



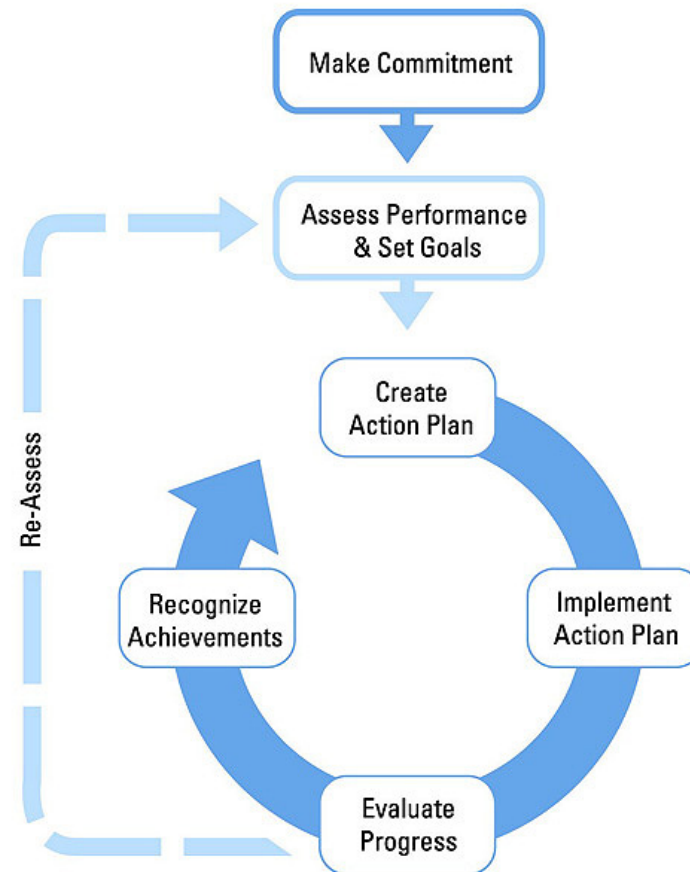
# **Green Buildings & Energy Efficiency: A Discussion**

Web Conference  
February 15, 2006

# About The Web Conferences



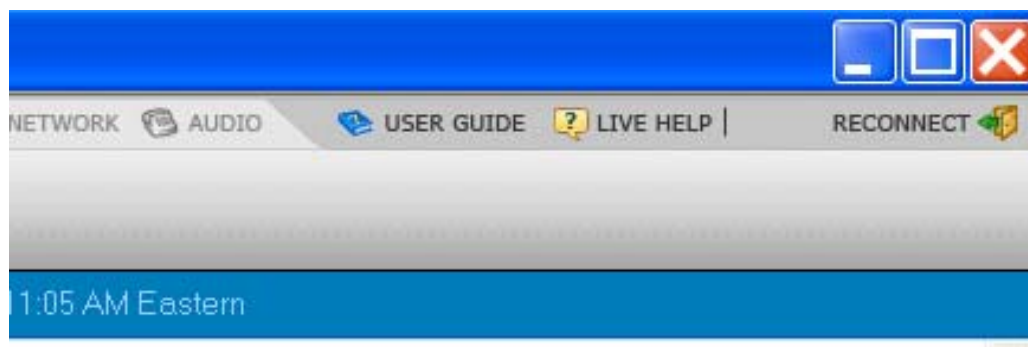
- **Monthly**
- **Topics are structured on a strategic approach to energy management**
- **Help you continually improve energy performance**
- **Opportunity to share ideas with others**
- **Slides are a starting point for discussion**
- **Open & interactive**



# Web Conference Tips



- Mute phone when listening! Improves sound quality for everyone.  
Use \* 6 – to mute and # 6 to un-mute
- If slides are not advancing, hit the **reconnect** button or close presentation window and press the launch button again.



# Web Conference Tips



- Presentation slides will be sent by email to all participants following the web conference.
- Hold & Music – If your phone system has music-on-hold, please don't put the web conference on hold!



