

What's Your Score?

Benchmarking Energy Use through ENERGY STAR®

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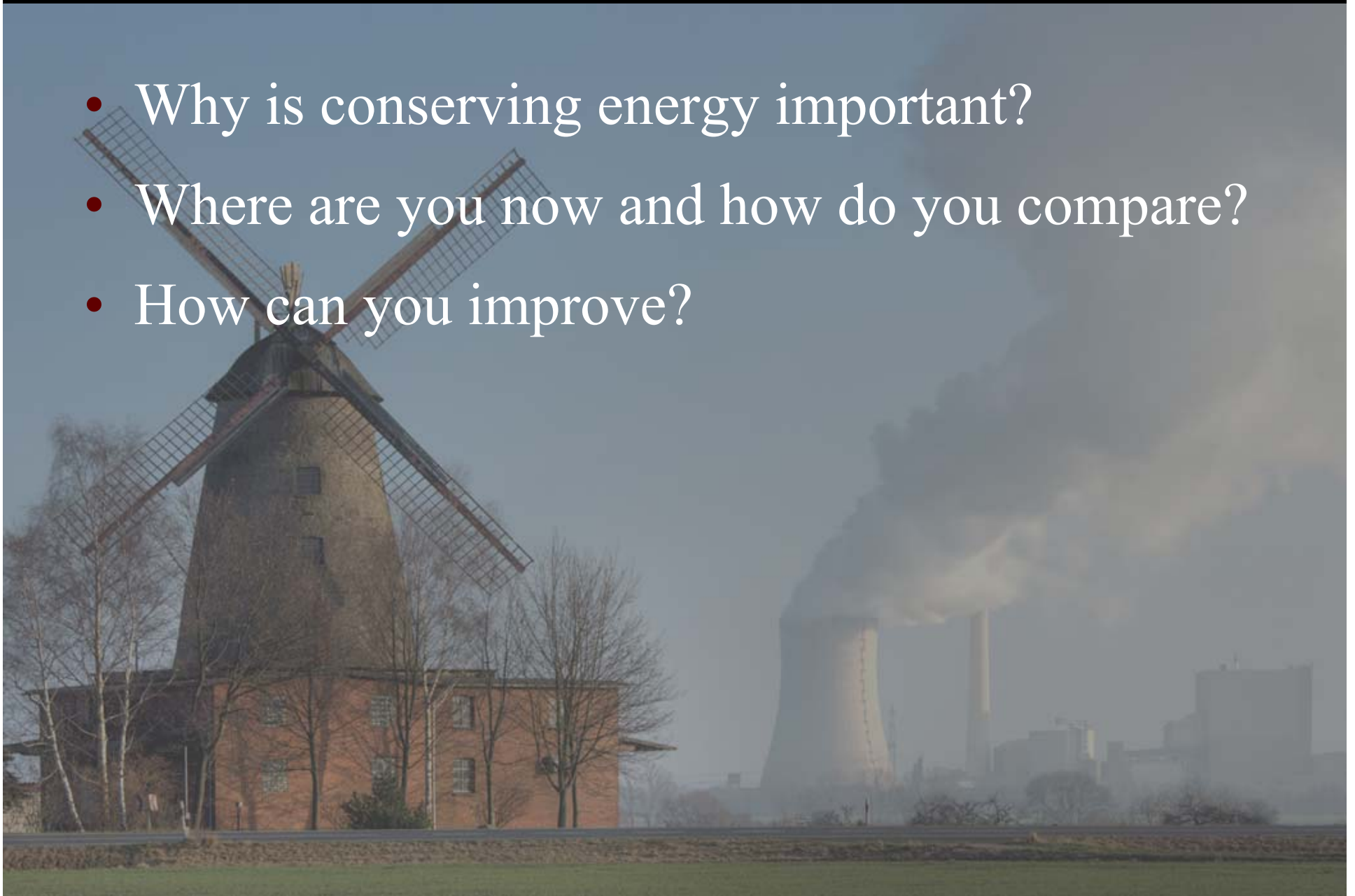


— I N C L U D I N G —



Outline

- Why is conserving energy important?
- Where are you now and how do you compare?
- How can you improve?



Importance of Conservation

Factors encouraging the implementation of Energy Conservation Opportunities (ECOs)

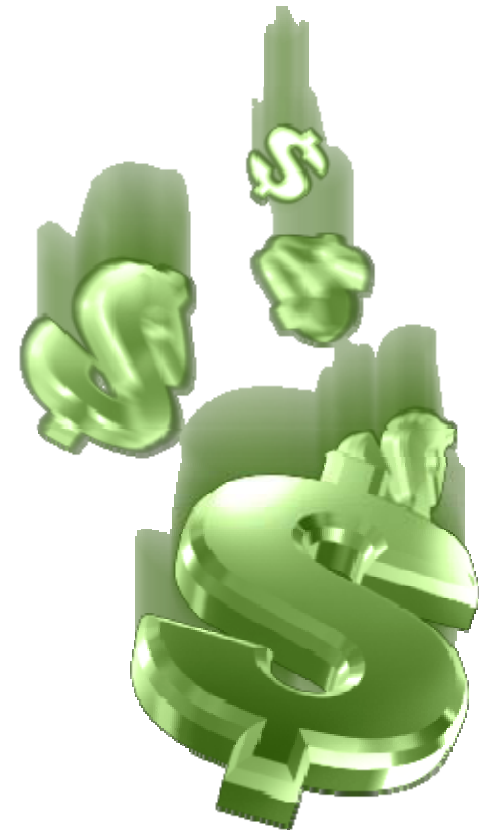
- Global
- National/State
- Organizational
- Personal



