc)

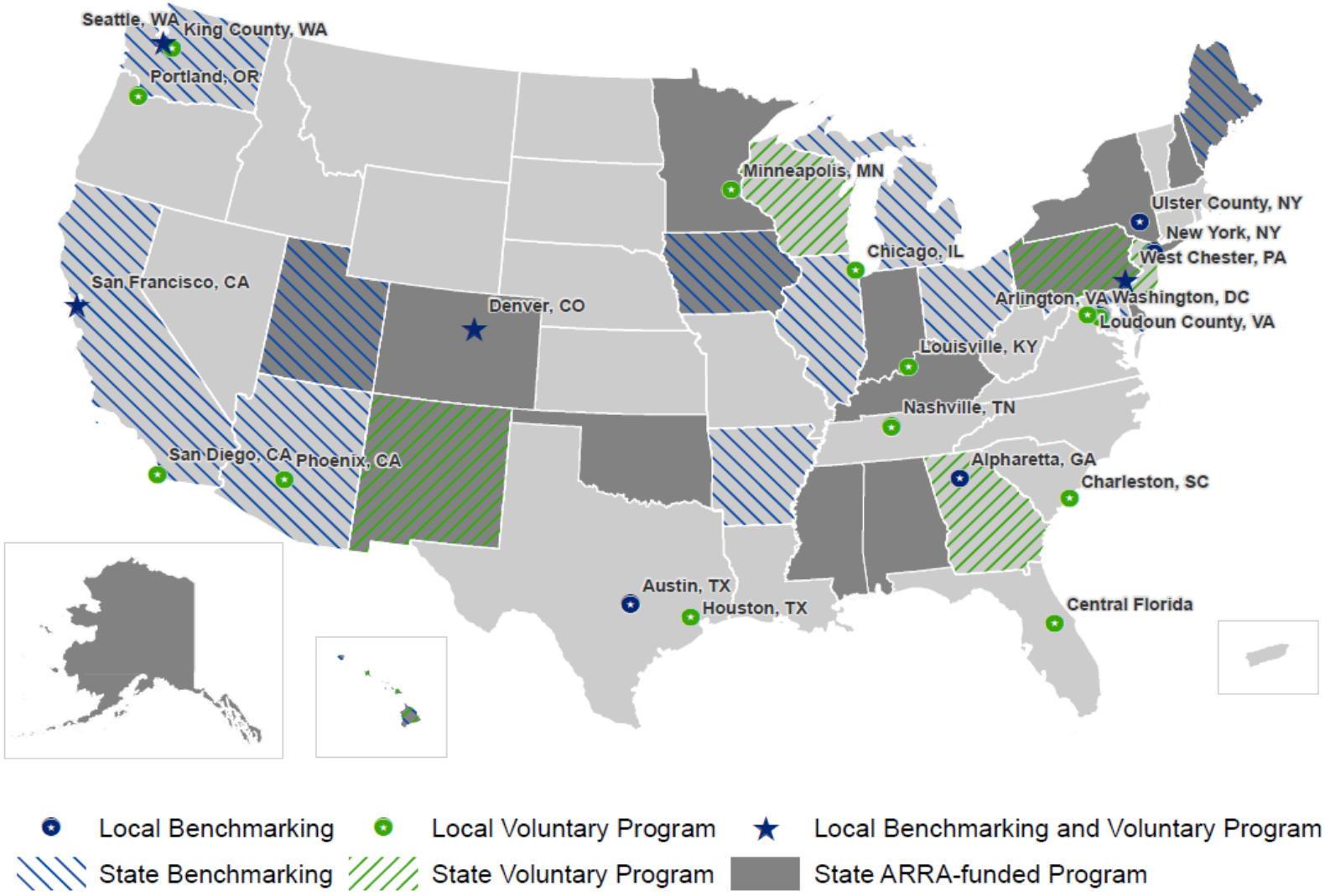
Benchmarking Activity in Portfolio Manager Continues to Increase



Trends in the Marketplace

- Grant and incentive programs
- Voluntary energy efficiency campaigns
- Benchmarking and disclosure mandates
- Federal executive orders

Trends in the Marketplace



Benchmarking Competitions & Campaign Models

ENERGY STAR Collaboration with the IT Industry

US Industry Collaboration

- Foundation
  - Group meeting in January 2010 to agree to guiding principles for Data Center energy efficiency metrics
- Participating organizations agreed on the following 3 major guiding principles
  1) Power Usage Effectiveness (PUE) using source energy is the preferred energy efficiency metric
  2) IT energy measurements should, at a minimum, be measured at the output of the UPS. The industry should improve measurement capabilities to ultimately enable taking this measurement directly at the IT load (i.e. servers)
  3) For stand-alone facilities, total energy measurement should include all energy sources at the point of utility handoff. For data centers in larger buildings, total energy should include all cooling, lighting, and support infrastructure, in addition to IT load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get connected to efficient IT


