



Energy Efficiency in Buildings

Climate Leaders Conference

October 7, 2008

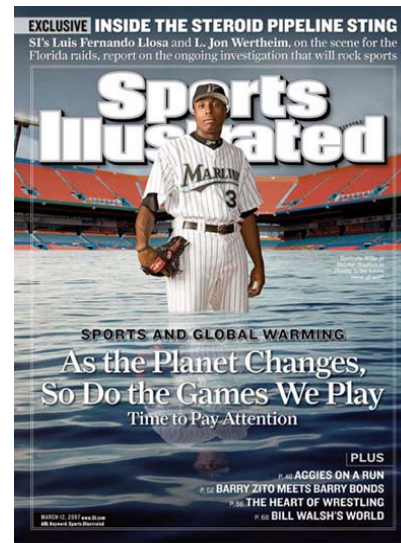
Audrie Hicks-Washington
U.S. Environmental Protection Agency

Agenda



- **Background - Climate Change and Buildings**
- **Legislative Response**
- **Prepare for a Carbon-constrained Future**

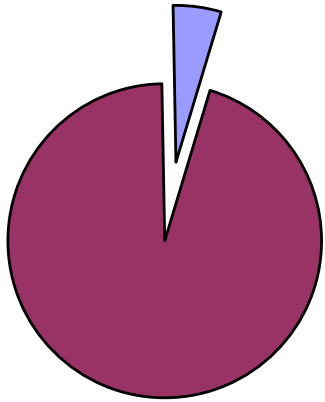
Global Warming is Everywhere



The Global Picture: US Energy Consumption



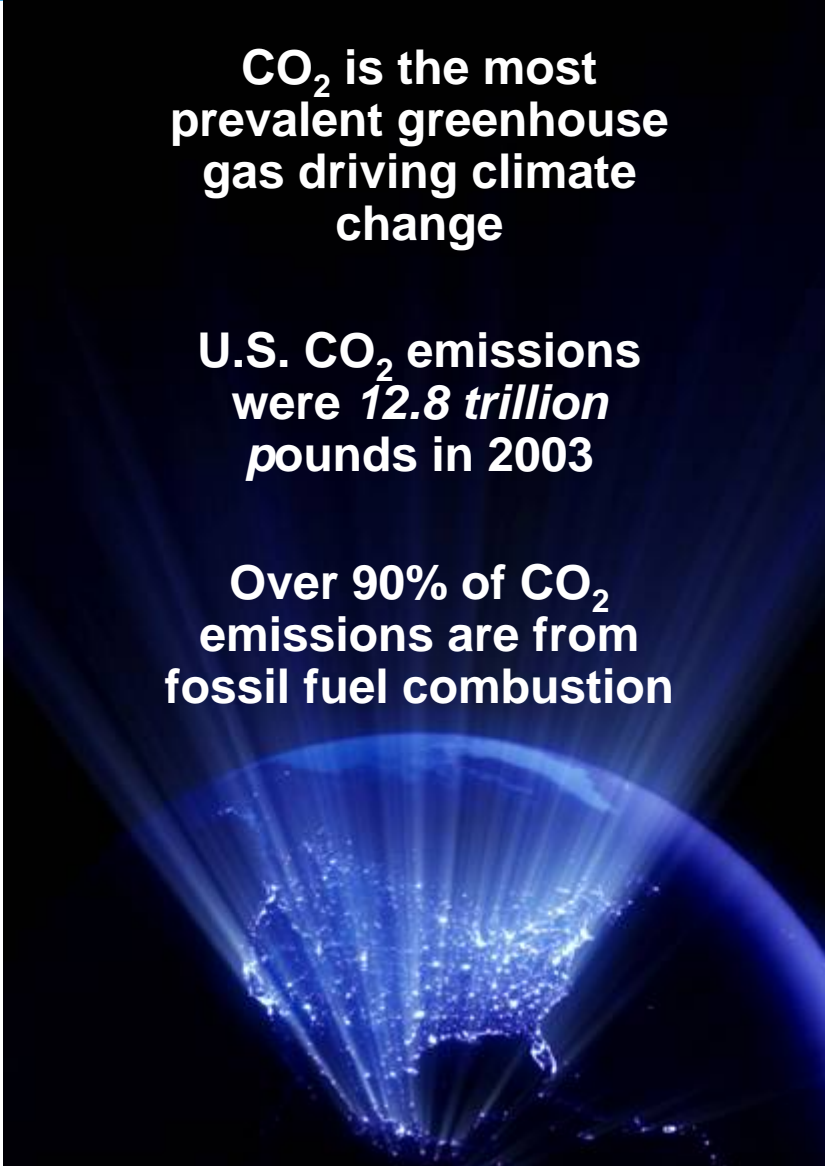
The US
represents 5%
of the world
population...