Importance of Conservation

Economic -

- Reduced operating costs
- Marketing Advantage
- Potential for Return of Investment
- Reduce costs → Increase Profit
- Higher Asset Values



Importance of Conservation

Economic -

- Increased Profit
 - ↓ Occupancy Costs
 - ↑ Tenant Retention
 - ↑ Occupancy
 - ↑ Rent Revenue



Importance of Conservation

Economic -

- Increased Asset Values

↓ Occupancy Costs

↑ Tenant Retention

↑ Occupancy

↑ Rent Revenue

↑ Increased Cash Flow



Importance of Conservation

Environmental -

- Prevent Pollution
- Emissions Reduction (i.e. CO₂)
- Inefficient energy use → excessive GHG emissions



Importance of Conservation



Majority of carbon dioxide emissions from operations



Importance of Conservation

Emitter	CO ₂ eq Contribution	Tons per Year
You (average human)	2 pounds/day	.36
Your Car	1 ton per 100 gallons of gas	5 – 7
Mother Pig and her Piglets	9.2 tons per year (primarily Methane from effluent)	9.2
Electricity Consumption	Average U.S. Household of 2	8.1
Waste Generation	Average U.S. Household of 2	1.0
Coal Fueled Power Plant (500 Megawatt Plant)	3.7 Million Tons of CO ₂ alone (not including SO _x , NO _x , particulates, and heavy metals)	3.7 Million
Absorber	CO ₂ Removal	Tons per Year
Tropical Zone Trees	50 pounds/year	.025 or 40 trees/ton

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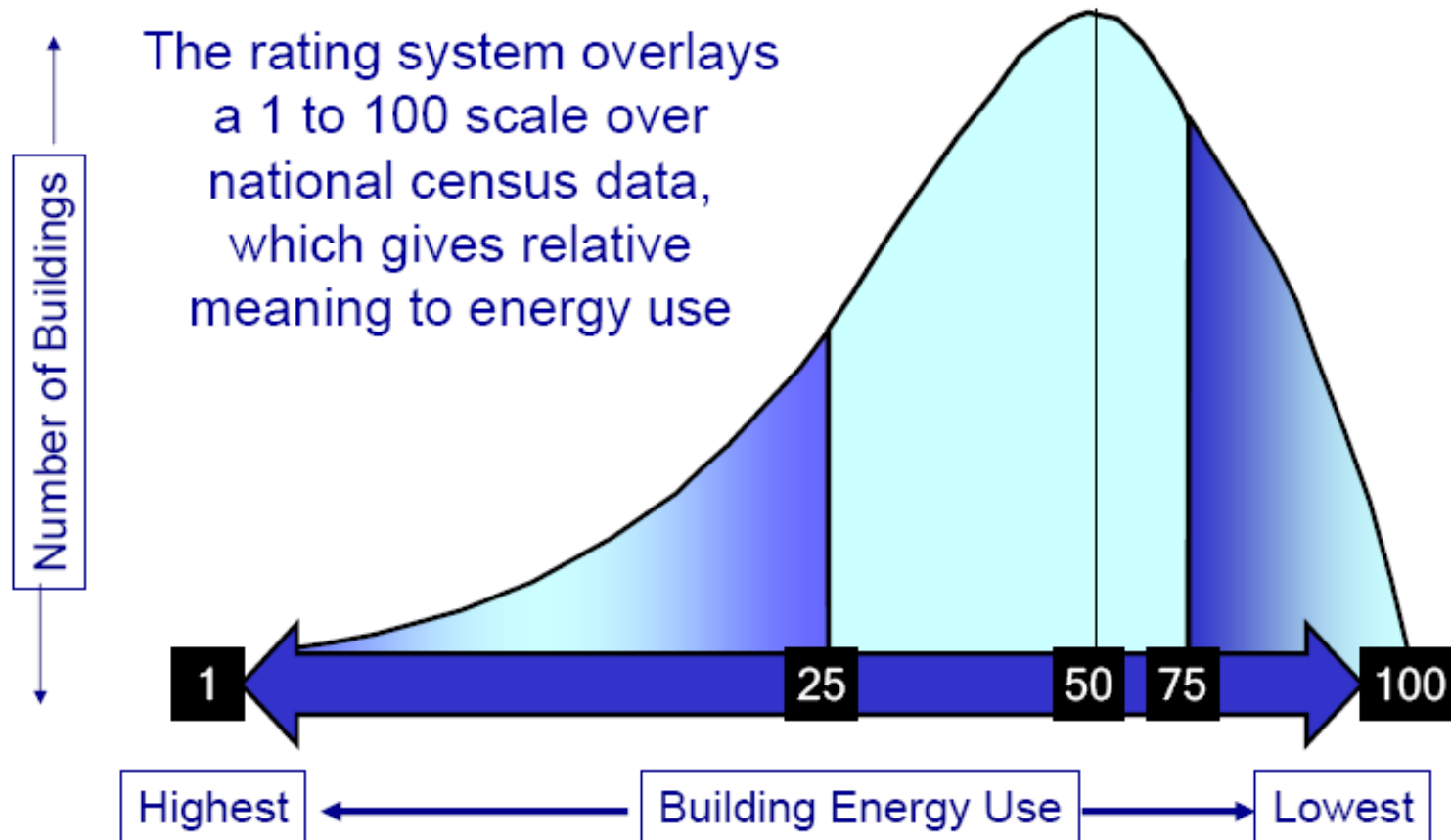
Establishing A Baseline

