



# **Energy Efficiency: A Key First Step to Green/High Performance Buildings**

Mike Zatz  
Chief, Market Sectors Group  
ENERGY STAR Commercial and Industrial Branch  
U.S. EPA

Energy 2006  
Chicago, IL – Aug. 8, 2006

# ENERGY STAR



In 2005, Americans with the help of ENERGY STAR, prevented 35 million metric tons of greenhouse gas emissions and saved about \$12 billion on their utility bills.

# ENERGY STAR Challenge



Improve energy efficiency 10% or more!

# ENERGY STAR Challenge



## ENERGY STAR Challenge Participants

- State Sector – More than half of the country participating
  - AZ, AL, CA, CT, DE, GA, FL, HI, IL, IN, KS, KY, ME, MD, MI, MS, MN, NH, NM, NC, NY, OH, PA, SC, TX, WI, WV, VT, and Washington, DC
- Leading K-12 and Local Government Associations participating
- Where is Federal participation?

# Potential Impact



- Our governments, schools, and businesses spend billions annually on energy. **Typically, about 1/3 of this money is paid to utility companies unnecessarily due to energy inefficiency.**
- Instead, this money could be invested in energy efficiency which can improve the lighting, acoustics, thermal comfort, and indoor air quality creating a better working and learning environment.

# Opportunities in Federal Buildings



- Federal Gov't owns about 445,000 buildings with more than 3 billion square feet
- If these buildings reduced energy use by 10%, in 10 years taxpayers would save \$420 million and reduce ghg equivalent to those from 625,000 cars.

# New Model for Achieving Green and Energy Efficiency



- Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings:
  - Establish whole building performance target:
    - Design to Earn ENERGY STAR
  - Reduce energy cost budget 30% from ASHRAE 90.1-2004
    - Increase efficiency of components
  - Measure and verify energy use
    - Compare to design target
    - Use EPA's energy performance rating

# Why Use ENERGY STAR?



A high performance/green building can:

- Cost the same or less to build
- Cost less to operate
- Helps protect the environment
  - Reduces greenhouse gas emissions and air pollution from burning fossil fuels to generate energy to run buildings

# Why Use ENERGY STAR?



- Taxpayers benefit from cost-effective reductions:
- ENERGY STAR qualified offices demonstrate:
  - 35% less energy use
  - \$0.50 per square foot less to operate
  - Energy performance persists over multiple years.



# How can you build a high performance/green building cost-effectively?



## Start with energy efficiency:

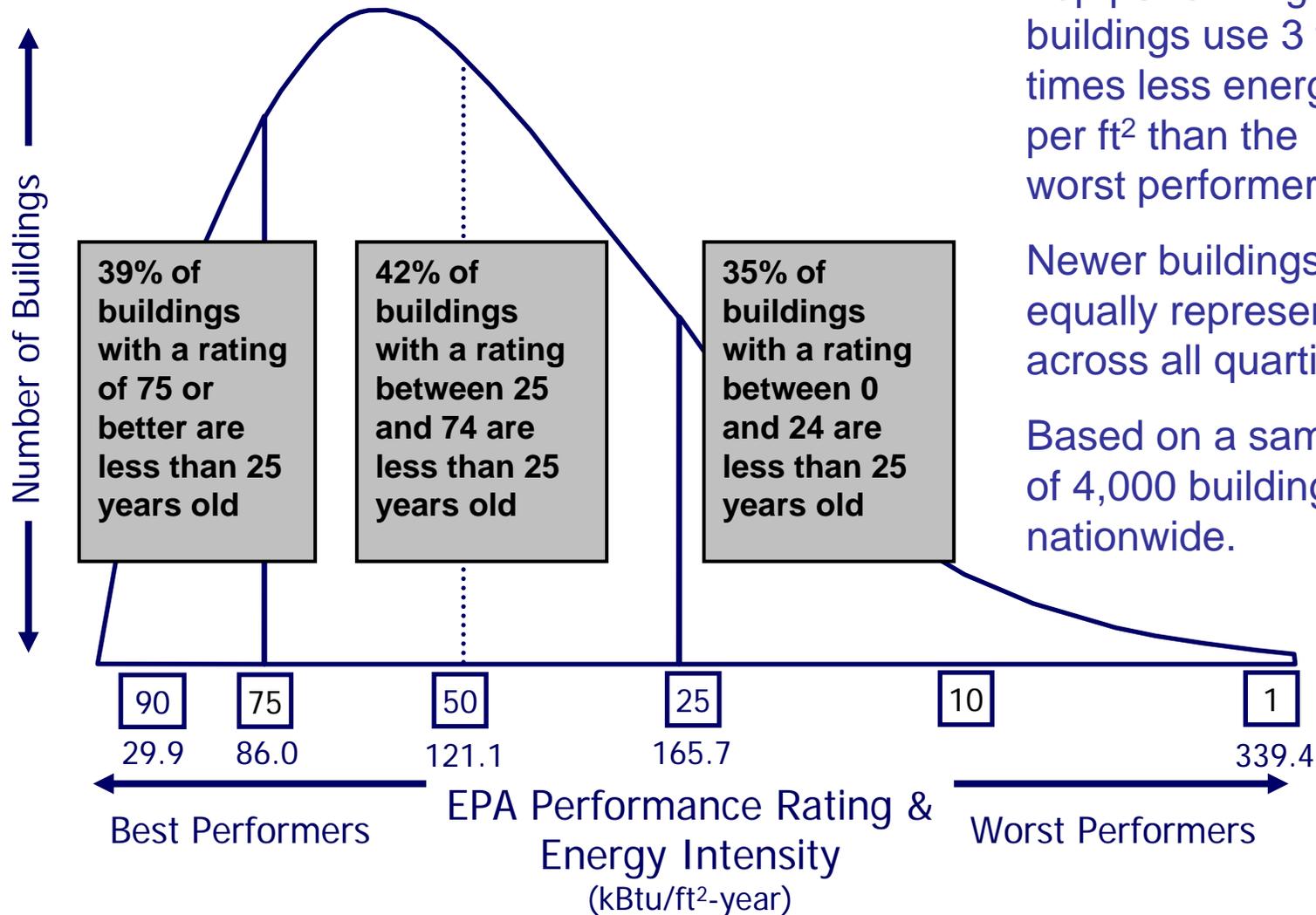
- Building orientation and the use of daylighting in the building design,
- Energy-efficient building envelope and windows,
- Use correctly sized energy-efficient technologies,
- Design buildings in “zones,”

