



Energy Efficiency and Clean Energy: Essential Strategies for Superior Business Performance

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U.S. EPA – Region 1
*Cleaner Technology and Energy Efficiency:
Structuring a Competitive Advantage*
Boxborough, MA
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ENERGY STAR

A Voluntary Partnership



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

Why Energy Performance?



- Energy use is the number one source of air pollution in NE and the nation
- When we use less energy, we reduce pollution that causes:
 - Global warming
 - Acid rain
 - Smog and soot
 - Mercury and Air Toxics
- Saves money
- Reduces business and financial risks
- Reduces strain on energy supplies: electricity blackouts/brownouts, natural gas shortages/costs



Strategic Energy Management Produces Superior Results



1. **Reduce Demand – Energy Efficiency**
 - Management, Operations, and Maintenance
 - Upgrade Technology
 2. **Clean Up Supply – On-Site and Purchased Energy**
 - Efficient and properly sized boilers and chillers
 - Purchase Green Power
 - Combined Heat and Power (CHP)
 - On-Site Renewable Energy
- Reducing demand first is critical, because it makes supply side investments:
- Smaller, less expensive, more efficient, and cheaper to operate.



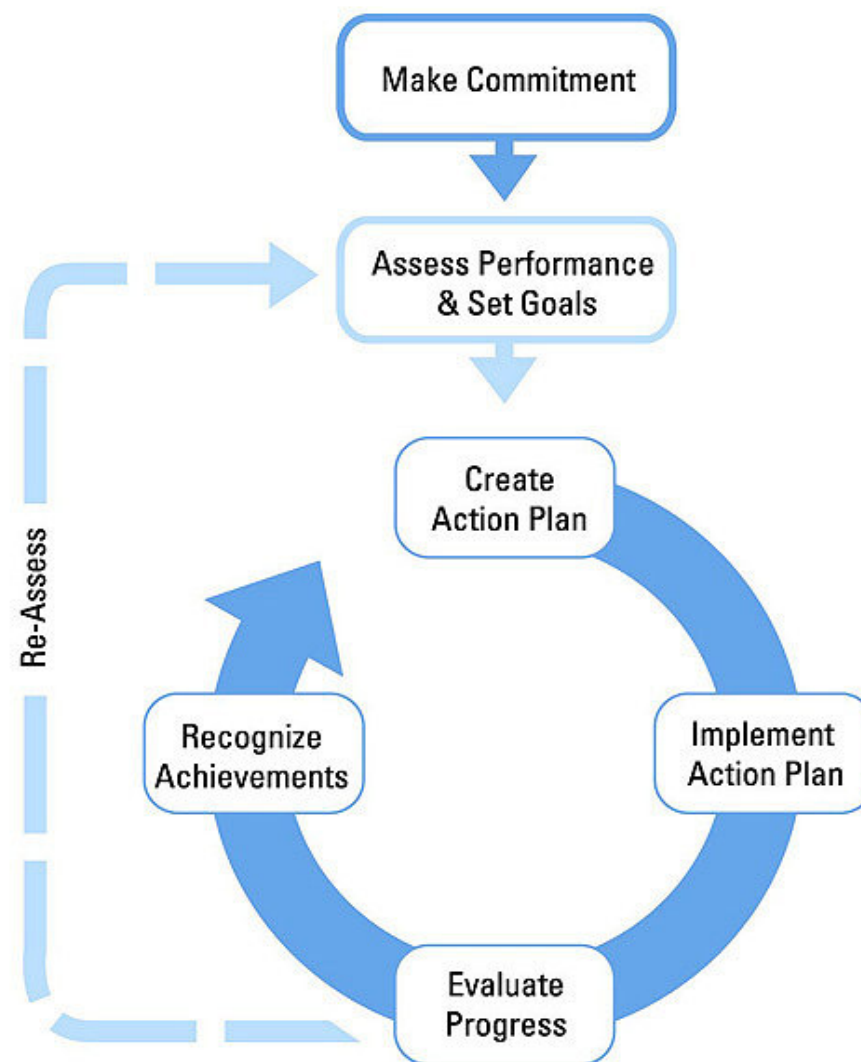
STEP 1:

Reduce Demand through
Energy Efficiency

Superior Energy Management Approach



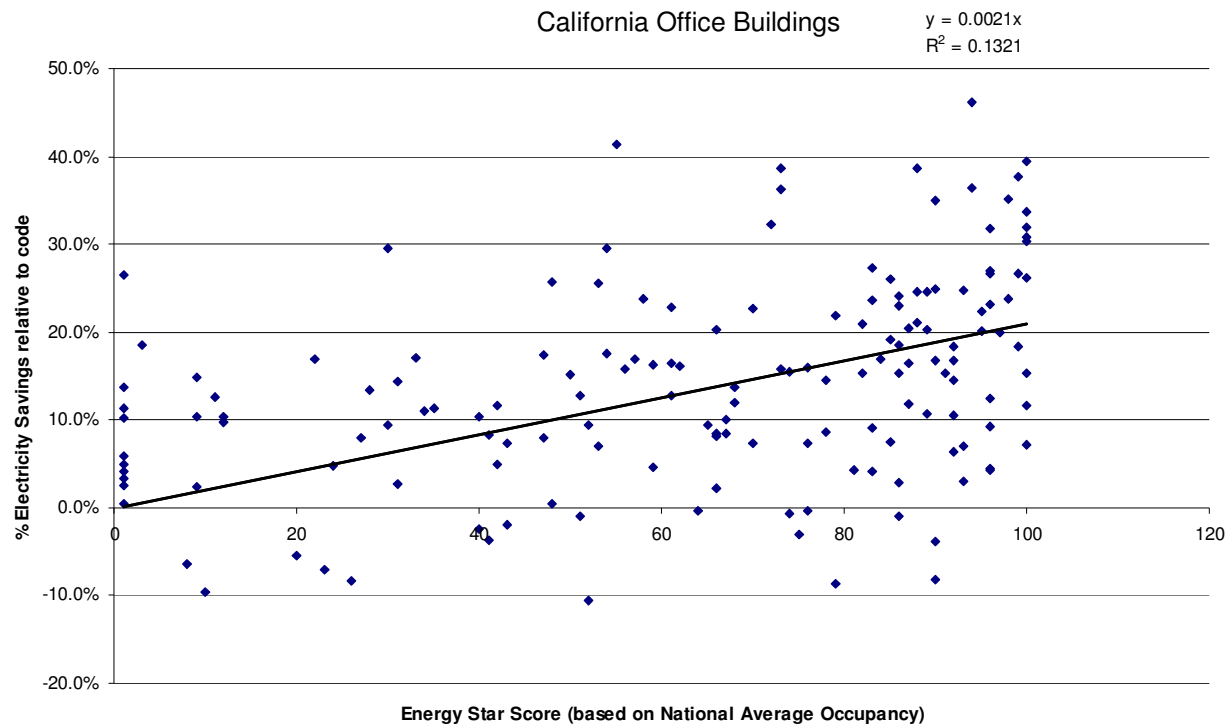
Based on successful practices of ENERGY STAR partners, EPA has identified the key components for a successful energy management program



Technology alone does not guarantee performance - management is critical



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

Do You Know How Your Facilities Perform?

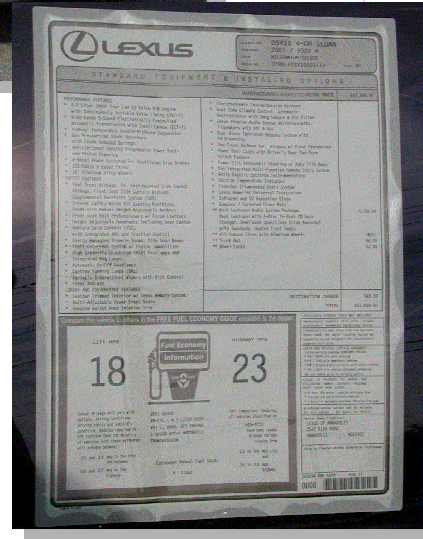


- You can't manage what you don't measure!
- Until recently, a standardized, comparable metric of whole building energy performance did not exist.
- EPA's **Energy Performance Rating System** developed to meet this need.

Performance Rating Systems



**Fuel Efficiency
Rating: MPG**



Is 10 MPG high or low for an automobile?

Common knowledge.

Is 65.7 kBtu/sf/yr high or low for a building?