ASHRAE

US Industry Coordination

- Published Documents
  - Guiding Principles for Energy Efficiency
    - Outlines guiding principles for using PUE, including recommending IT energy measurements taken at the UPS output.
    - Published February 2010
    - http://www.energystar.gov/ia/partners/prod_development/downloads/DataCenters_AgreementGuidingPrinciples.pdf
  - Recommendations for measuring PUE (July 2010, updated May 2011)
    - Outlines procedures and nomenclature for measuring PUE in mixed use and stand alone environments.
    - Published July 2010, Updated May 2011
    - http://www.energystar.gov/ia/partners/prod_development/downloads/Data_Center_Metrics_Task_Force_Recommendations_V2.pdf
- Next Steps
  - DOE is working to convene another in-person meeting to assess market progress and identify priorities going forward

Global Coordination

- Purpose
  - Work with leading organizations in the US, Japan, and the EU to harmonize metrics for data center energy efficiency
  - Share lessons learned and provide recommendations for data center efficiency metrics that can be used consistently across the global market
- Group Coordination Meetings
  - Bi-weekly phone meetings
  - Regular in person meetings every 6-9 months
- Next Steps
  - Continue to work on common metrics for
    - Greenhouse gas emissions and carbon efficiency
    - IT productivity proxies and IT productivity measurements
  - In-person meeting in DC – October 2011

Global Coordination

- US EPA
- US DOE
- Japan's Ministry of Economics, Trade, and Industry (METI)
- The European Code of Conduct
- The Green Grid
- Japan's Green IT Promotional Council

Global Industry Coordination Publications

- Publications
  - Guiding Principles (February 2010)
    - Similar to the US principles, defines PUE as an energy based measurement
    - Also identifies goals for moving the market towards measures of IT productivity
    - http://www.energystar.gov/ia/partners/prod_development/downloads/Harmonizing_Global_Metrics_for_Data_Center_Energy_Efficiency.pdf
  - PUE Measurement Guidelines (February 2011)
    - Detailed guidance on how to measure PUE most effectively, including guidance when electric generation occurs on-site
    - http://www.energystar.gov/ia/partners/prod_development/downloads/Harmonizing_Global_Metrics_for_Data_Center_Energy_Efficiency_2011-02-28.pdf

Industry Collaboration: Summary

- Regular collaborative meetings across the US Industry and with leaders in Japan and the EU
  - Recognize the need for common metrics and priorities
  - Data centers operating around the world need common and consistent ways to understand energy efficiency
- Key goals and priorities
  - Measured results
    - You cannot manage what you do not measure
  - Meaningful metrics will evaluate annual **energy** to include total energy at all loads and during all seasons
  - Power Usage Effectiveness (PUE) is the primary way of understanding and reporting the efficiency of infrastructure
    - Cooling and power supply

Obstacles to Energy Efficiency Measurements

Growth in Data Center Energy Benchmarking

- Nearly 17,000 buildings with data centers benchmarked in Portfolio Manager
  - Over 95% are mixed use buildings
    - Contain Data Center with Office/Other spaces
  - Approximately 1,200 currently have an IT Energy meter
    - Less than 10%
- ENERGY STAR Requirements
  - Currently allow benchmarking and ENERGY STAR score without IT measurements
  - Starting in June 2012, an IT measurement will be required
  - Over 15,000 buildings currently benchmarking will need to start reporting this data

Questions and Challenges on IT Energy Measurements

- Stand Alone Data Centers
  - Greater expertise with data center operation
  - Energy measurements are more common
  - Still some who focus on ***power***
  - Need to educate on the importance of energy measurements for a true assessment of efficiency
    - UPS system
    - Cooling system
    - Entire data center
- Mixed Use Data Centers
  - More questions about data center management overall and ewer expert staff located on-site
  - Similar need to educate on the importance of energy measurements for a true efficiency assessment
  - In other industries have already worked to foster collaboration between owner/managers and their tenants
    - Efficiency measurements benefit all parties

Questions and Challenges on IT Energy Measurements

- How to gain access to a mixed-use data center?
  - In mixed use settings the building manager does not always have direct access to data center space and cannot install their own meters
  - Meters directly on the equipment facilitate reading/reporting without requiring a change from the tenant
- Where to measure IT Energy?
  - UPS, PDU, or Servers all represent measurement points that are recommended
  - Measurement at the UPS is the simplest approach that can be applied most consistently
  - The ENERGY STAR score is based on a sample of data with measurement taken at the UPS output
- How to measure IT Energy?
  - If there are multiple UPS devices one meter could be installed, or each device could report energy
  - Meters built into each device would be simplest for the end user, especially at times when devices are replaced or configurations are modified

Questions on Content?

Discussion to follow all speakers