EPA's ENERGY STAR Portfolio Manager

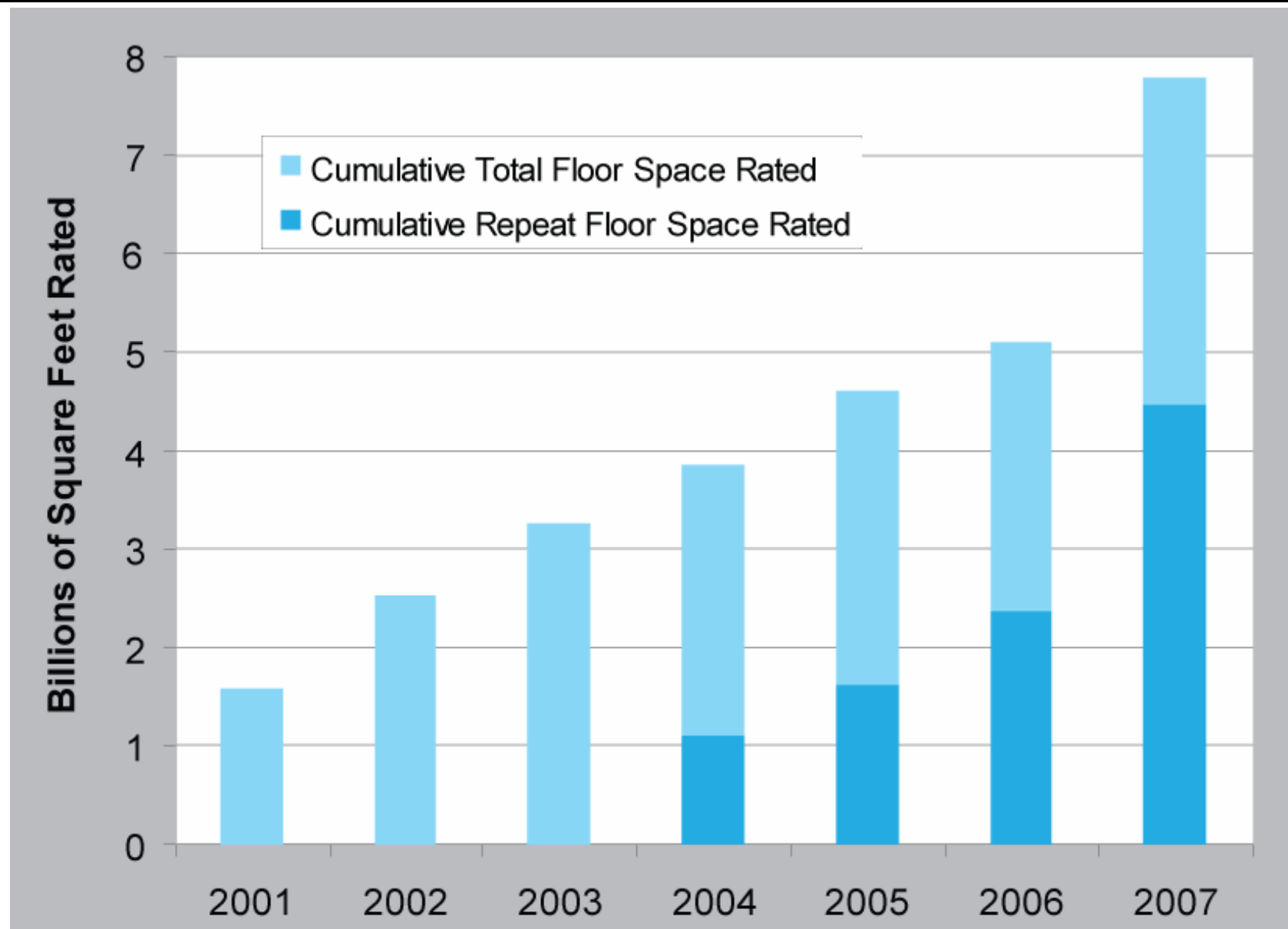
- What's It For?
 - Standardized Metric of Energy Performance
 - Compare Efficiency Across Country
(Scale of 1-100)
 - Normalize Energy Consumption
- What Can it Do?
 - Track Building/Facility Performance
 - Assist with Achieving LEED Certification



Establishing A Baseline



Establishing A Baseline



Establishing A Baseline

Energy Star Portfolio Manager

- Who can use it?

All buildings can use the tool

Certain types can benchmark similar buildings

Certain criteria must be met for rating



Establishing A Baseline

Energy Star Portfolio Manager

- Rating Criteria
 - *50% GFA must be of a certain use type*
 - *Operating characteristics criteria*
 - *Energy Data*

Establishing A Baseline

Criteria for Rating Building Energy Performance: Operating Characteristics

Portfolio Manager asks you to enter data for key operating characteristics for each space in your building. There are minimum and maximum thresholds for these values which differ by space type. These limits are designed to make sure that your building falls into an operation pattern consistent with that of the peer group used for comparison.