# How can you build a high performance/green building cost-effectively (cont.)?



- Use cost-effective on-site renewable energy – (wind, geothermal, other),
- Use interior materials, furnishings, and cleaning practices that minimize indoor air pollutants,
- Design to control space humidity,
- Commissioning equipment to ensure performance is as intended.

# Energy Performance Gap

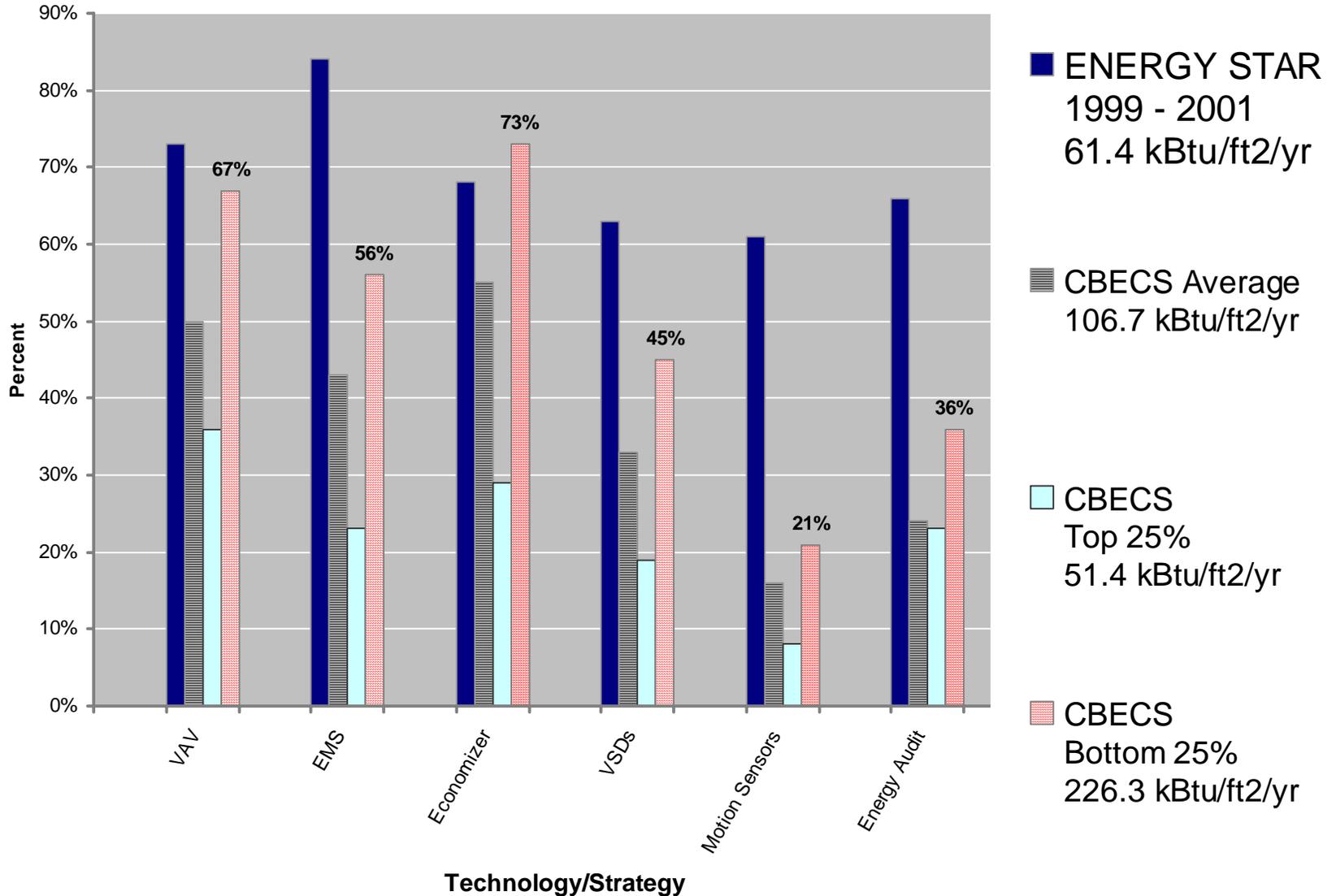


Top performing buildings use 3 to 4 times less energy per ft<sup>2</sup> than the worst performers.

Newer buildings are equally represented across all quartiles.

Based on a sample of 4,000 buildings nationwide.

# Technology Doesn't Always Equal Performance



# How Does Your Building Compare?



Fuel Efficiency  
MPG



Is 18 MPG high or low for an automobile?

Is 80 kBtu/SF/YR high or low for a building?

Energy Performance  
EPA Rating

**STATEMENT OF ENERGY PERFORMANCE**  
**Margrave High School**  
 Building ID: 1027120  
 For 12-month Period Ending: January 31, 2004<sup>1</sup>  
 Date SEP Generated: March 30, 2004

Margrave High School  
 2200 Hwy 26  
 Langford VA 23229  
 Gross Building Area: 361,365 SF  
 Year Built: 1982

Center:  
 Customer Group:  
 Contact: John Doe  
 1234 North Fort Meade Drive  
 Suite 200  
 Arlington, VA 22200  
 (703) 242-0000

