Busting Myths about Energy Efficiency and ENERGY STAR

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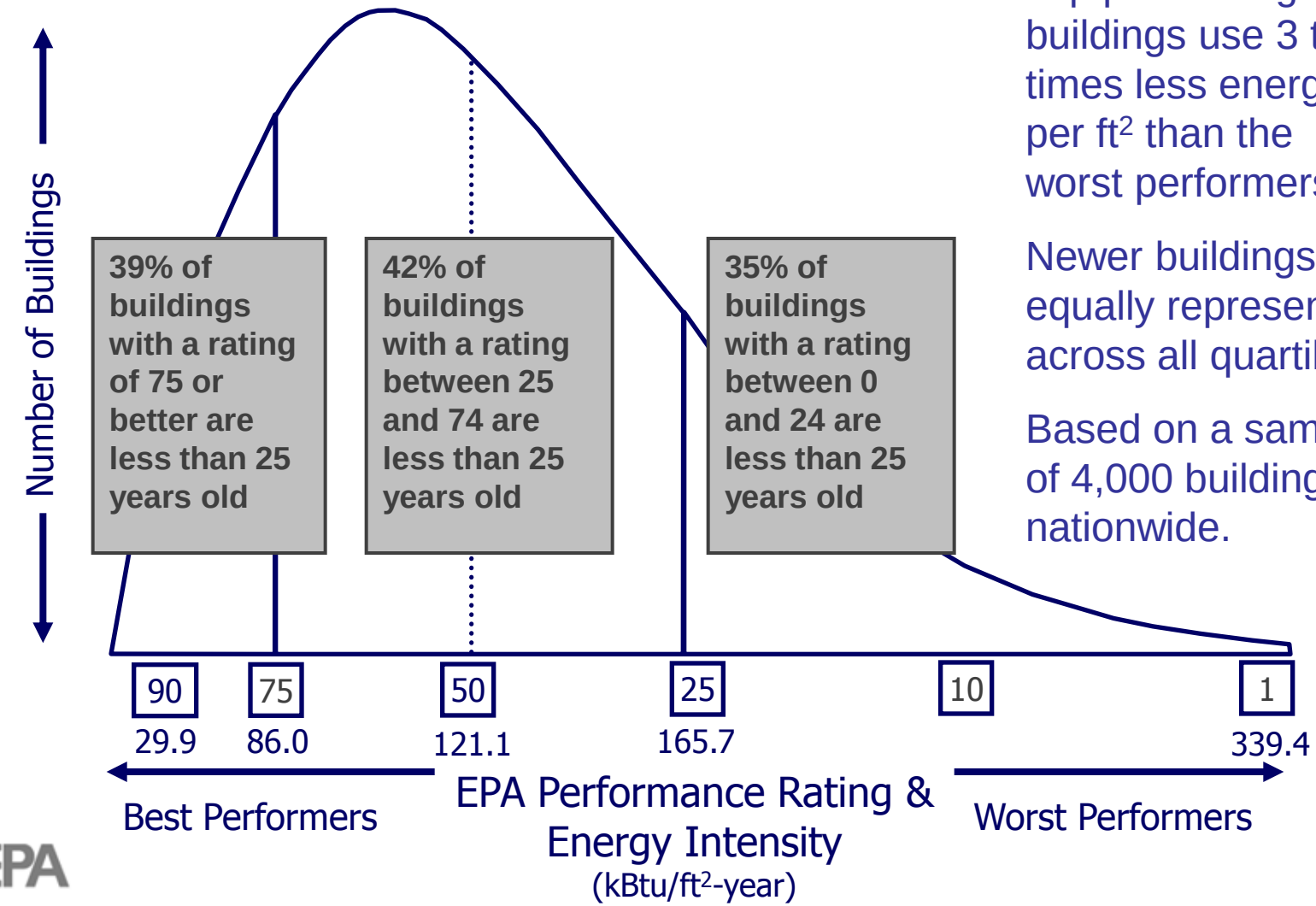
Conventional Wisdom?