	Office	Bank/Financial	Courthouse	Hospital	Hotel/Motel*	K-12 School	Medical Office	Supermarket	Residence Hall/Dormitory	Refrigerated/ Nonrefrigerated Warehouse	Retail
Gross Floor Area (ft ²)	≥ 5,000	≥ 1,000	≥ 5,000	20,000 ≤ ft ² ≤ 5,000,000	≥ 5,000	≥ 5,000	≥ 5,000	≥ 5,000	≥ 5,000	≥ 5,000	≥ 5,000
Operating Hours (Hrs/Week)/ (months/year)	30 ≤ H/W ≤ 168	30 ≤ H/W ≤ 168	30 ≤ H/W ≤ 168	30 ≤ H/W ≤ 168	30 ≤ H/W ≤ 168	30 ≤ H/W ≤ 168, ≥ 8 mo/yr	30 ≤ H/W ≤ 168	30 ≤ H/W ≤ 168	30 ≤ H/W ≤ 168	30 ≤ H/W ≤ 168	30 ≤ H/W ≤ 168
Personal Computers/ Registers (#)	# PCs ≥ 1	# PCs ≥ 1	# PCs ≥ 1	N/A	N/A	# PCs ≥ 1	N/A	# Registers & PCs ≥ 0	N/A	N/A	≥ 1 register, ≥ 0 PCs
Workers on main shift/ seating capacity (#)	≥ 1	≥ 1	≥ 1	N/A	N/A	student seating capacity ≥ 1	≥ 1	N/A	N/A	≥ 1	≥ 1
Licensed Beds (#)	N/A	N/A	N/A	16 ≤ #beds ≤ 1,510	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Rooms (#)	N/A	N/A	N/A	N/A	See table below	N/A	N/A	N/A	≥ 5	N/A	N/A
Floors (#)	N/A	N/A	N/A	1 ≤ # Floors ≤ 40	N/A	N/A	N/A	1 ≤ # Floors ≤ 3	N/A	N/A	N/A
Walk-in Refrigeration/ freezer Units (#)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	≥ 0	N/A	≥ 0	≥ 0
Open & Closed Refrigeration/ freezer Cases (#)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	≥ 1	N/A	N/A	≥ 0

Hotel/Motel Additional Requirements

Hotel Type	Upper Upscale	Upscale	Midscale w/food & Beverage	Midscale w/o food & Beverage	Economy & Budget
# Rooms	20 ≤ # rms ≤ 2,500	30 ≤ # rms ≤ 2,000	50 ≤ # rms ≤ 665	40 ≤ # rms ≤ 320	20 ≤ # rms ≤ 700

Wastewater Treatment Plant Requirements

Criteria for Operating Characteristics	Average influent flow (MGD)	Average influent BOD ₅ (mg/liter)	Average effluent BOD ₅ (mg/liter)
	MGD ≥ 0.6	30 ≤ mg/liter ≤ 1,000	mg/liter ≥ 0

Establishing A Baseline

- Where is it?

On the web: <http://www.energystar.gov>



Establishing A Baseline

- How do I start?
 - Gather data
 - Create an account
 - Add a facility
 - Enter data



Gather Data



Current Space Attribute Values What is this?	
Space Attribute	Space Attribute Value (Temporary values should only be used if an Actual value is not currently known) What is this?
Gross Floor Area (required for benchmarking)	139789.0000
Weekly operating hours (required for benchmarking)	50.0000
Workers on Main Shift (required for benchmarking)	608.0000
Number of PCs (required for benchmarking)	900.0000
What percent of this space is air-conditioned? (required for benchmarking)	50% or more
What percent of this space is heated? (required for benchmarking)	50% or more

- Location
- Year Built
- Building Type
- Spaces (office, parking)
- Floor Area
- Number of People
- Operating Hours
- Number of Computers
- Metering Data

www.energystar.gov

Create An Account



Account Information

Please complete the following information to set up your account in Portfolio Manager.

☐ **REQUIRED**

*Username:

Your password must be between 8 and 32 characters in length (letters and numbers only; no special characters).

*Enter Password:

*Re-Enter Password:

*First Name:

*Last Name:

*E-mail:

Title:

Organization:

Address:

Add A Facility



Add General Facility Information

Use the form below to provide general information concerning your facility.

☒ REQUIRED

*Type of Facility:

- ☒ A single facility for which my organization owns or manages 90% or more of the floor area.
- ☐ A portion of a single facility for which my organization owns or manages less than 90% of the floor area.
- ☐ A hospital composed of a single facility or collection of facilities.
- ☐ A municipal wastewater treatment plant or water treatment and distribution utility

*Country:

United States



*Facility Name:

*Address:

*City:

*State:

Select State



County:

*ZIP Code:

*Year Built:

Enter Data - Space



Space Use Add Space					
Space Name	Space Type	Floor Area (Sq. Ft.)	% Floor Area	Alerts	
Atrium	Other - Other	936	0		Delete Space
Auditorium	Other - Entertainment/Culture	4,160	1		Delete Space
Computer Data Center	Computer Data Center	3,500	1		Delete Space
Fitness Center	Other - Other	518	0		Delete Space
Garage	Parking	72,000	15		Delete Space
General Office Space	Office	375,000	80		Delete Space
Kitchen	Other - Restaurant/Cafeteria	7,451	2		Delete Space
Medical Office	Other - Other	322	0		Delete Space
Print Shop	Other - Other	1,300	0		Delete Space
Restaurant	Other - Restaurant/Cafeteria	900	0		Delete Space
Total		466,087	99 %		

Enter Data - Meter



Edit Energy Use: 625267

Please enter the energy use for each meter entry below. Portfolio Manager requires that entries are for consecutive time periods; only one day of overlap or one day of gap can exist between meter entries to be eligible to generate an Energy Performance Rating.

If you are accounting for "sold" energy, indicate this by entering a negative energy use for the appropriate time period.