# Today's Web Conference



- Background
- Katy Hatcher, ENERGY STAR
- Bucky Green, Sustainable Facilities Practices Branch, US EPA
- Open Discussion
- Announcements

# Background



- Interest in green design and green buildings is growing rapidly:
  - Many States have adopted Green Building Policies
  - Many companies are pursuing green buildings
- Green building projects create an opportunity for energy efficient design

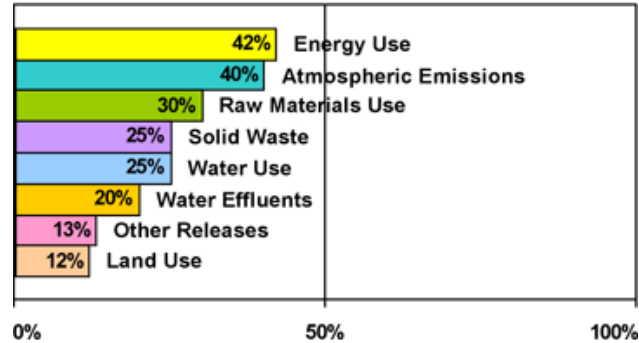
# Energy and the Environment



Energy is a key aspect of building sustainability...

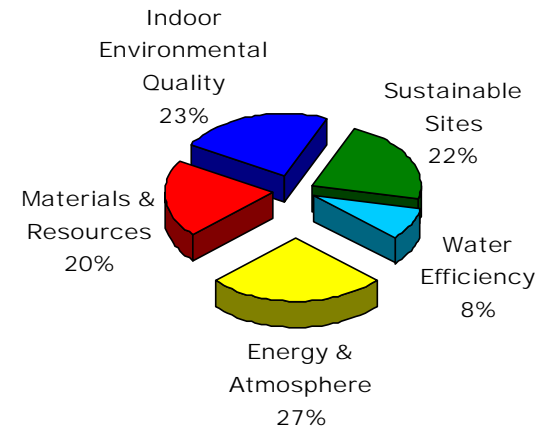
## Environmental Impact of Buildings

Percentage of U.S., Annual Impact

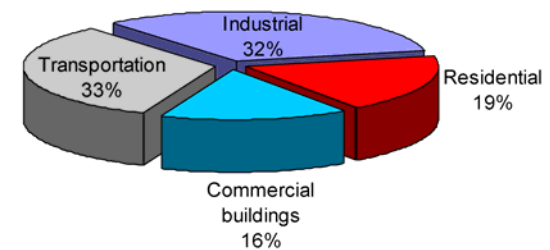


Source: Hal Levin, *SEABEP* (1997)

## Distribution of environmental attributes in LEED



## U.S. Greenhouse Gas Emissions, 2004



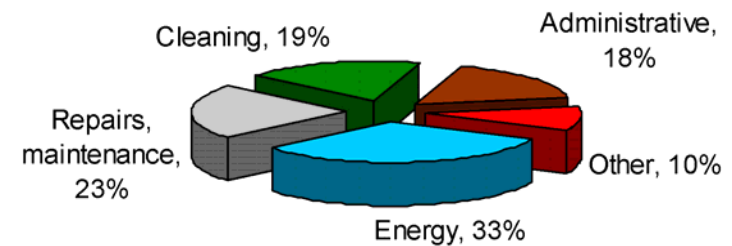
Building energy-use is a major source of CO<sub>2</sub> emissions

# Energy's Role in Green Building



- ROI for green buildings comes largely from energy efficiency gains that reduce operating costs
- Investments in energy efficient building systems and building envelope can help increase assets value
- Market assumes green buildings are energy efficient
  - Examples show that this is not always the case
- ✓ Energy efficiency should be foundation for green building when determining design criteria

Commercial building operating expenses



Source: BOMA

ENERGY STAR labeled buildings: typically:

- use 35 kBtu/ft<sup>2</sup>/yr less energy
- save \$0.50/ft<sup>2</sup>/yr in operating costs compared to the average US office building