- New buildings are more efficient
- Lack of financing is *the* major barrier to efficiency
- I'm putting PV panels on my building's roof, so I don't need to worry about efficiency
- My ENERGY STAR buildings don't have any more room to improve
- The kind of fuel my building uses determines its ENERGY STAR score
- To get an ENERGY STAR score, EPA compares my buildings' energy use to the other buildings in Portfolio Manager
- EPA doesn't want to create an ENERGY STAR scale for [libraries, museums, sports centers, fire stations…]

DOES NEW = EFFICIENT?

New Doesn't Always Equal Efficient

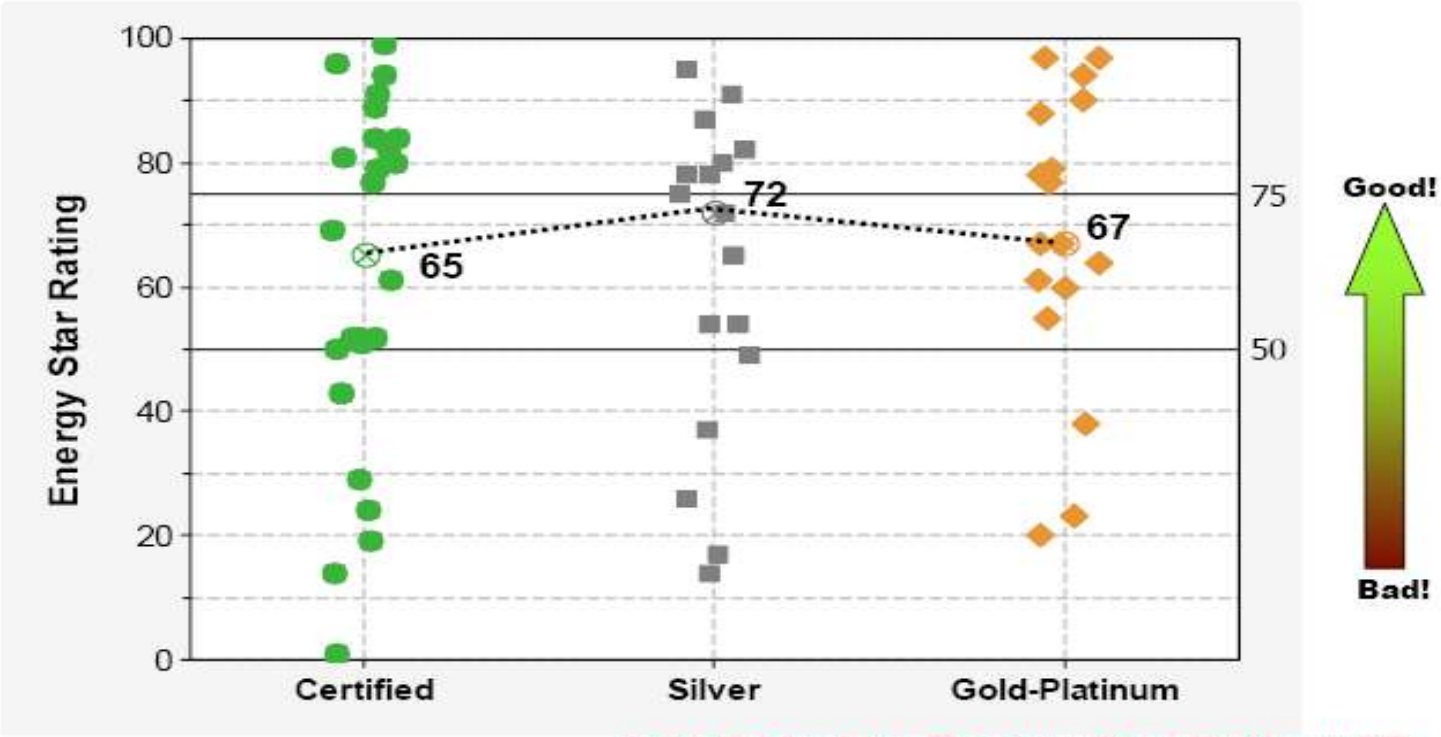


Top performing buildings use 3 to 4 times less energy per ft^2 than the worst performers.