Meter Information [Edit](#)

Fuel Type: Electricity (kWh (thousand Watt-hours))

Space(s): Entire Facility

[Download Meter Data in Excel](#)

Edit Energy Use:

[Add Meter Entries](#)

Remove Entry	Start Date (MM/DD/YYYY)	End Date (MM/DD/YYYY)	Energy Use (kWh (thousand Watt-hours))	Cost - US Dollars (optional)	Last Updated By
☐	09/01/2007	09/30/2007	165598.00	\$	MKROSKOSKI
☐	08/01/2007	08/31/2007	209687.00	\$	MKROSKOSKI
☐	07/01/2007	07/31/2007	213203.00	\$	MKROSKOSKI

Establishing A Baseline



Portfolio Averages	
Baseline Rating: 86 Facilities Included: 3	Current Rating: 88 Facilities Included: 4
Portfolio Adjusted Percent Energy Reduction: 2.7% Facilities Included: 3	
Averages are weighted by Total Floor Space. More about Baselines More about Adjusted Percent Energy Reduction	

[Add a Property](#)

Work with Facilities

[Import](#) Facility Data Using Templates

[Update](#) Multiple Meters

[Share](#) Facilities

[Request](#) Energy Performance Report

Apply for Recognition

[Apply](#) for the ENERGY STAR

[ENERGY STAR Leaders](#)

GROUP: All Facilities ▼ [Create Group](#) | [View All](#)

VIEW: Summary: Facilities ▼ [Create View](#) | [Edit View](#) | [View All](#)

[Download](#) in Excel

Results 1 of 1

Search Facility Name: Search

A I # A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Facility Name ▼	Current Rating (1-100) i	Current Source Energy Intensity (kBtu/Sq. Ft.) i	Adjusted Percent Energy Reduction i	Eligibility for the ENERGY STAR i	ENERGY STAR Application Status i	Building Profile Status i
I Building	89**	184.3	0.2%	Not Eligible: Default space values used (ENERGY STAR Eligibility Rules)	No Status Available	No Status Available
J Building	86**	198.3	2.1%	Not Eligible: Default space values used (ENERGY STAR Eligibility Rules)	No Status Available	No Status Available
NYAPPA	N/A	0.0	N/A	Not Eligible: Rating must be 75 or above (ENERGY STAR Eligibility Rules)	No Status Available	No Status Available
Sample Facility	73**	136.5	N/A	Not Eligible: Rating must be 75 or above (ENERGY STAR Eligibility Rules)	No Status Available	No Status Available
HQ1	92	177.3	15.7%	Eligible to Apply for the ENERGY STAR	No Status Available	No Status Available

Outline

- Why is conserving energy important?
- Where are you now and how do you compare?
- How can you improve?





What's Next ?

Set goals

Identify improvements

Create action plans

How to Improve



- Based on Initial Rating

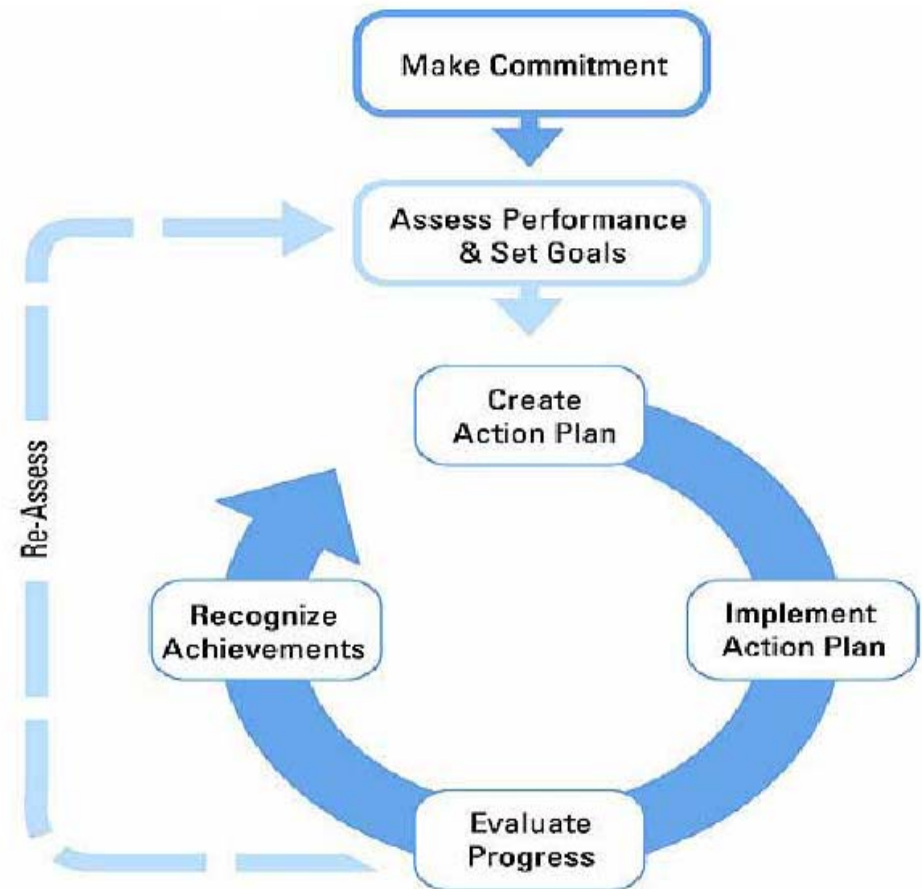
1 – 49 New equipment & best practices

50 – 74 Best practices & equipment upgrades

75 – 100 Congratulations! Build on your success

How to Improve

1. Make Commitment
2. Assess Performance
3. Set Goals
4. Create Action Plan
5. Implement Action Plan
6. Evaluate Progress
7. Recognize Achievements