# Energy & New Construction



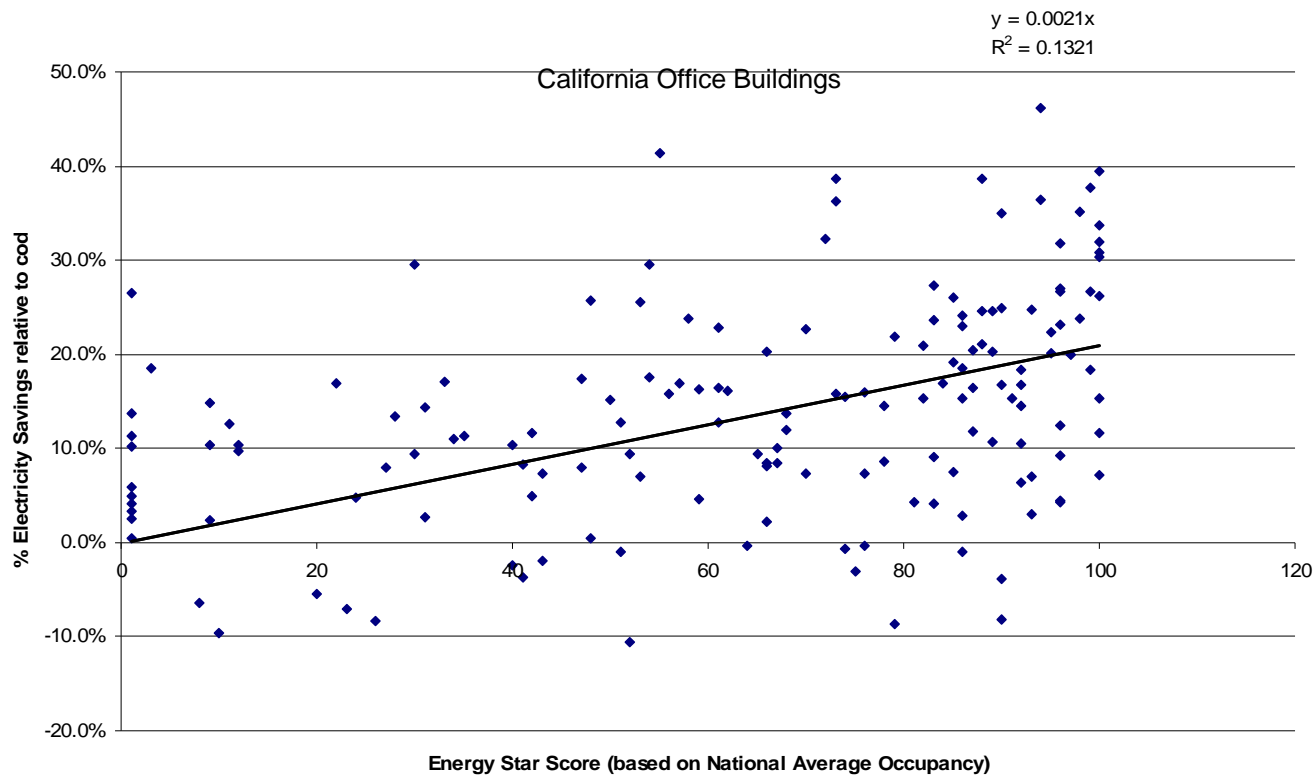
Designing for energy efficiency in any new construction project is challenging, regardless if it's green:

- Code requirements for energy performance:
  - “Better than code” is only weakly correlated to energy performance
- Can't rely solely on technology
  - Specific technologies do not guarantee energy performance
- Modeling energy use has variable predictability and may be “optimistic”
- Use of Whole Building Targets is only emerging
- Competition for project \$\$\$, design priorities, and controlling costs