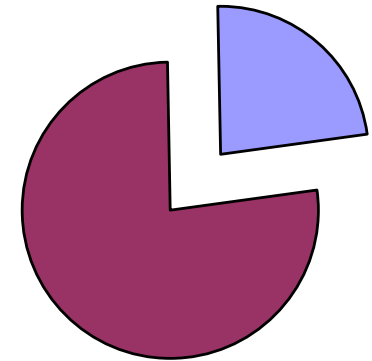
CO₂ is the most
prevalent greenhouse
gas driving climate
change

U.S. CO₂ emissions
were *12.8 trillion*
pounds in 2003

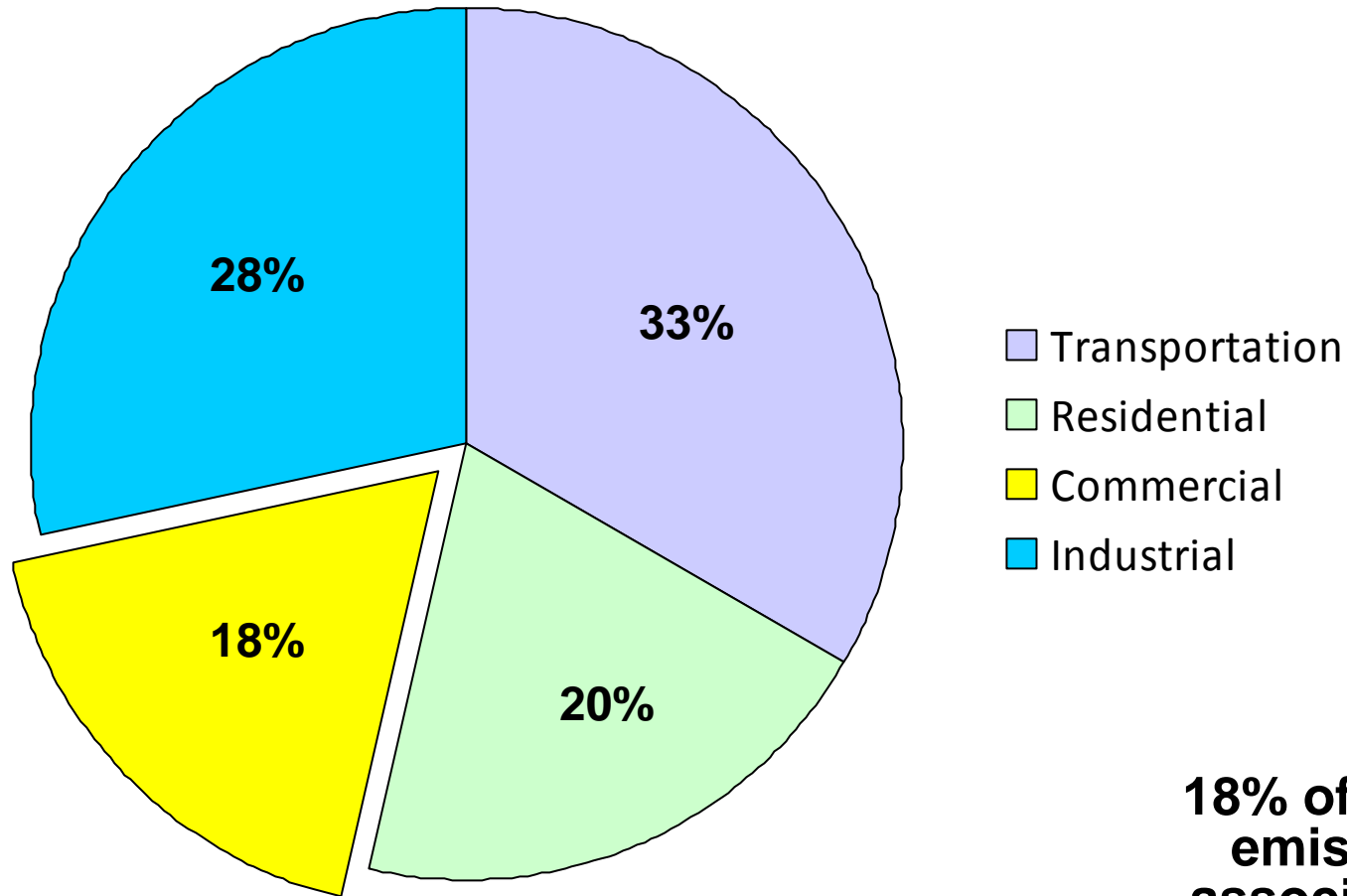
Over 90% of CO₂
emissions are from
fossil fuel combustion