Newer buildings are equally represented across all quartiles.

Based on a sample of 4,000 buildings nationwide.

ENERGY STAR Rating for LEED Certified Buildings



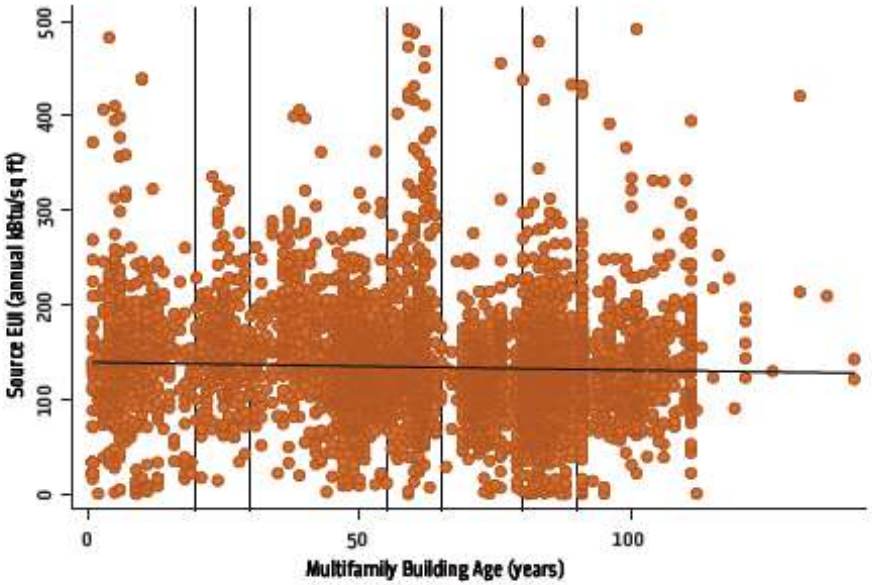
LEED Median Energy Star Rating: 68

nbi
USGBC

Energy Star Rating by LEED Level

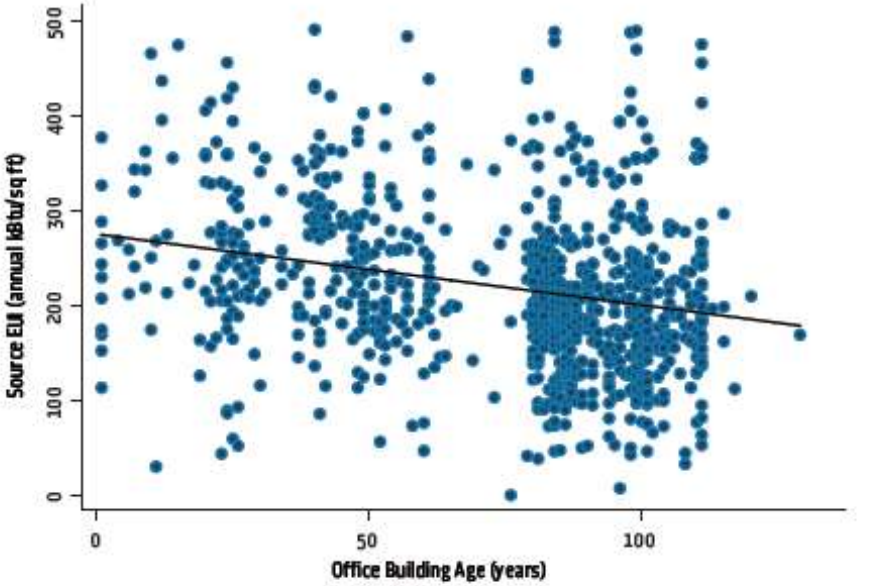
Factors that contribute to energy consumption: Age