# NC Issues - The Problem With Code



## Weak Correlation: Code vs. Simulated EUI



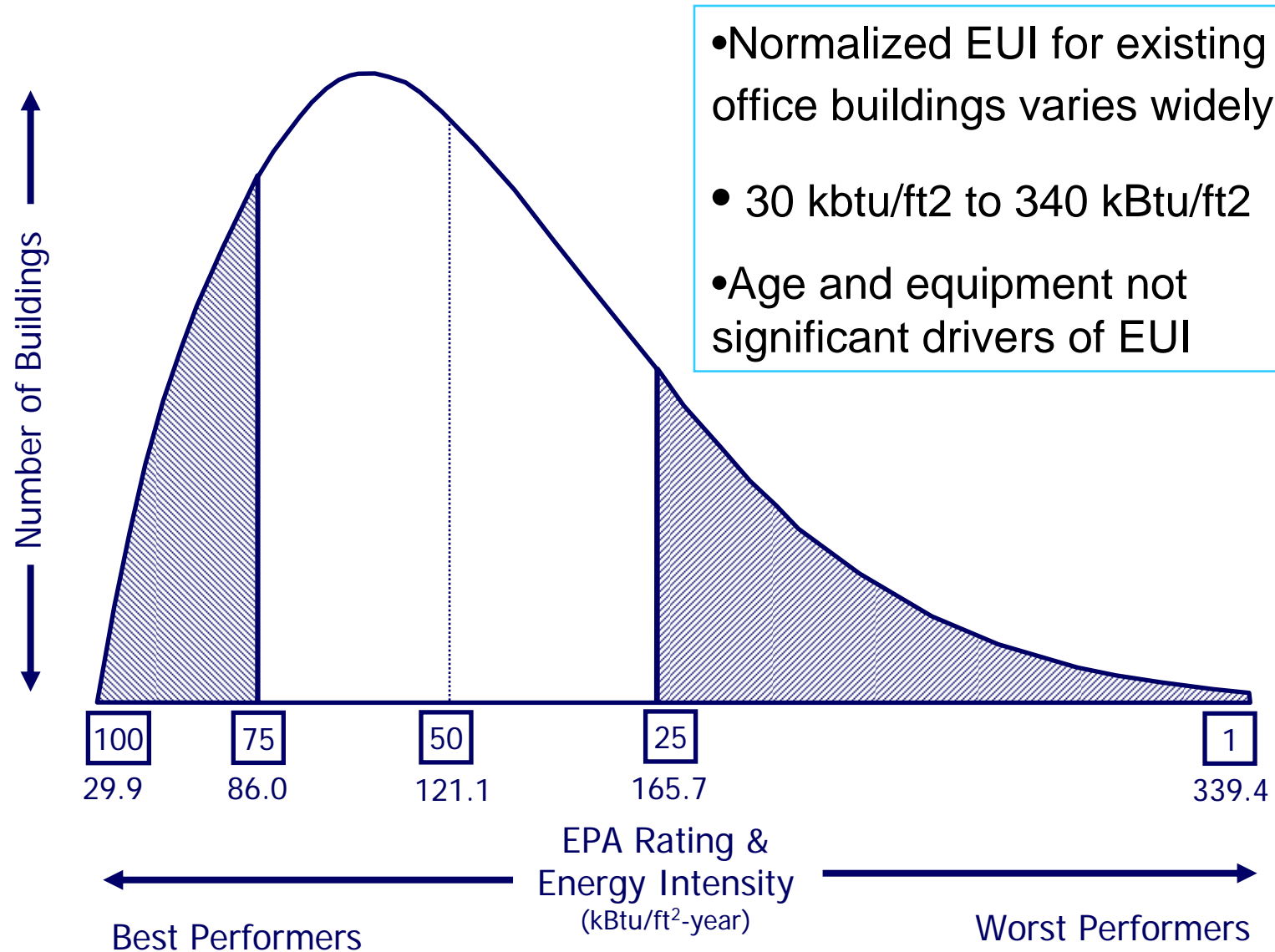
Buildings 20% better than code can have an energy performance score ranging from 1-100.

Not sending right market signal.

Source: NBI, California Board for Energy Efficiency, EPA

Performance against code is weakly correlated to EUI

# Energy performance gap



# NC Issues – Construction Management



Poor energy choices can arise from:

- Lack of performance targets
- Lack of Coordination
- Poor field construction decisions
- First cost over lifecycle costs
- Overly optimistic modeling projections
- Money spent on high visibility features instead of good building systems

*How are people overcoming these issues?*

# Federal Approach



- Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings focus on performance:
  - 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

# Commonwealth of Pennsylvania



- Long Term Vision: “PA LEED Plus” (LEED plus ENERGY STAR)
- Use of performance targets
- Emphasis on “Climate Responsive Design” requirements:
  - aggressive use of natural daylighting and
  - high performance envelope design (ICF Walls, R-50 Roof, HP Glass...)
  - well engineered building systems
  - aggressive Use of Natural Ventilation
- Training for ensure better project managers and teams.
- ENERGY STAR Benchmarking

[http:// www.gggc.state.pa.us/gggc/site/default.asp](http://www.gggc.state.pa.us/gggc/site/default.asp)



# California



## Green Building Action Plan

- 20% energy efficiency goal for all buildings by 2015
- Lifecycle cost accounting
- Energy performance benchmarking for all buildings with ENERGY STAR
- Incentives for sharing up to 25% of savings from energy efficiency projects
- Renovation of existing buildings over 50,000 must meet LEED-EB with ENERGY STAR Rating of 75+
- LEED NC Silver for major projects with energy objectives clearly stated at project on-set