How to Improve

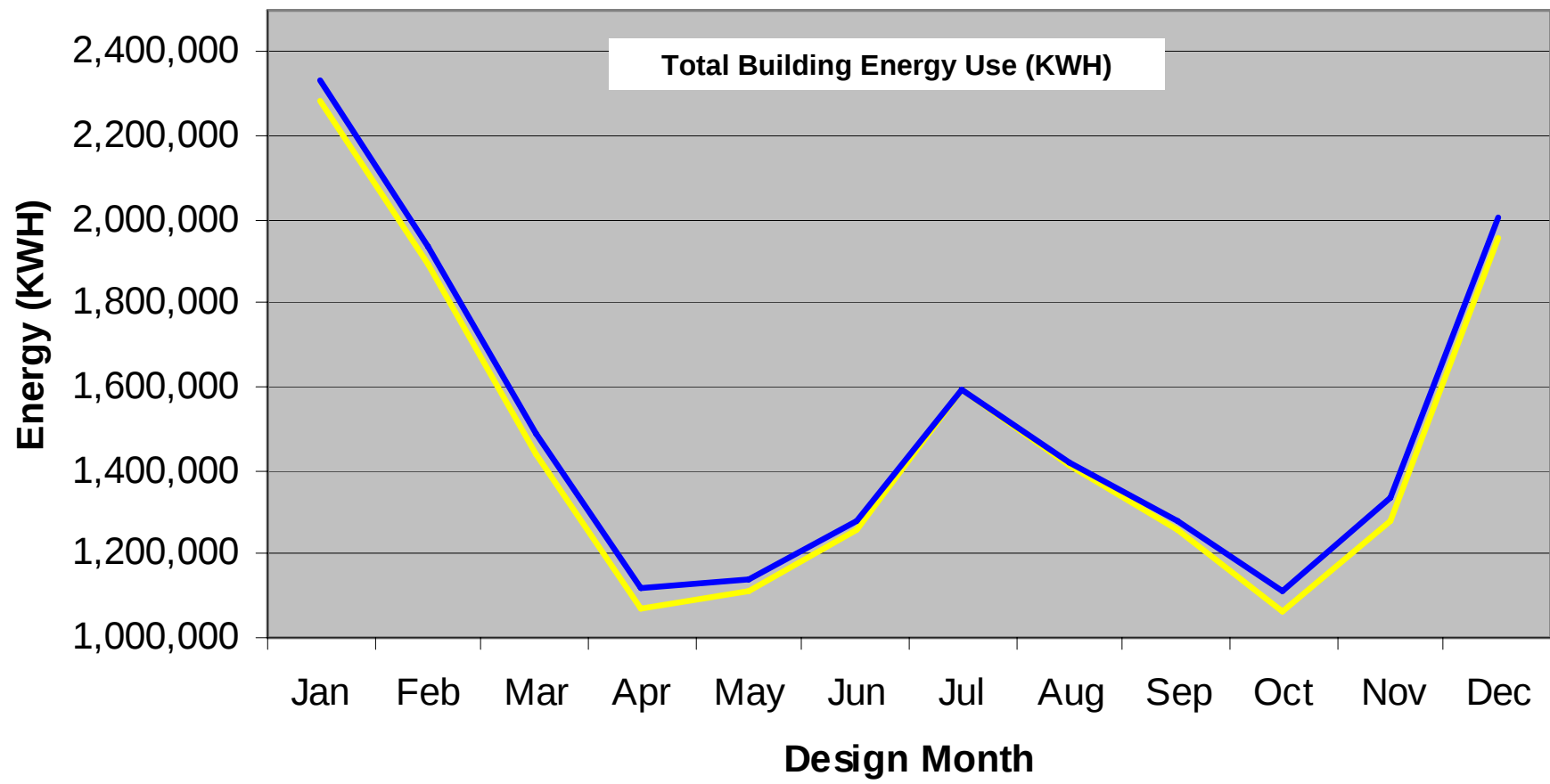
Energy Saving Initiatives

- Energy Audit
- Commissioning
- Energy Conservation Measures



How to Improve

Total Building Energy Use (KWH)



How to Improve

Implement measures

Establish a baseline

Internal Processes	Organizational Goals	Sustainability Objectives	Initiatives	Measures	Targets	Current Status
	3. Simplify and streamline processes 4. Effectively allocate resources to maximize utilization	1. Become Carbon Neutral				
		2. Decrease Water Consumption				
		3. Achieve Energy Star Certification	1. Lighting retrofit project. 2. Perform an energy audit. 3. Purchase energy star products.	Decrease in energy consumption	20% Decrease	
		4. Decrease Waste				

Verify implementation works

Conduct an energy audit

How to Improve

Internal Processes	Organizational Goals	Sustainability Objectives	Initiatives	Measures	Targets	Current Status
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Energy



How to Improve – Energy Audit

Energy Audit

- Examine a facility to identify opportunities to reduce energy consumption
- ASHRAE Energy Audit Levels
 - Level 1 - Walk-through Analysis
 - Level 2 – Energy Survey and Engineering Analysis
 - Level 3 - Detailed Analysis of Capital Intensive Projects