Figure 22: Scatter Plot of Multifamily Building EUI Versus Age



Source: New York University

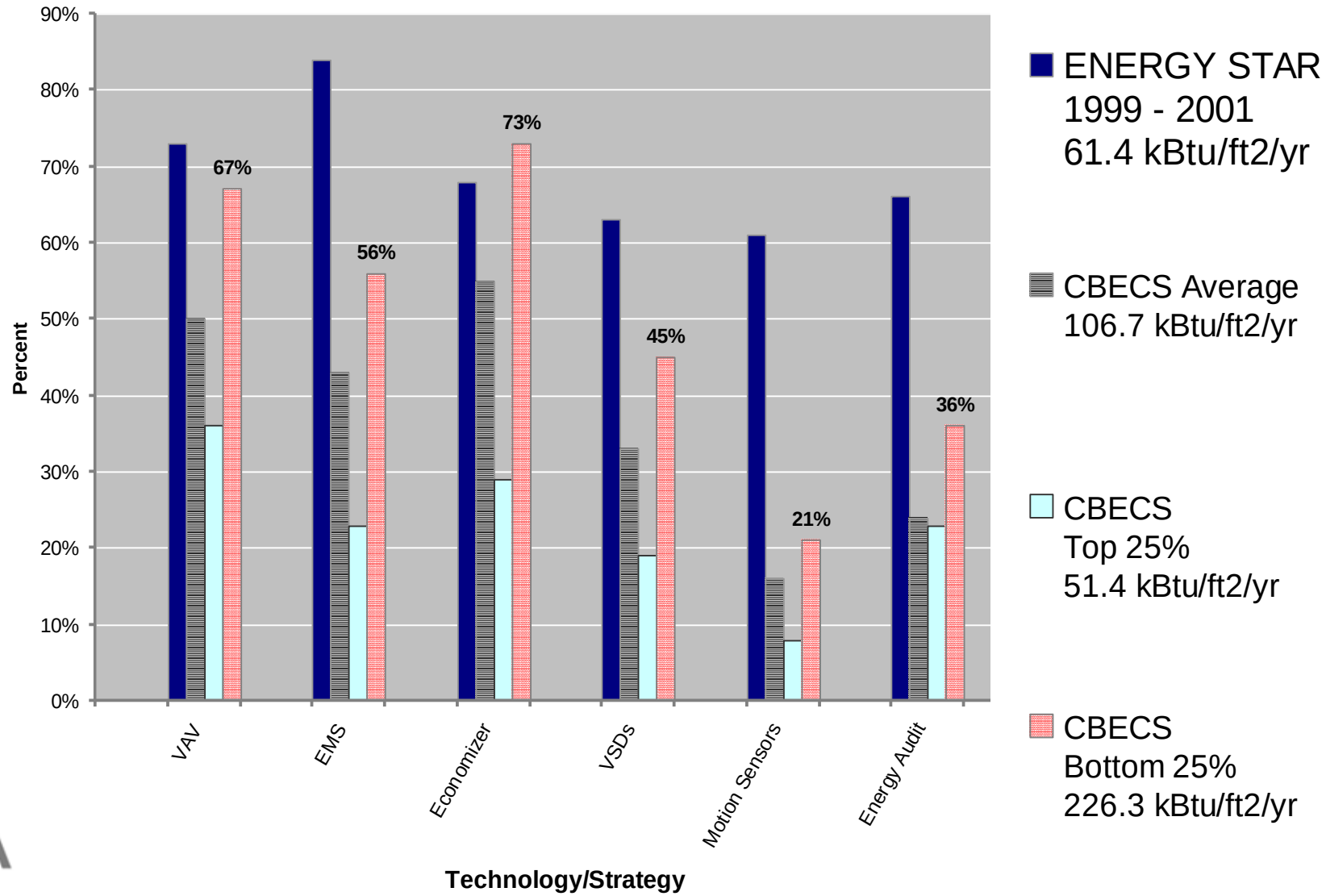
Figure 23: Scatter Plot of Office Building EUI Versus Age



Source: New York University

Source: NYC presentation at GreenGov Symposium

Technology Doesn't Always Equal Performance



Why Do New Buildings Sometimes Under-Perform?