...But emits 23% of
the world's
carbon dioxide (CO₂)

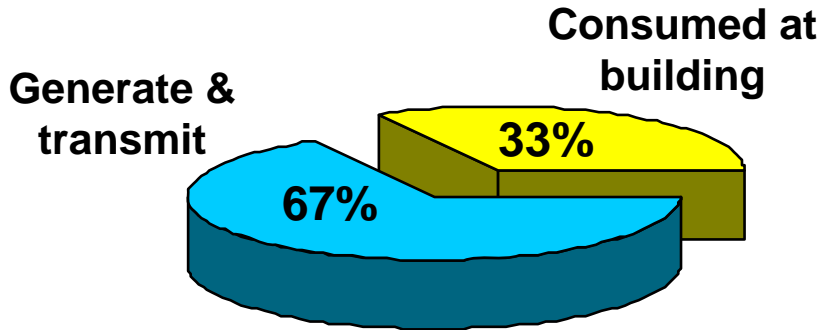


U.S. Carbon Dioxide Emissions by Sector



18% of U.S. CO₂ emissions are associated with commercial building energy use

Losses in Energy Generation and Transmission to Buildings



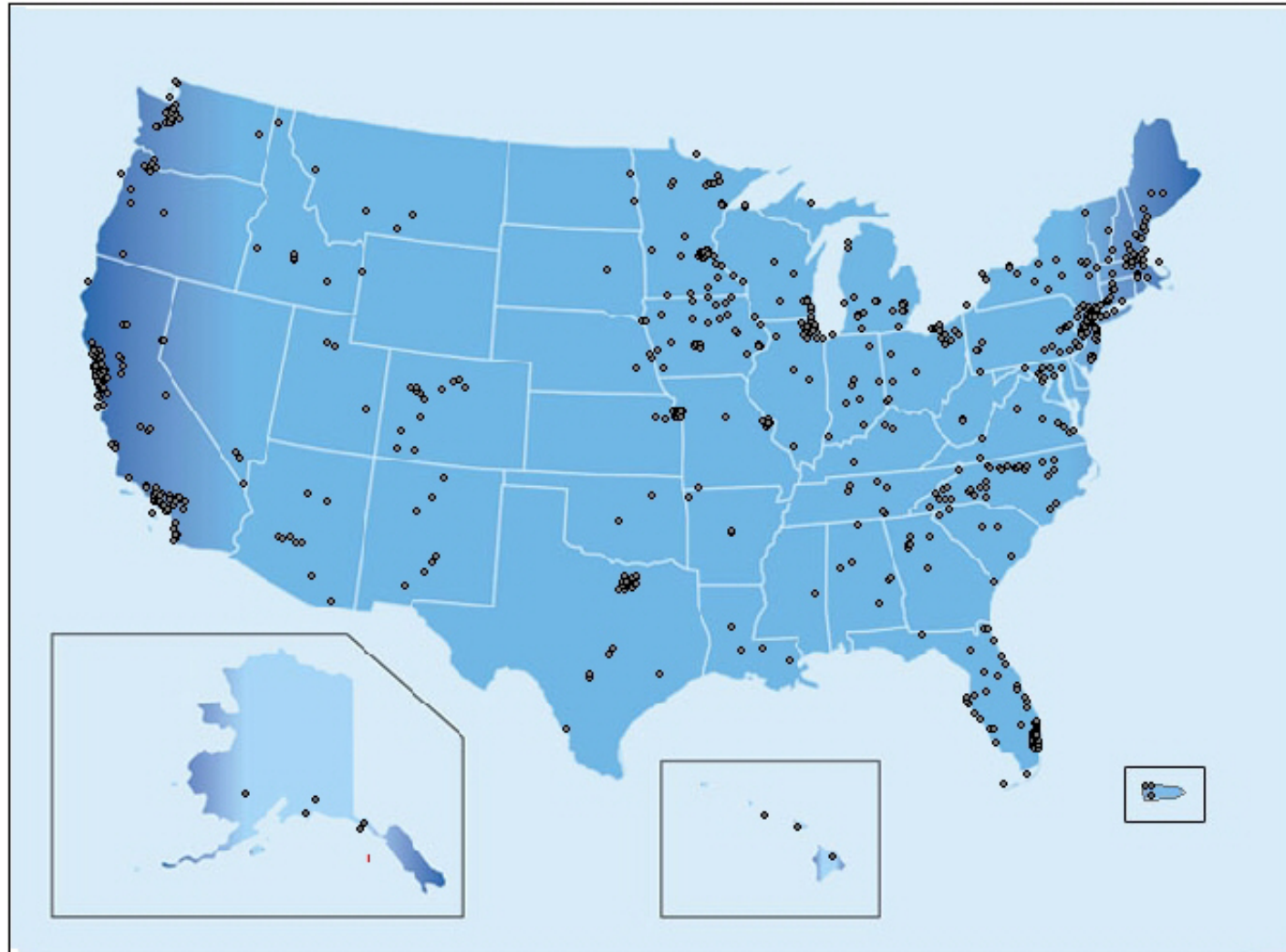


Legislative Response

Mayors Drive Climate Protection



- US Mayors Climate Protection Agreement
- 850 Mayors joined
- Agree to meet or beat Kyoto targets by 2012



Cities and States Adopt Energy and Green Legislation



Examples:

- **City of Denver, CO:** Executive Order 123
- **Borough of West Chester, PA:** Zoning Ordinance
- **Illinois:** State Joint Resolution 27, 2007
- **State of California:** Assembly Bill 1103

***For a list of all legislation incorporating Energy Star,
Visit www.energystar.gov/government***

Lieberman-Warner Climate Security Act: “roadmap for the next President”

- ▶ Reduce greenhouse gas emissions by:
 - 25% below 2005 levels by 2020
 - 66% below 2005 levels by 2050
- ▶ Establish a cap and trade system
- ▶ Strengthen appliance and building code energy efficiency requirements

Looking Ahead . . .

**Prepare for a Carbon-constrained
Future**

Start Now with ENERGY STAR!



ENERGY STAR is . . .

- **Environmental leadership through superior energy performance**
- **Guidance, tools, and resources help organizations achieve superior energy performance**
- **Internationally recognized* brand**



**Recognized internationally across Europe, Australia, Japan, and Canada.*

ENERGY STAR for Buildings



- **Benchmarked buildings:**

62,000+ buildings, representing ~7.5 billion square feet measured energy performance with ENERGY STAR