[http:// www.green.ca.gov/GreenBuildingActionPlan/default.htm](http://www.green.ca.gov/GreenBuildingActionPlan/default.htm)



# Colorado Springs School District 11



- Integrated Design Teams
- Aggressive energy targets:
  - K-12 High Performance 25KBTU/SF/YR
  - K-12 National average 80KBTU/SF/YR
- Specific “team requirements”
  - Ask for documented KBTU/SF/YR results for similar building type
  - Demonstrated use of integrated design team approach
  - Willing to accept performance based fees
- Owner Directed Structure
  - Expert project manager oversees all design disciplines instead of A&E firm
  - Design team free to meet design goals collaboratively without traditional barriers
  - Performance bonus for all members







## Energy Performance as a Component of Green Buildings at EPA

**Bucky Green**  
**Sustainable Facilities Practices Branch**  
**U.S. Environmental Protection Agency**

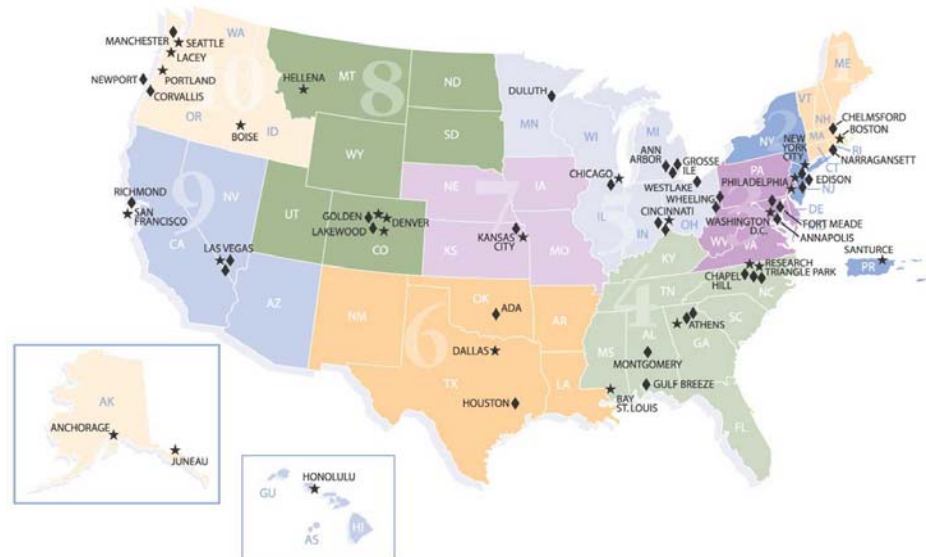


**ENERGY STAR**  
**Web Conference**  
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# EPA Real Estate

- EPA houses 26,000 people in offices and laboratories across the country
- 9 million square feet of office and laboratory space
- 3.6 million square feet of laboratory space
- Mix of owned space (mostly laboratories) and leased space (offices and regional laboratories) via General Services Administration
- EPA has a Sustainable Facilities Practices Branch in its Facilities Division



# Why Energy Is Important: Environment



- Energy use in buildings is a huge percentage of U.S. energy consumption
- Energy is the “gift” that keeps on giving
  - Impact on environment continues for the life of the building
  - Impact on operating costs continues for the life of the building
- EPA-FMSD considers energy use the #1 environmental impact of a building

# Why Energy Is Important: Economics



- EPA's owned real estate portfolio consists of laboratories, which are energy intensive
- Laboratories use 5 to 10 times the energy of a comparably sized office building
- In laboratories particularly, energy efficiency pays for itself in the short term

# Why Energy Is Important: Advocacy



EPA wants its buildings to reflect its mission, so we work on energy consumption “visibly” and “invisibly”

# How EPA “Greens” Vis-a-Vis Energy

- Every stage in the life of a building is important
- We borrow everyone’s good ideas and ENERGY STAR is a good idea

# LEED® /Design/Energy



- EPA uses LEED® for considering the environmental performance of our new buildings
- LEED has become the common language of green building
- LEED isn't perfect, and it is being revised and improved
- LEED falls short: it doesn't require any energy points
- LEED does require commissioning
- LEED is a design standard not a performance standard
- LEED Plus: EPA adds additional environmental and energy provisions in our procurements
- EPA particularly concentrates on energy performance specifications and metrics in EPA's new buildings

