

ENERGY STAR for Data Centers

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Agenda



- ENERGY STAR for Buildings
- EPA Ratings
 - ◆ Overview
 - ◆ Data Centers
 - ◆ Source and Site Energy
- CHP and ENERGY STAR

ENERGY STAR for Buildings



- 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
- Free technical and managerial resources
 - ◆ National rating system 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



- Work in markets with a focus on:
 - ◆ Commercial Properties (offices, retail, hotels)
 - ◆ Public Sector (government, education)
 - ◆ Healthcare
 - ◆ Small Businesses and Congregations
- Provide an online tool to rate energy performance on a scale of 1-to-100
 - ◆ Over 90,000 buildings have been rated
- Buildings that earn a 75 or higher can earn the prestigious ENERGY STAR label
 - ◆ Over 7,900 buildings have earned the ENERGY STAR as of August 2009
- Learn more: www.energystar.gov/buildings

Is Your Building Performing Well?



Fuel Efficiency
MPG



Is 18 MPG good or bad for an automobile?

Is 80 kBtu/SF/YR good or bad for a building?

Energy Performance
EPA Rating

STATEMENT OF ENERGY PERFORMANCE
Margrave High School
 Building ID: 102120
 For 12-month Period Ending: January 31, 2004
 Date SEP Generated: March 30, 2004

Margrave High School
 1200 Hwy 96
 Longmead VA 22079
 Gross Building Area: 351,365 SF
 Year Built: 1982

Owner:
 Catholic Group
 Contact: John Doe
 1020 North 1st Street
 State: VA
 Arlington VA 22206
 (703) 247-8900

Facility Space Use Summary	Area (SF)	Number of Students	Number of PCs	Cooling Percent
Space Type	NA	NA	NA	NA
Computer Data Center	154	NA	NA	NA
K-12 Classroom	343,221	6,221	425	100

Site Energy Use Summary

Electricity (kBtu)	Professional Verification
5,649,861	John Doe
Process (kBtu)	1020 North 1st Street
320,419	State: VA
Natural Gas (kBtu)	Arlington VA 22206
0	(703) 247-8900
Total Energy (kBtu)	5,970,280
	License Number: 123456789
	State: VA

Risklets

Energy Performance Rating (1-100): 94

Energy Intensity¹
 kWh (kBtu²/yr)
 kWh (kBtu²/yr): 17
 kWh (kBtu²/yr): 49.4

Emissions
 CO₂ (1000 Btu): 6,793
 SO₂ (1000 Btu): 266
 NO_x (1000 Btu): 21

Energy Cost
 Cost (\$/yr): \$264,485
 Intensity (\$/SF/yr): \$0.72

Indoor Environment Criteria³
 Indoor air pollutants controlled? Yes
 Adequate ventilation provided? Yes
 Thermal conditions met? Yes
 Adequate illumination provided? Yes

Notes:
 1. Annual ENERGY STAR is a national program to reward the
 2002-2004
 3. Based on the current standard of disclosure
 of energy use in this building. Locally, due to
 government involvement on this standard is
 accurate.

Tracking Number: SEP2004000001004542



EPA Rating 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

EPA Rating Requirements



- 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 improvements at a building change its ranking relative to its peer group

EPA Rating

Technical Foundation



- Analyze national survey data
 - ◆ Commercial Building Energy Consumption Survey (CBECS)
- Develop regression models to predict energy use for specific space types based on physical and operational characteristics
- Create scoring lookup table
 - ◆ Ratings are based on the distribution of energy performance across commercial buildings
 - ◆ One point on the ENERGY STAR scale represents one percentile of buildings
- Buildings that rate 75 or higher (top quartile) can earn the ENERGY STAR label