- **Energy and environmental savings:**

Use 40 percent less energy than average buildings
emit 35% less carbon emissions

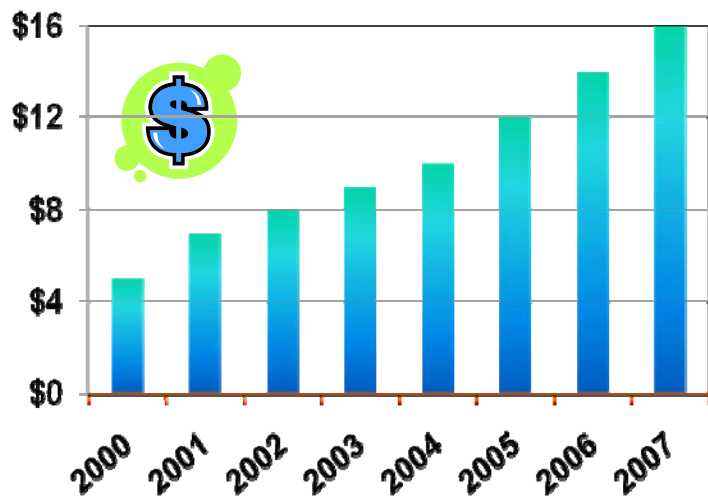
- **Financial savings:**

Utility bills are over 50 cents per square