# How EPA Does Energy in New Buildings

- EPA used “30% better than ASHRAE 90.1 – 1999” as a goal
- EAct 2005 raises the bar to 30% better than ASHRAE 90.1-2004
- Since design is not necessarily a good indicator of performance, EPA also uses ENERGY STAR Building Certification as an operating performance guarantee for new offices
- Can't use ENERGY STAR for labs ☹
- Design competitions where possible on build-to-suit leases
  - Environmental performance and particularly energy performance are key evaluation factors
- Energy modeling on new major build-to-suit leases and major new EPA owned buildings
  - Identifies opportunities to improve energy performance
- Working on better specifications for energy performance in our buildings



# Commissioning

- In 2002, EPA institutionalized commissioning in our Building and Facilities capital budgeting process

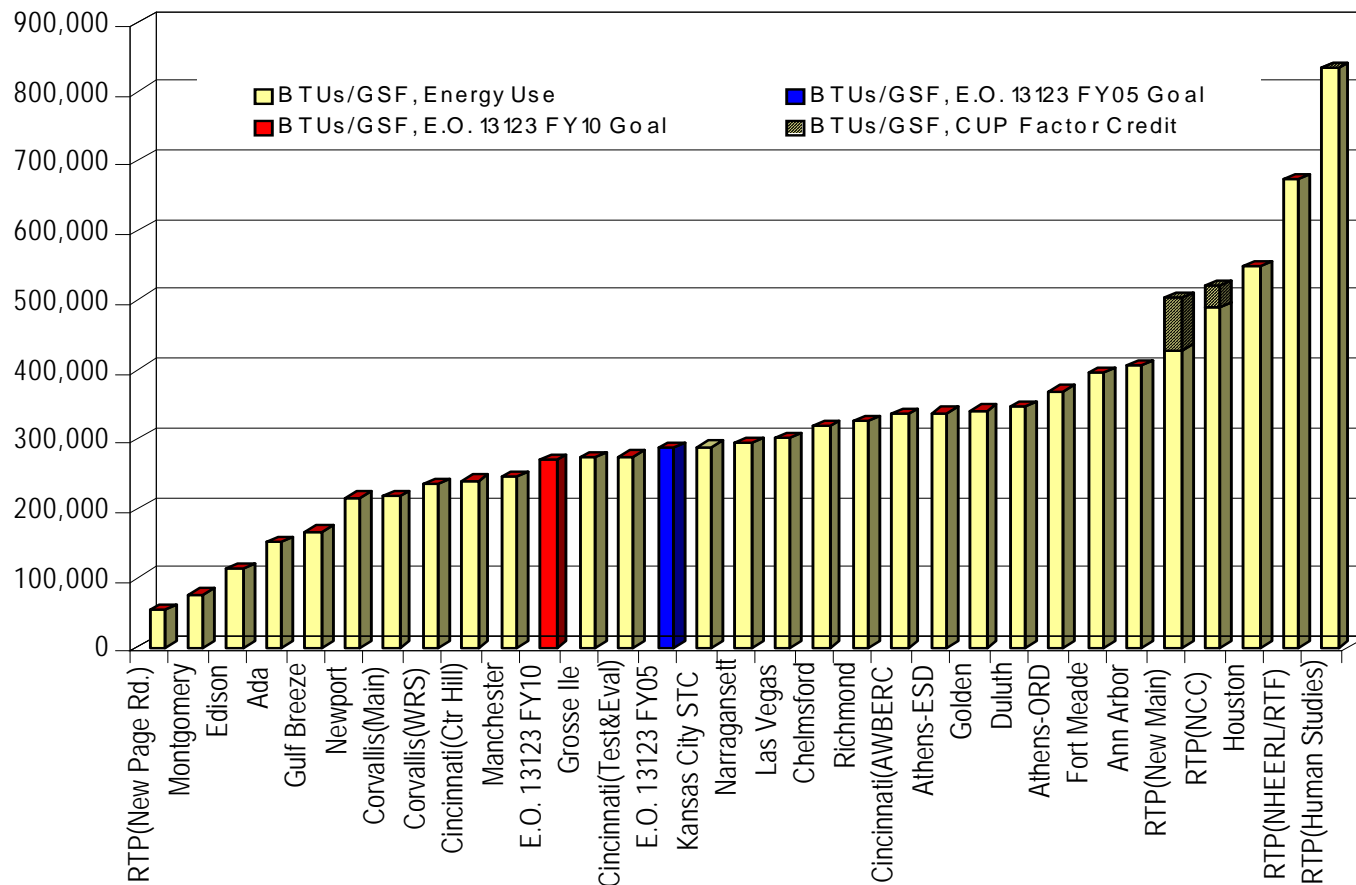


# Operations and Maintenance

- Continuous ENERGY STAR Building Certification requirements for NOVA
- Pilot O&M assessment project
- Buildings are getting smarter than the people we have operating them
- Joint GSA/EPA Federal Triangle O&M evaluation
- EPA lab O&M evaluation
- Re-commissioning is our most effective energy program

# Monitoring and Measurement

## Energy Use in BTUs/GSF/FY 2005



- EPA reports quarterly on our laboratories; working on quarterly reporting for new major office building leases

# Building Better Energy Specifications for Our Buildings

## A Tale of Three Cities:

- Denver Regional Office – design competition with environmental performance evaluation factors
- Potomac Yard – low-cost procurement, speculative building, dropped from 30% to 20% energy performance requirement literally at the last minute, but maintained ENERGY STAR rating
- Boston Regional Office – renovation of a historic 1930 post office and court house to house EPA and other federal tenants; under-funded; space constraints for mechanical systems; historic windows

# Building Better Energy Specifications for Our Buildings (cont.)

	ASHRAE 90.1-1999	ASHRAE 90.1-2004	ENERGY STAR
Potomac Yard	19%	16%	93
Denver RO	36%	32%	86
Boston	15%	9%	88

- Preliminary study results – not peer reviewed
- Regulated loads, total savings lower on total load basis
- ASHRAE works on a energy budget (\$) basis, not a BTU basis, so need to convert back to energy