- Not designed to an energy target
- Value engineering
- Oversizing of equipment
- Improper installation
- Not always properly commissioned
- Complicated systems

IS LACK OF FINANCING THE MAJOR BARRIER?

The ENERGY STAR Experience

- Many efficiency opportunities are low cost
  - Operations & Maintenance – keeping equipment serviced, evaluating controls, set points and schedules, etc
  - Tenant, occupant, and consumer awareness and engagement
  - Behavior changes
- Where there is high level commitment and good information, investment follows
- Example: Memorial Hermann hospitals reduced energy use 20% across portfolio through low-cost measures

"We are paying for energy efficiency projects *whether or not* we do the projects!"

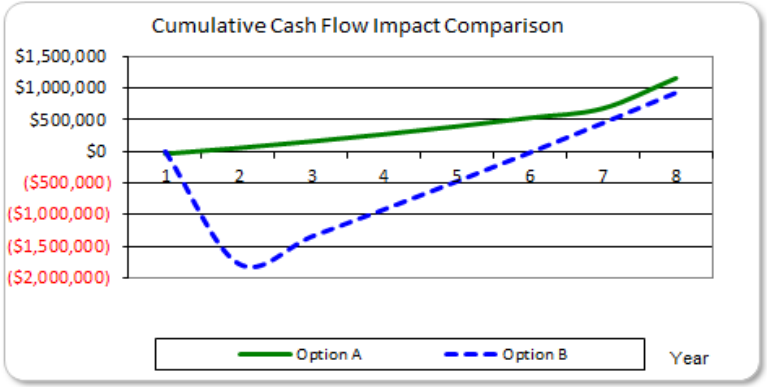
CFO Calculator Quantifying the COST OF DELAY

Cash Flow Opportunity Calculator

HELP SAMPLE VALUES

COST OF DELAY and CASH FLOW ANALYSIS

Amount Financed	1,883,800	$
Simple payback	5	years
	0	month(s)
Interest rate	5.00	%
Financing term	7	years
Year(s) postponed	1	years
Project cost increase due to postponement	5.00	%
Estimated energy cost change in year 2	10.00	%
Annual change in energy costs after year 2	2.50	%
Estimated energy savings in year 1	75.00	%



These cash flow calculations are on a pretax basis.
For purposes of this calculation, all cash flows are being discounted at the interest rate indicated in cell G7 - financing paid monthly in arrears.

Net Present Value of Option A (Fast Track Financing) **$857,589**

$455,734 **Net Present Value of Option B (Waiting for Cash)**

Fast Track Financing generates $401,855 or 88% more cash than waiting!

	Option A (Fast Track Financing)				Option B (Waiting for Cash)			
Year	Savings	Project Cost including financing	Annual Cash Flow	Cumulative Cash Flow	Savings	Project Cost	Annual Cash Flow	Cumulative Cash Flow
1	$281,176	($319,505)	($38,329)	($38,329)	$0	$0	$0	$0
2	$412,391	($319,505)	$92,886	$54,556	$309,294	($2,082,990)	($1,773,696)	($1,773,696)
3	$422,701	($319,505)	$103,196	$157,752	$422,701	$0	$422,701	($1,350,995)
4	$433,269	($319,505)	$113,763	$271,516	$433,269	$0	$433,269	($917,726)
5	$444,101	($319,505)	$124,595	$396,111	$444,101	$0	$444,101	($473,626)
6	$455,203	($319,505)	$135,698	$531,808	$455,203	$0	$455,203	($18,423)
7	$466,583	($319,505)	$147,078	$678,886	$466,583	$0	$466,583	$448,160
8	$478,248	$0	$478,248	$1,157,133	$478,248	$0	$478,248	$926,408