foot less than average buildings'

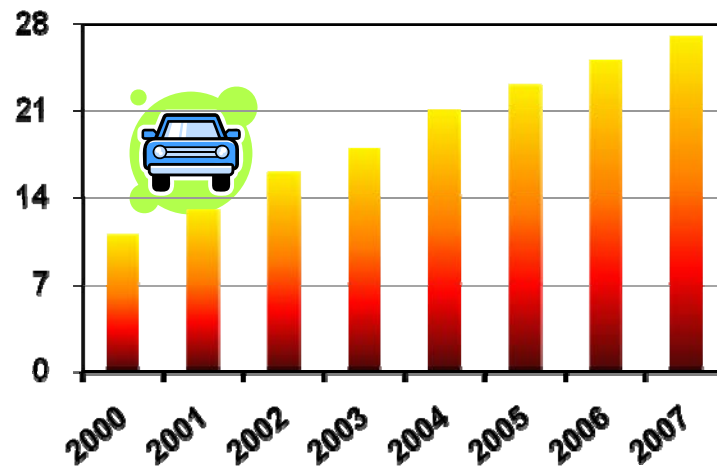
Successful Program!



Utility Bill Savings
(\$ Billions)



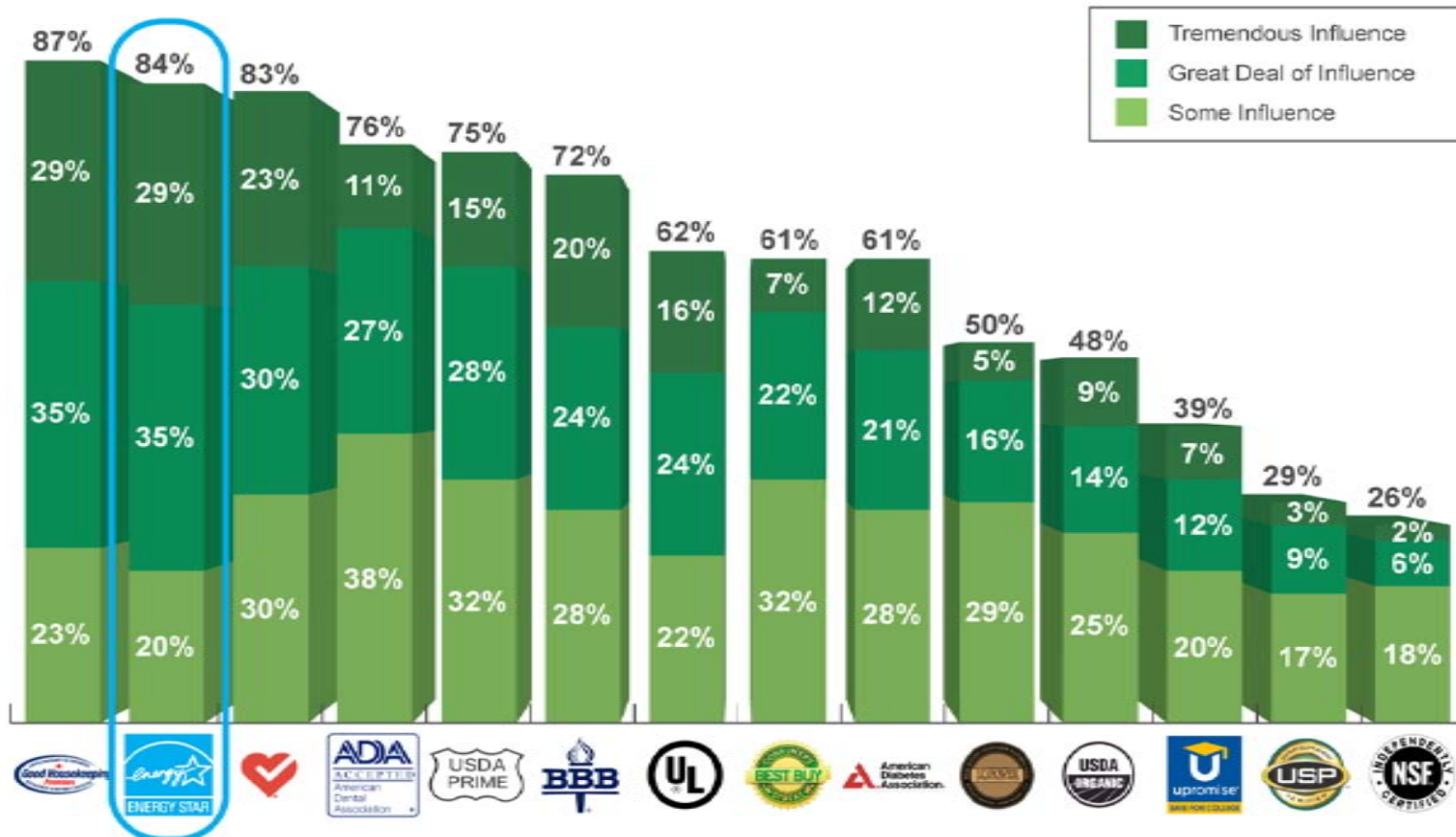
Emission Savings
(Vehicle equivalents millions)