Facility Space Use Summary		Number of Students	Number of PCs	Cooling Percent
Space Type	Area(SF)	NA	NA	NA
Computer Data Center	134	1,021	420	100
K-12 Schools				

Site Energy Use Summary

Electricity (kBtu)	5,549,861	Professional Verification	John Doe
Process (kBtu)	300,419	1234 North Fort Meade Drive	Arlington, VA 22200
Natural Gas (kBtu)	0	(703) 242-0000	
Total Energy (kBtu)	5,919,220	Licensed Number: 123456789	State: VA

Rosetta

Energy Performance Rating<sup>2</sup> (1-100) 94

Energy Intensity<sup>3</sup>  
 Site (kBtu/SF-yr) 17  
 Source (kBtu/SF-yr) 49.4

Emissions  
 CO<sub>2</sub> (1000 lbs/yr) 6,791  
 SO<sub>2</sub> (1000 lbs/yr) 266  
 NO<sub>x</sub> (1000 lbs/yr) 21

Energy Cost  
 Cost (\$/yr) \$204,486  
 Intensity (\$/SF-yr) \$0.57

Indoor Environment Criteria<sup>4</sup>  
 Indoor air pollutants monitored? Yes  
 Adequate ventilation provided? Yes  
 Thermal conditions met? Yes  
 Adequate illumination provided? Yes

Notes:  
<sup>1</sup> Based on the ENERGY STAR® tool that will be approved in summer 2004.  
<sup>2</sup> EPA  
<sup>3</sup> Based on the electricity consumed at the time of the audit for the building. Ensure that the power source is indicated on this statement in Remarks.  
<sup>4</sup> EPA, ASHRAE, and ESMA Lighting Handbook for lighting quality.  
 Tracking Number: SEP20040300001004542