**Even many
building experts
don't know.**

**EPA Energy
Performance
Rating**

STATEMENT OF ENERGY PERFORMANCE
Margrave High School
 Building ID: 1021125
 For 12-month Period Ending January 31, 2014¹
 Date SEP Generated: March 31, 2014

Margrave High School
 2500 Hwy 98
 Longwood ID 83229
 Gross Building Area: 351,395 sq ft
 Year Built: 1982

Owner:
 Catholic Group
 Contact: John Doe
 1001 North Fort Meyer Drive
 Suite 100
 Arlington VA 22209
 (703) 247-6800

Facility Space Use Summary

Space Type	Area (ft²)	Number of Students	Number of PCs	Cooling Percent
Computer Data Center	134	N/A	N/A	N/A
K-12 Schools	351,221	1,221	420	899

Site Energy Use Summary

Energy (kBtu)	Electricity (kBtu)	Gas (kBtu)	Total Energy (kBtu)
5,645,801	320,419	0	5,976,220

Professional Verification
 John Doe
 1001 North Fort Meyer Drive
 Suite 100
 Arlington VA 22209
 (703) 247-6800
 Licensed Number: 123456789
 State: VA

Results

Energy Performance Rating² (1-100): 94

Energy Intensity³
 Site (kBtu/sq ft-yr): 17
 Source (kBtu/sq ft-yr): 69.4

Emissions
 CO₂ (1000 Btu): 6,791
 SO₂ (1000 Btu): 305
 NO_x (1000 Btu): 21

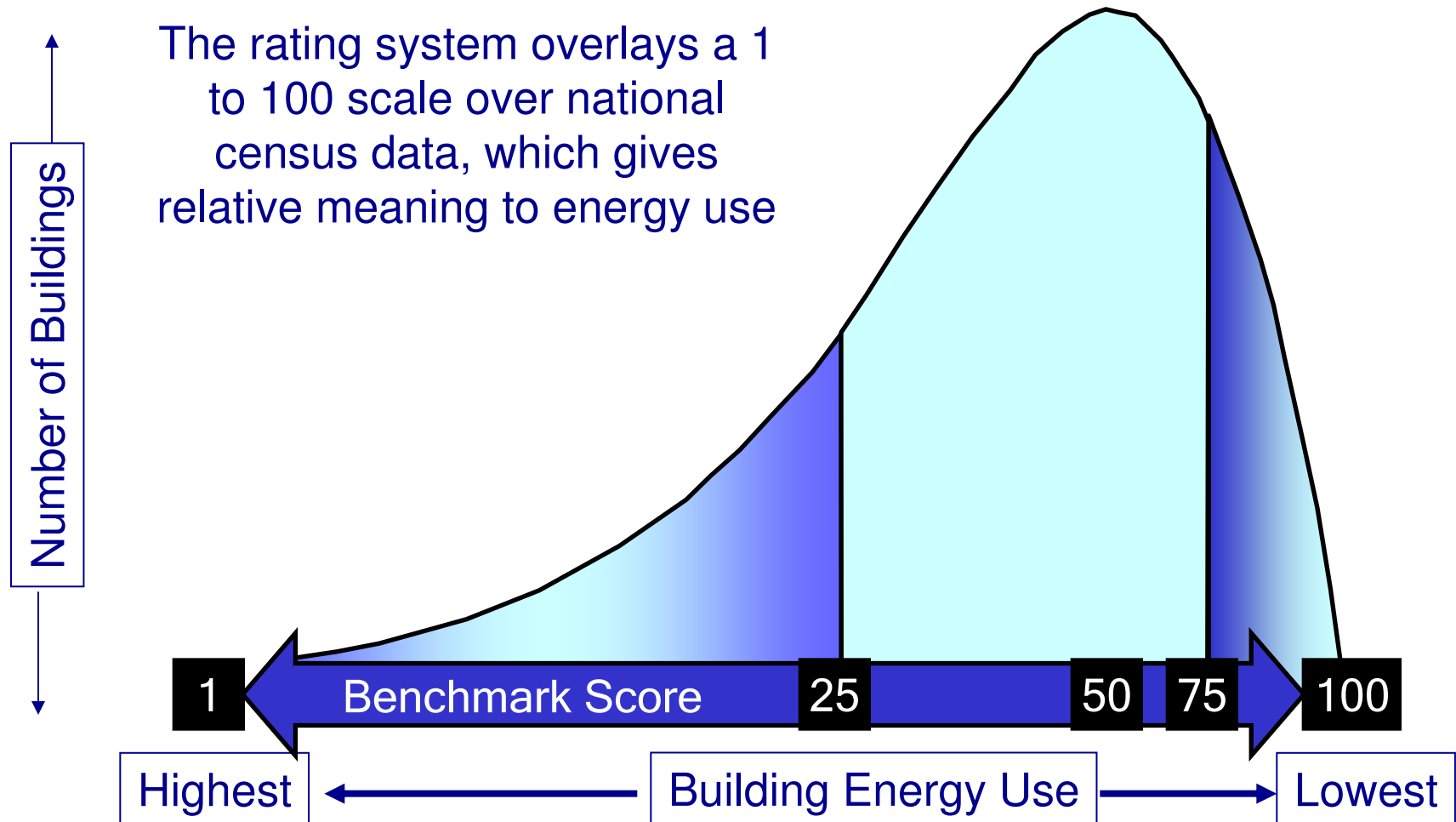
Energy Cost
 Cost (\$/yr): \$264,485
 Intensity (\$/ft²-yr): \$0.72