How to Improve

High Rise (Washington, D.C.)		Annual Savings					Implementation Cost (\$)	Simple Payback (<u>yrs.</u>) 1	Estimate d Project Lifetime (<u>yrs.</u>)
ECM No.	ECM Title	Electric Energy (kWh/yr)	Peak Demand (kW)	Water/ Sewer (kGal/yr))	Nat. Gas. (Therms/ yr)	Cost (\$/yr)			
Capital Expenditures									
HVAC Controls:									
1 (OR)	Install automatic thermostat control for each HVAC unit with: ²								
	A. Stand-alone Thermostats	1,489,815 ₂	-	N/A	-	\$170,000 ₂	\$600,000 ²	3.5 Yrs ²	20 + Yrs
	B. Thermostats networked w/ central system	1,953,315 ₂	-	N/A	-	\$223,000 ₂	\$800,000 ²	3.6 Yrs ²	20 + Yrs
Boilers/Controls:									
2 (OR)	A. Replace burners and controls at one of three low-pressure steam boilers (OR)	36,580	N/A	N/A	33,316	\$64,800	\$120,000	1.9 Yrs	20–30 Yrs
	B. Replace burners and controls at all three low-pressure steam boilers ³	36,580 ³	N/A	N/A	33,316 ³	\$64,800 ³	\$360,000 ³	5.6 Yrs ³	20-30 Yrs
Pump Controls and Accessories:									
3	Install a hydrocumulator tanks and new controls and motors at (2) domestic cold water pressure booster pumps	17,477	0.175	N/A	N/A	\$1,992	\$6,220	3.1 Yrs	30 + Yrs
Domestic Hot Water:									
4	Replace (4) steam-to-hot water heat exchangers with gas-fired condensing-type hot water boilers	N/A	N/A	-	31,771	\$40,667	\$140,000	3.4 Yrs	20-30 Yrs

How to Improve - Commissioning

Benefits of Commissioning

- Improved Indoor Air Quality
- Increased Energy Efficiency
- Fewer Contractor Call-backs
- Fewer Occupant Complaints
- More Integrated Overall Design and Operation of Building System



How to Improve

Commissioning

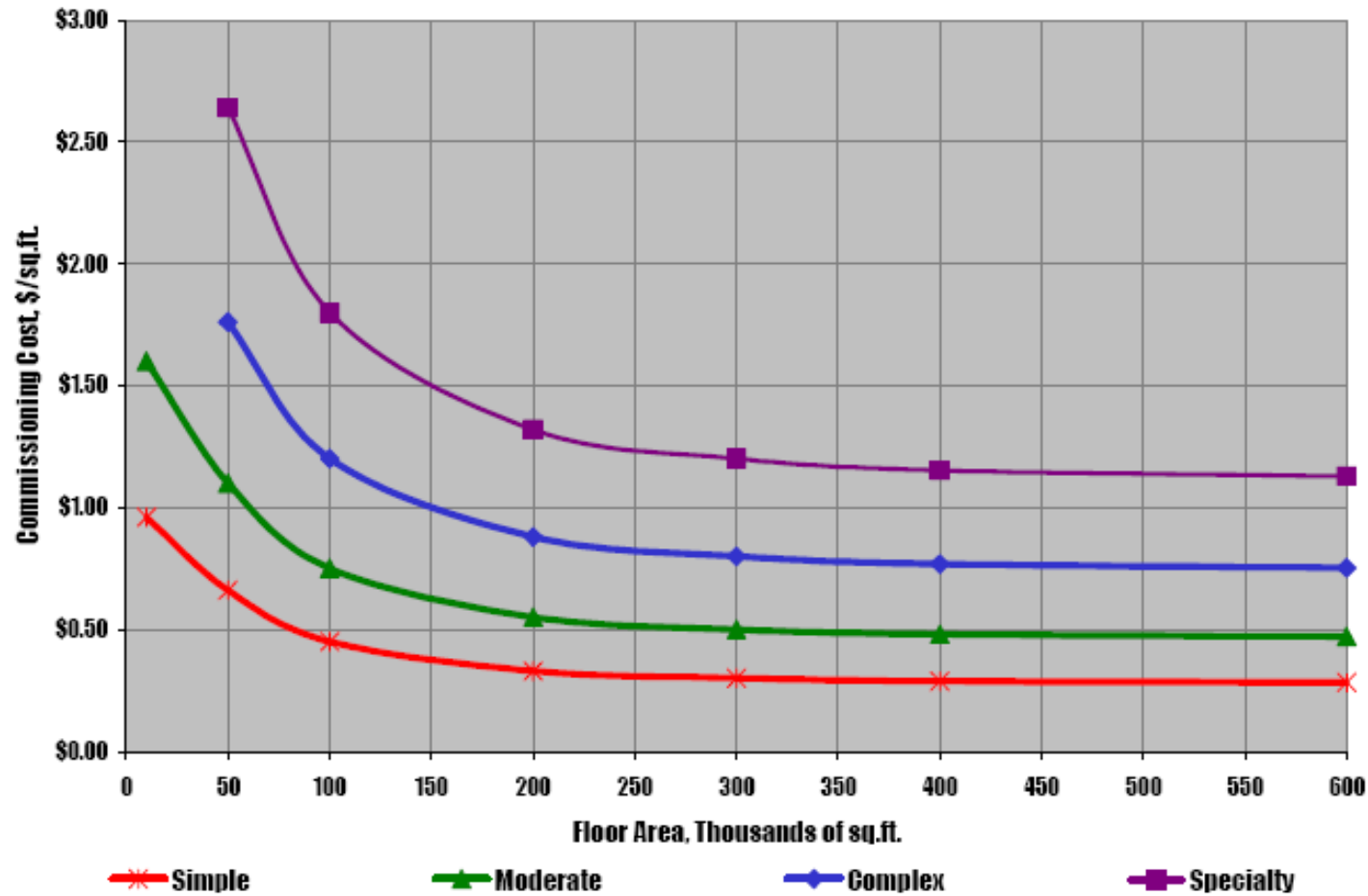
- Commissioning
Upon Installation
- Re-Commissioning
Documented Commissioning Done
Previously
- Retro-Commissioning
No commissioning ever done
- Recommended Every 5 Years
California Green Action Plan of 2005

**Typical Retro-Commissioning
Costs \$.27 - \$.40/SF**



How to Improve

Estimates of Construction Phase Commissioning Costs
(Costs for the commissioning authority in new construction, per square foot)



Ver. 5.0, 2/14/02, PEGI

How to Improve

- Verify and ensure fundamental building elements and systems are designed, installed, and calibrated to **operate as intended**.