Over 12,000 ENERGY STAR Partners

- Reduced 5% nation's electricity demand
- Saved Americans \$16 billion on utility bills
- Equivalent to 27 million cars

Energy Star Awareness



Source: Fairfield Research, Summer 2007



ENERGY STAR

Technology ≠ Performance



60% of building fan systems
oversized on average

(Source: EPA fan study)

Chillers oversized by 50-200%

(Source: Lawrence Berkeley National Laboratory)

Improper installation and poor maintenance

How well is your building performing?



Is 10 MPG high or low for an automobile?

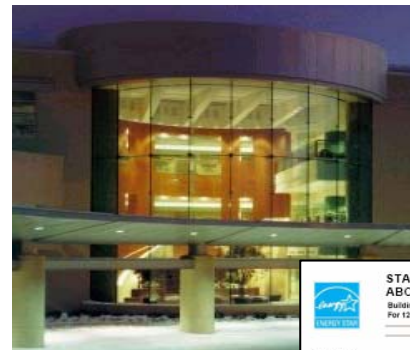


Answer: Common Knowledge

Fuel Efficiency
MPG



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



Answer: Even some facility experts don't know

Energy Efficiency
1 - 100

STATEMENT OF ENERGY PERFORMANCE			
ABC Hotel			
Building ID: 1043797			
For 12-month Period Ending: February 29, 2004*			
ABC Hotel 123 Hospitality Drive Somerville, IL 12345 Gross Building Area: 650,000 ft ² Year Built: 1980		Owner: ABC Office Contact: Sammie Peterson 123 Office Building Drive Somerville, IL 12345 123-45-6789	
Facility Space Use Summary			
Space Type	Area(ft ²)	Number of Rooms	Cooking Facility
Hotel (Upper Upscale)	650,000	514	Y
Site Energy Use Summary			
Electricity (kBtu)	32,560,768	Professional Verification Johnson M. Joe	
Natural Gas (kBtu)	0	Licensed Number: 123 State: CA	
Total Energy (kBtu)	32,560,768		
Results			
Energy Performance Rating ¹ (1-100)	50		
Energy Intensity ²			
Site (kBtu/ft ² -yr)	50.1		
Source (kBtu/ft ² -yr)	151.1		
Emissions			
CO ₂ (1000 tpy/yr)	54,720		
SO _x (1000 tpy/yr)	2,647		
NO _x (1000 tpy/yr)	122		
Indoor Environment Criteria³			
Indoor air pollutants controlled?	Not Assessed	Professional Engineer Stamp	
Adequate ventilation provided?	Not Assessed	Based on the conditions observed at the time of my visit to the building, I certify that the information contained on this statement is accurate.	
Thermal conditions met?	Not Assessed		
Adequate illumination provided?	Not Assessed		
<small> Note: 1. Application for ENERGY STAR must be submitted to EPA within 4 months of the Period Ending date. Award of ENERGY STAR is not final until approval is received from EPA. 2. Natural Gas values are units of energy (kBtu) and are converted to kBtu with appropriate metric conversion factors based on Facility use code. 3. An energy performance rating (EP) is calculated for each building based on the information provided on this statement. 4. Owner Name: ABC Hotel 5. Based on meeting ASHRAE Standard 90.1-1999 for indoor air quality, ASHRAE Standard 55-1982 for thermal comfort, and IESNA Lighting Handbook for lighting quality. </small>			