# Building better energy specifications for our buildings (cont.)

- EPAAct 2005: ASHRAE 90.1-2004 may be a tough standard for the federal government to meet
- EPA will move to a dual performance system: design and performance
- EPA may begin to designate a base case or base energy performance target and evaluate proposals based on improvements above that base case

# Labs21



**L A B S F O R T H E 2 1 S T C E N T U R Y**

- A voluntary program dedicated to improving the environmental performance of U.S. laboratories
- 32 public and private sector laboratory Partners
- More than 120 Supporters, made up of trade associations, energy services contractors, architecture/engineering firms, and independent energy consultants
- 2006 Annual Conference- San Antonio, Texas; October 17-19, 2006

# Contact Us

- Sustainable Facilities Practices Branch  
Bucky Green (202) 564-6371

**[WWW.EPA.GOV/GREENINGEPA](http://WWW.EPA.GOV/GREENINGEPA)**



# Discussion



- What strategies have worked for you?
- How can energy managers get involved in the design process?
- Tips for working with A&E firms?

# Summary: Ensuring Energy Performance

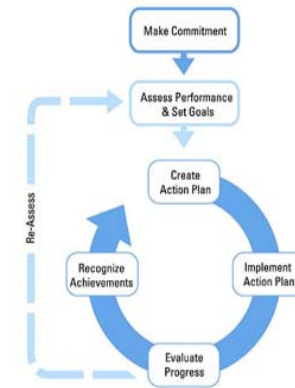


- ✓ Make the case for energy efficient & energy team involvement
- ✓ Create a real energy goal: kBtu/sq/ft
  - EPA's Target Finder can help
- ✓ Real integration of building systems
  - Form Integrated Design/Project Team
  - Whole building performance targets necessary
- ✓ Set goals and monitor throughout process
  - Need measurable goals that track through design, construction and operation cycle
- ✓ Accountability through entire process
  - Every stakeholder plays a role and accountable for their part
  - Use Portfolio Manager to do M&V
- ✓ Commitment to continuous management
  - Green is not a point in time but affects decision making throughout lifecycle

# Path to Energy Efficiency



- Estimate Energy Use at Design
  - Target Finder
- Verify energy use in operation
  - Portfolio Manager
- Reduce energy across portfolio
  - ENERGY STAR Guidelines for Energy Management



# Upcoming Web Conferences



March 15 – Lighting Choices & Strategies

April 19 – Profiles In Energy Management  
Leadership

Download past web conference presentations at:  
[www.energystar.gov/networking](http://www.energystar.gov/networking)



Thank you for participating!