Eligible Space Types



**Bank/Financial
Institutions**



Courthouses



Dormitories



Hospitals



Hotels



**Houses of
Worship**



K-12 Schools



Medical Offices



Office Buildings



Retail Stores



Supermarkets



Warehouses



**Wastewater
Treatment Plants**

EPA Rating for Data Centers



- Build on existing ENERGY STAR methods and platforms
- Apply to stand-alone data centers and data centers housed within office or other buildings
- Assess performance at the building level to explain how a building performs, not why it performs a certain way
- Provide users with information and links to additional resources to aid in their efforts to determine next steps
- Offer the ENERGY STAR label to data centers with a rating of 75 or higher (performance in the top quartile)

→ Initial barrier = lack of energy use data for data centers

EPA Rating for Data Centers



■ EPA Data Collection

◆ Winter 2008

- Worked with industry to identify key factors and variables for analysis
- Developed data center data collection form

◆ Spring 2008

- Released data collection form in March 2008

◆ June 2009

- 100+ complete forms submitted to EPA

■ EPA Data Analysis

◆ Currently underway!

- Examining key relationships between IT Energy, Total Energy, Tier Level, and other key factors

EPA Rating for Data Centers



- Next steps
 - ◆ Webinar to share analytical findings
 - September 29, 2009
 - ◆ Finalize analysis and rating model development
 - ◆ Program new rating model into Portfolio Manager

→ Model scheduled for release: first quarter 2010

EPA Rating

Source and Site Energy



- Because ENERGY STAR rates the whole building, the ratings must account for any mix of fuels
- Site Energy
 - ◆ Energy consumption expressed on utility bills
 - ◆ Includes combination of primary and secondary energy, which are not directly comparable
 - Some heat and electricity comes from fuels burned on-site (e.g. natural gas), while some comes from fuels burned off-site (e.g. district steam)
- Source Energy
 - ◆ Traces on-site consumption back to energy content of primary fuels
 - ◆ Accounts for the losses in conversion from primary to secondary energy (which can occur either on-site or at a utility)
 - ◆ Accounts for losses in distribution to buildings

CHP and ENERGY STAR

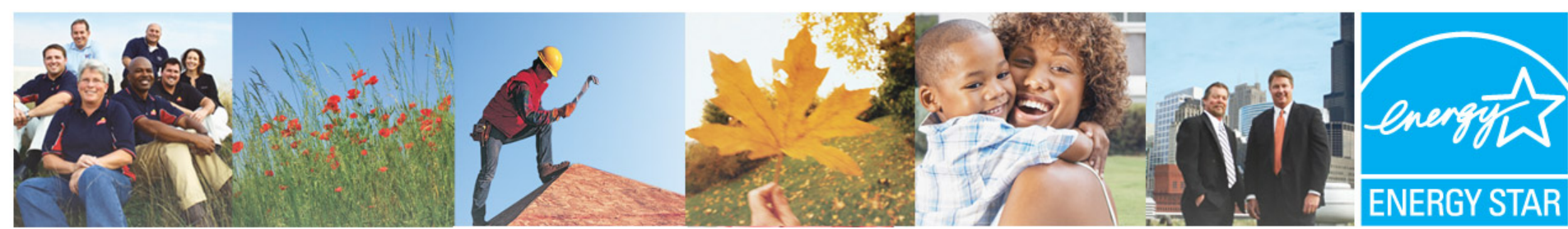


- Input requirements
 - ◆ Include total purchased energy (e.g. natural gas)
 - ◆ Not required to report products (e.g. steam, electricity)
 - These may be tracked in Portfolio Manager, but are not required for the rating
 - Benefits of CHP
 - ◆ CHP provides an on-site conversion efficiency
 - ◆ Buildings with CHP will have lower site (and source) energy needs
 - Purchase smaller quantities of fuel
 - ◆ Buildings with CHP will achieve higher ratings than buildings without
- **The EPA rating recognizes the benefit of CHP as an energy efficiency measure**

Summary



- ENERGY STAR offers proven energy management solutions to the commercial building market
- EPA rating provides a fair assessment of building energy performance
 - ◆ Existing ratings for 13 building types
 - ◆ Over 7,900 buildings have earned the ENERGY STAR
- EPA is in the process of developing a rating for data centers
- EPA ratings recognize the efficiency benefit of CHP projects



Questions?