Indoor Environment Criteria⁴
 Indoor air pollutants controlled? Yes
 Adequate ventilation provided? Yes
 Thermal conditions met? Yes
 Adequate illumination provided? Yes

Notes:
¹ Based on the conditions observed at the time of my visit to this building, I certify that the information contained on this statement is accurate.
² ASHRAE 90.1-2010
³ ASHRAE 90.1-2010
⁴ ASHRAE 62.1-2010 and ASHRAE 90.1-2010



National Energy Performance Rating



How Does the Rating System Work?



Actual Energy Consumption Data (EIA Commercial Building Energy Consumption Survey [CBECS])

Easy-to-use web-based, simple data requirements

Easy-to-understand 1-100 performance score – “whole building mpg rating” – compared to peers in national building stock

Normalizes for Building Variables: weather, size, occupancy, hours, computers, other features

Use it to: Benchmark, Compare, Inform, Track and Measure, and Reward Success

Eligible Building Types



Hotels



Office Buildings



Courthouse



Schools



Medical Offices



Hospitals



Dormitories



Grocery Stores

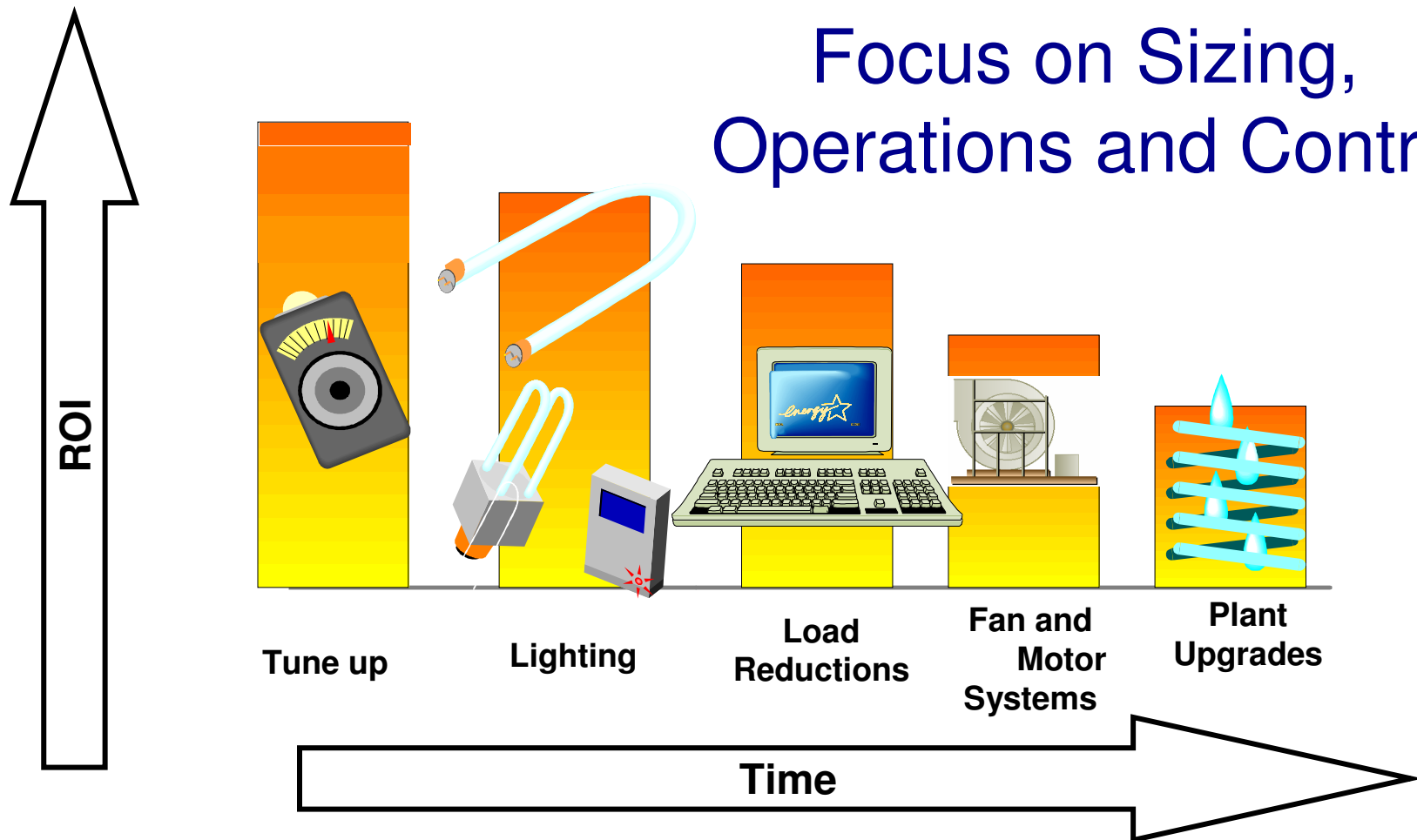


Warehouses

Planning Improvements: The Five-Stage Approach



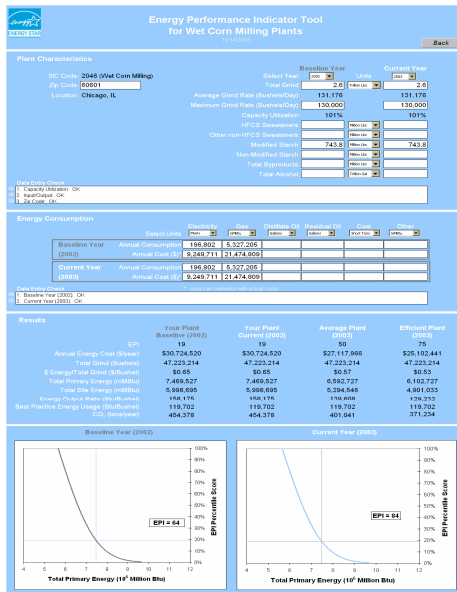
Focus on Sizing,
Operations and Control



For Industrial Facilities: Plant Energy Performance Indicator (EPI)