U.S. EPA Energy Performance Rating System



Comparison to Peer Buildings

Normalizes building energy consumption

Weather-normalized whole building “mpg” rating

Benchmarks for comparison

Similar buildings in national stock

Recognizes top performing buildings

Top 25% qualify for ENERGY STAR



Eligible Space Types



Hospitals



Retail



Office Buildings



Hotels



Medical Office Buildings



Waste Water Treatment Plants



Courthouses



Financial Centers



Warehouses



Dormitories



Supermarkets



Schools



Benchmarking Data Needs



General

Address
Year built

Energy Consumption

12 consecutive months for each source (electric, gas, etc.)

Space Type Data

Square Footage
Occupancy
Number of PCs
Hours of operation
% Heated and Cooled



“Track your energy related carbon emissions with Portfolio Manager.”

Future Enhancements in Portfolio Manager



■ Enhanced tracking of greenhouse gases (GHG)

- Methane (CH₄)
- Nitrous Oxide (N₂O)

■ Greater flexibility to view data – Oct. 2008

- Site Energy Use (kBtu)
- Direct, Indirect and Total Emissions (metric tons CO₂)
- Baseline Total Emissions (metric tons CO₂-eq)
- Change from Baseline: GHG emissions (metric tons CO₂-eq)

■ New GHG Performance Review – Jan. 2009

- Downloadable Excel for Climate Leaders
- Links to other EPA carbon calculators
- Refrigerants
- Other pollutants (SO_x, NO_x, Hg)
- Expand district steam factors to account for co-generation

Apply for the ENERGY STAR Label

Energy Performance Rating 75 to 100

Obtain Professional Engineer Verification

Submit SEP & Application



Create and Submit Building Profile

Must meet IAQ standards for lighting, ventilation, and thermal comfort (ASHRAE)

Partner of the Year Awards



EPA Target Finder Tool



**Set energy targets
and rate building
estimated energy
use . . .**



Take the ENERGY STAR Challenge



National Call to Action



Benchmark and improve building energy efficiency by 10 percent or more portfolio-wide.

Annual:

- ◆ **Financial savings**
\$20 billion
- ◆ **Environmental impact**
Reduce ghg emissions =
30 million vehicles

www.energystar.gov/challenge

Get Started



Free Webinar benchmarking trainings held monthly

Upcoming Sessions:

Nov. 11 at 12:00 EST

Office Buildings: Rating Energy Performance with EPA's Portfolio Manager

Nov. 11 @ 1:00 EST

ENERGY STAR and the LEED Rating System

Nov. 12 @ 12:00 EST

Best Practices to Improve Energy Performance in Commercial Real Estate

Register at: www.energystar.gov/training

Contact Information



Audrie Hicks-Washington
U.S. EPA - Region 5 Chicago
Washington.audrie@epa.gov

Anna Stark,
U.S.EPA – Headquarters, Washington, DC
Stark.anna@epa.gov

ENERGY STAR Hotline

1 888 STAR YES (1.888.782.7937)

ENERGY STAR Website

www.energystar.gov