Important Notice

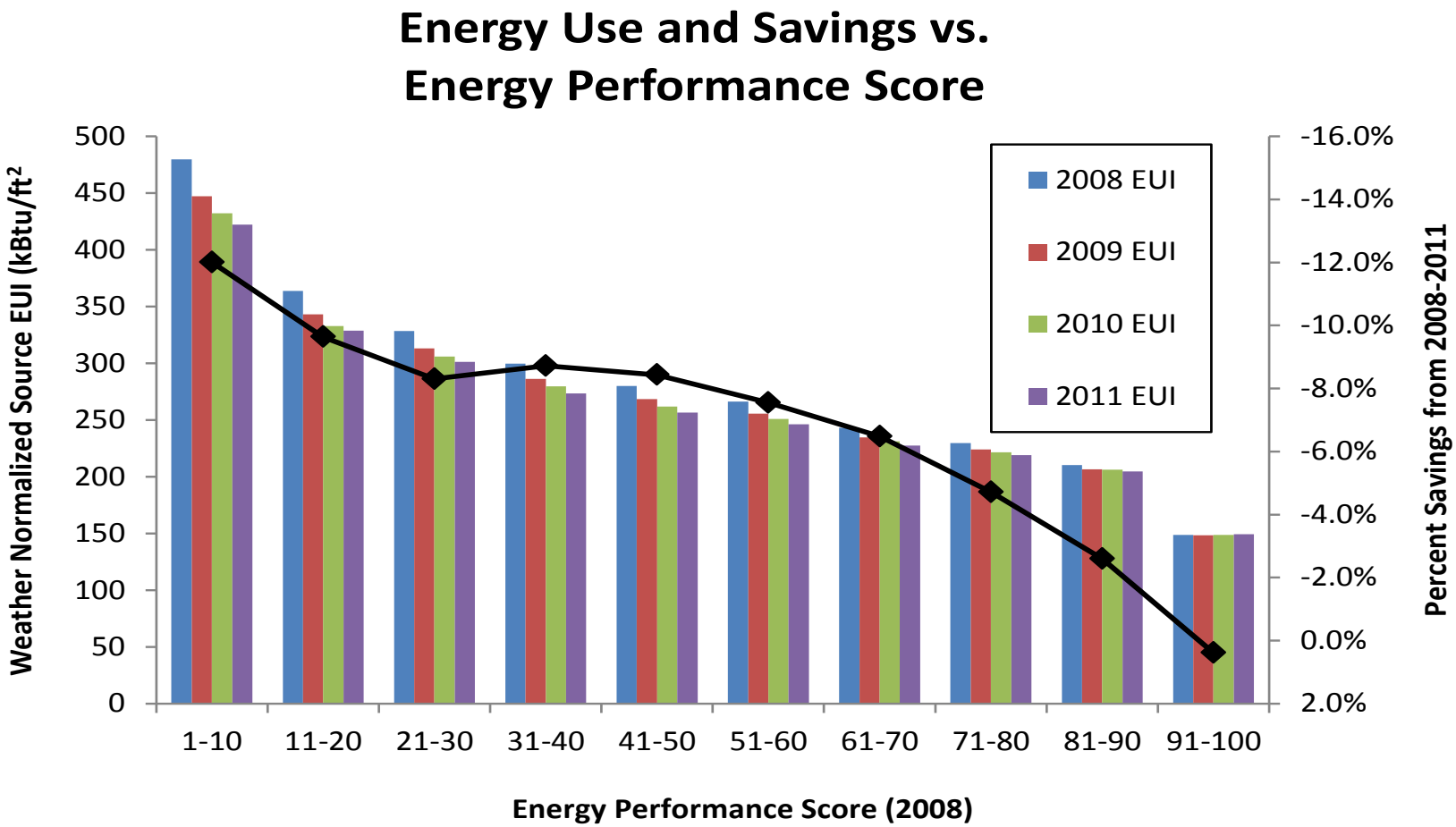
IS RENEWABLE ENERGY A SUBSTITUTE FOR EFFICIENCY?