- EPA's Energy Performance Rating
  - **Building design (no utility data)**
    - Weather data: 30-year average
    - ENERGY STAR tool: Target Finder
  - **Existing buildings (utility data available)**
    - Weather data: 30-year average + data for year
    - ENERGY STAR tool: Portfolio Manager

# Simple Energy Metric – EPA’s Energy Performance Rating System



- **Normalize**
  - Weather, hours, occupant density, plug load
  - Whole-building “mpg” rating (kbtu/sf/yr).
- **Compare**
  - Benchmark against similar buildings in national stock
  - Receive 1-100 rating
- **Recognize**
  - ENERGY STAR Label - Existing buildings
  - “Designed to Earn the ENERGY STAR” - New construction
  - ENERGY STAR Leaders - Portfolio-wide improvement 10% or more
  - LEED-EB requirements - Prerequisite score of 60

# Simplifying the Rating Process for Those with Large Portfolios?



- Needed to address large data input issues.
- Solution was an “automated benchmarking” system.
- System is hosted by a number of energy information and utility bill handling providers.

# Advantages of Automated Benchmarking



- You can receive monthly benchmarks without the burden of data entry.
- Automated benchmarking places the ENERGY STAR rating in your primary data tracking system.
- Enables you to quickly see ratings across your entire portfolio to facilitate a strategic approach to improving your portfolio and recognition opportunities.

# Proven Providers



- The following companies have successfully delivered of ENERGY STAR ratings to their customers:

Provider Name	Contact	Total Buildings Rated (as of 6/1/06)
<a href="#">Advantage IQ</a>	Ed Schlect, 509-329-7602	3,418
<a href="#">Save More Resources</a>	Renee Rodgers, 970-255-9786 x224	424
<a href="#">Cadence Network</a>	Mark Duffer, 513-763-3106	299
<a href="#">Energard</a>	Kelly Scace, 425-881-3451	148
<a href="#">Johnson Controls</a>	Gerrit Reinders, 414-524-7331	54
<a href="#">ei<sup>3</sup></a>	Spencer Cramer, <a href="mailto:scramer@ei3.com">scramer@ei3.com</a>	31
<a href="#">EnergySolve</a>	Jeff Alba, 203-245-0034	20

# Steps to Automated Benchmarking



1. Use energy information or bill handling products from a proven provider to track energy use and energy cost savings.
2. Request optional integration of ENERGY STAR rating into bill handling services.
3. Provide service provider with ENERGY STAR site characteristics.
4. Receive monthly benchmarks for your entire portfolio within a matter of weeks.

# So What Does All This Mean?



- Significant improvements are possible, and ENERGY STAR tools can help you to get there.
- Opportunities exist for those with small portfolios, as well as large portfolios.
- Making energy efficiency the first step to achieving green building goals can pay off in many ways.
- Consider the following examples . . .

# Portfolio-Wide Focus: Veterans Administration



- Asset Enterprise Management commitment
  - Track and manage portfolio
  - Develop web based tracking
  - Link with ENERGY STAR
- ~18 ENERGY STAR qualified
- Some buildings labeled multiple years
- Require ENERGY STAR for leased office space

# First Step to Green: Citigroup



- Portfolio = 90 million sq. ft.
  - Comprehensive tracking of + 13,000 properties
  - Set ghg reduction goal: 10% by 2011
- Use EPA energy performance rating
  - Enhance internal tracking
  - Identify facilities to improve
  - First step in plans for LEED-EB

“We believe that by participating in ENERGY STAR and LEED certification programs, we can better prioritize our emission-reduction activities in the next 5 years and have a better method of measuring our progress”

# Whole Building Strategy: St. Francis Hospital



- 150,000 sq. ft hospital- Maryville, Missouri
  - Initial rating 51
  - Methodological review
  - Commissioning, lighting and ENERGY STAR procurement policy
  - Used \$ saved from right-sizing water pump to buy new boilers
  - Used \$ saved from new boilers to fund new DDC controls
  - In one year:
    - Score: 91
    - Gas bill cut in half
    - Electricity reduced 17%

“Benefits to patient comfort....  
savings put into patient services”



# Operations and Maintenance: Hines

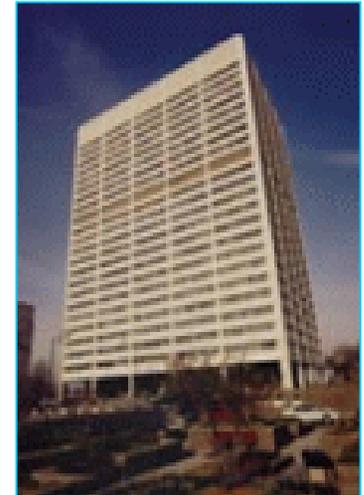


- 1900 K Street, Washington DC-1996 construction
  - 1999 scored 32
  - 2002 scored 70
  - By 2003 earned ENERGY STAR
- Found quality construction with energy efficiency in mind, but oversized
  - VFDs on chillers to match measured demand
  - Improved operating standards- static pressure, set points
  - Tracked and managed energy use continuously
  - Improved lighting controls
- Savings based on synergies and management practices
  - “did not really cost us anything to implement—just a change in the way things get done.”