How to Improve

Commissioning

During Design Development Phase:

- Meet with Owner and Design Team
- Review the Owner's Design Intent – what is the Owner trying to accomplish with the various systems?
- Review of Basis of Design – how are the building systems meant to operate? What are the governing parameters?



How to Improve

Commissioning

During Construction Document Phase:

- Review Construction Documents
- Develop the Commissioning Plan
- Incorporate commissioning requirements into the Construction Documents



How to Improve

Commissioning

During Construction Phase:

- Perform Commissioning
- Provide a Commissioning Report



How to Improve

Commissioning Checklist

SYSTEM	UNIT NUMBER	COMMISSIONING PROCEDURE	STATUS CODE
Indoor Air Handling Units - General	AHU-1	Casing in good condition: no dents, no leaks, door gaskets fit tight	
Indoor Air Handling Units - Identification labels	AHU-1	Located on side of unit. Labeled per drawings.	
Indoor Air Handling Units - Access/Service Clearance	AHU-1	Verify maintenance access per mfr's requirements and drawings	

OK - No Action Required, NC - Needs Correction, NA - Not Applicable,

NA - Not Applicable, INC - Incomplete, NPP - Not per plans, DNC - Did Not Check

How to Improve

Commissioning Typically includes:

- HVAC – controls, ducts, piping, equipment
- Lighting – controls, fixtures, day lighting systems
- Power – normal, emergency
- Plumbing – piping, equipment

How to Improve

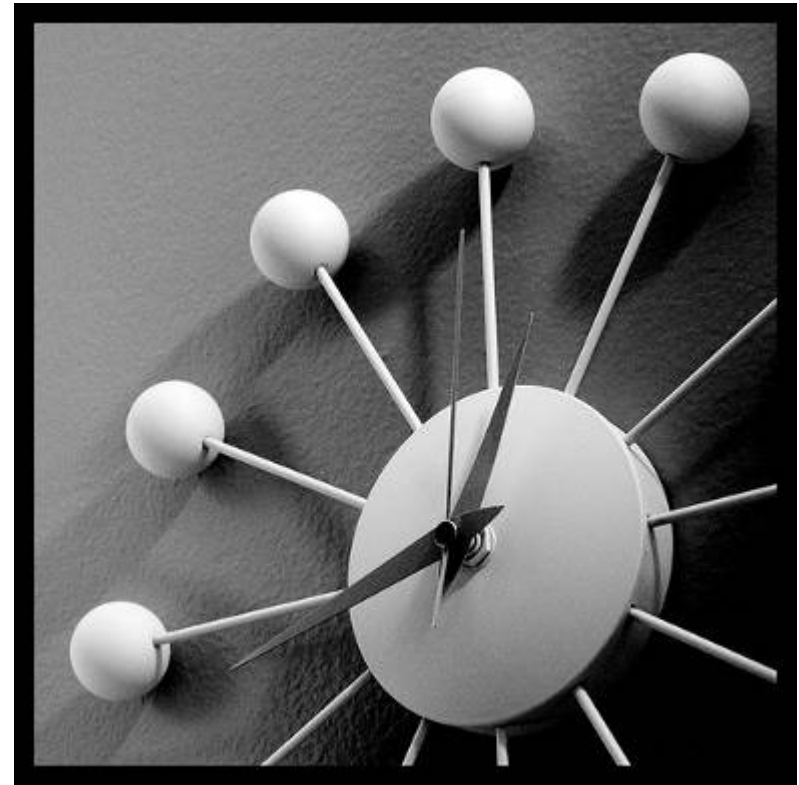
Commissioning can include:

- Building envelope – windows, insulation, roof systems
- Special systems – rain water harvesting systems, etc.
- Other advanced performance technologies

How to Improve

Retro-Commissioning of Existing Facilities Typically...

- Costs \$.27 - \$.40 per SF
- 5-20% annual energy savings
- 0.5 to 2 year payback



How to Improve – Energy Saving Opportunities

- Other Energy Saving Opportunities for Property Managers

Window Replacement

Window Film



How to Improve – Energy Saving Opportunities

Energy Savings Via Window Replacement

Utility	Existing Windows		Proposed Windows		Savings From Window Replacement	
	Energy/ Demand	Cost	Energy/ Demand	Cost	Energy/ Demand	Cost
Electricity (kWh/ kW)	2,252,276/ 578	\$129,328	1,943,176/ 434	\$112,215	309,100/ 144	\$17,113
Natural Gas (therm)	113,546	\$161,348	107,542	\$152,818	6,004	\$8,530
Totals:	\$290,676		\$265,033		\$25,643	

8.5 % Energy Savings!

What Now?

- Benchmark Your Facility
- Determine Where You Stand
- Set Goals and Establish an Action Plan
- Evaluate Progress



Questions