Efficiency First

- Cost-effective efficiency should be the first step, to reduce total energy use
- Renewable energy can be expensive, so it makes sense to determine the scope of a project after trimming waste
- ENERGY STAR partners have successfully taken this approach

DO ENERGY STAR BUILDINGS HAVE ROOM TO IMPROVE?

It's True That the Least Efficient Buildings Improve the Most



But Substantial Opportunity Exists in Top-Performing Buildings

- ENERGY STAR Partner examples
  - Glenborough, LLC with help from SCIenergy
    - ENERGY STAR Leaders Top Performer in 2008 (portfolio-wide average of at least 75)
    - Leaders 10% improvement in 2009!
    - Leaders Top Performer again in 2009 and 2010
  - USAA building with score of 95 saw large savings in 1st year after parking facility lighting retrofit

ENERGY STAR buildings continue to improve!

- A 2006 study showed that buildings earning the ENERGY STAR in 6 consecutive years are 20% more efficient at end of 6th year
- Current data shows improvement among thousands of ENERGY STAR buildings that re-certify every year

DOES FUEL TYPE BIAS ENERGY STAR SCORE?

Energy Performance and Fuel Type

- **Myth:** Fuel type affects score
- **Fact:** Source energy enables a fair comparison for all fuel types
  - It would not be fair to compare these two buildings with site energy
  - If a building changes fuel source, it will also change its site energy, owing to the use of different heating methods
  - Source EUI shows a fair comparison for different fuel inputs

	Building 1	**Building 2**
Heating System	NG Boiler, 80% system efficiency	Air Source Heat Pump, COP=2.5
Heating Fuel	**Natural Gas**	**Electric**
Heat delivered to Space (MBtu)	1000	1000
Site Energy (MBtu)	1250	400
Source Energy (MBtu)	**1309**	**1336**

DOES EPA COMPARE MY BUILDING TO THE OTHERS IN PORTFOLIO MANAGER?

AND

HOW DOES EPA DECIDE WHEN TO CREATE AN ENERGY STAR SCALE?

Process of Creating ENERGY STAR Score

- **Analyze national survey data**
  - **Commercial Building Energy Consumption Survey (CBECS)**
  - **Independent industry surveys**
- Develop regression models to predict energy use for specific space types based on operations
- Create scoring lookup table
  - Scores are based on the distribution of energy performance across commercial buildings
  - Compares actual energy use with predicted energy use
  - One point on the ENERGY STAR scale represents one percentile of buildings
- Buildings that perform in the 75th percentile or better can earn ENERGY STAR certification

ENERGY STAR Energy Performance Scale Data Source Requirements

- Sample must, at a minimum:
  - Be random and nationally representative
    - Diverse in size
    - Diverse in geography
    - Diverse in ownership/management
    - Sufficiently large to be representative of population
  - Include measured whole building energy (and water) use data for all fuel types
  - Include data on numerous operational characteristics

ENERGY STAR Energy Performance Scale Data Sources

- CBECS
  - Bank/Financial Center, Courthouse, Hotel, House of Worship, K-12 School, Medical Office, Office, Residence Hall/Dormitory, Retail, Supermarket, Warehouse (refrigerated/unrefrigerated)
- Industry Surveys
  - Data Center – Conducted by EPA
  - Hospital – Conducted by American Society for Healthcare Engineering (ASHE)
  - Senior Care – Conducted by Assisted Living Federation of America (ALFA), American Association of Homes and Services for the Aging (AAHSA), American Health Care Association (AHCA), and National Center on Assisted Living (NCAL)
  - Wastewater Treatment Plant – Conducted by American Waterworks Association Research Foundation

Bottom Line: Data is Key

- We need good data to develop a 1-100 scale
- The underlying data, which represents the population, is the basis of comparison
- We are always looking to expand the ENERGY STAR scale to more types of building – but are limited by the available data