# Building Upgrades: GSA



- Richard B. Russell Federal Building
  - Atlanta, GA; 1.23 million sq. ft.
  - Upgrades through FEMP Super ESPC
    - Project expanded to 3 buildings
    - Significant additional savings
  - ENERGY STAR 2001; 2004
  - FEMP 2001 Energy Saver Showcase award
  - Upgrades include:
    - EMS, Lighting, roof insulation
    - VSD on fan, high efficiency chiller
    - Co-generation
  - \$6.44 million investment (3 buildings)
    - GSA payments: 20 years
    - Guaranteed savings: 18%



# Leveraging Recognition: Food Lion



- Energy savings over 25% = 285 stores.
- CO2 reductions: >940 million lbs.
- ENERGY STAR Partner of the Year: 2002-2005.
- ENERGY STAR labels: 400+; Goal for 2006 = 600 stores.
- ENERGY STAR Leader- Portfolio average over 75.
- Energy management dept. quadrupled in size in 3 years.



# New Portfolio Manager Enhancements



- Multi Facility Meter Update
- Statement of Energy Performance:  
Facility Summary Report
- Tracking Campaigns
- Water Tracking
- Percent Energy Reduction

# Multi Facility Meter Update



- Objective: enhance static template currently in PM to update a single meter, so that midsized users can update multiple meters at once
- Process:
  - In the tool, user selects up to 10 facilities to update
  - Tool provides personalized MS Excel template for selected facilities and meters
  - Users completes template and submits electronically
  - PM Account updated within 1 week
- Released: January 2006

# Statement of Energy Performance: Facility Summary Report



- **Objective:** Create a version of the SEP that can be generated for purposes other than applying for the ENERGY STAR
  - LEED EB application
  - Real estate transactions
- **Process:**
  - User selects time period of performance
  - No PE stamp required
  - Tool generates 1 page summary with energy use, cost, and emissions figures
  - Summary also included as second page when full SEP is generated to apply for the ENERGY STAR
- **Released:** March 2006

# Tracking Campaigns



- **Objective:** Allow associations/states to track progress of campaign participants, for example:
  - Association members or Chapters
  - Governments and school districts
- **Process**
  - Association creates a Master Account
  - Master Account appears in a public registry
  - Individual users can share facilities with Master Account
  - Master Account holder can view progress for all facilities that have been shared
- **Released:** May 2006

# Water Tracking



- **Objective: Allow users to track a new utility (water) in Portfolio Manager**
  - Continued emphasis on tracking all utilities
  - Lay groundwork for understanding the relationships between water and energy use
- **Process:**
  - User can select “Add Water Meter” for any facility
  - User can identify water meters as indoor, outdoor, or wastewater
  - Tool displays water use totals for any 12 month period
  - User can compare two different periods and track over time
- **Released: June 2006**
- **Upcoming Enhancement: % change between two time periods will be displayed**

# Percent Energy Reduction



- Objective: Provide a metric to show a percent change in energy use over time
  - Creates tracking capability for non ratable spaces
- Process:
  - No additional information required from user
  - For ENERGY STAR Ratable space categories the tool compares energy use between two periods adjusting for changes in weather and business activity
  - For non-ratable spaces the tool compares energy use between two period adjusting for weather only
- Released: July 2006

# Federal Leadership Opportunities



- Setting a national mark to ensure:
  - High performance and energy efficient synonymous
  - All “green” buildings are energy efficient
  - Intended energy use of buildings targeted to be among best in country
  - Installation of cost-effective efficient building components in buildings
  - Energy performance verified in operation with common metric

# Recognition Opportunities for Federal Facilities



- Estimate Energy Use at Design
  - Target Finder
  - Designed to Earn the ENERGY STAR
- Verify energy use in operation
  - Portfolio Manager
  - ENERGY STAR Label
- Reduce energy across portfolio
  - ENERGY STAR Leader



If it's not energy efficient ...



...it's not on a sustainable path.