- A tool that allows comparison of how efficiently a plant uses energy relative to those of its industry
- Enables industry to assess current performance
- Help companies set & track energy performance goals
- Help industry prioritize limited resources & apply them where they will have the most benefit



Plant Energy Performance Indicators



Current Sectors with EPI initiatives

- Automobile Assembly*
- Cement*
- Corn Refining*
- Food Processing
- Glass Making
- Pharmaceuticals
- Petroleum Refining
- Pulp & Paper (Fall '06)



* = Energy Performance Indicator has been released



STEP 2:

Clean Up Supply through:

Proper sizing

Combined Heat and Power

On and Off Site Renewable Energy

Oversized Equipment is a Major Source of Inefficiency



- 60% of building fan systems oversized on average 60%
(Source: EPA fan study)
- Chillers oversized by 50-200%
(Source: Lawrence Berkeley National Laboratory)
- Improper installation and poor maintenance
- Oversized equipment performs worse than its rated efficiency

Proper Sizing is Key When Replacing or Upgrading Equipment



- Assess energy use and reduce it
 - Everyone can improve energy efficiency
- Smaller units cost less
- Properly sized equipment operates more efficiently
- Explore configurations that maximize efficiency
 - E.g - Smaller units operated in series

Combined Heat and Power

- CHP – or cogeneration – is the generation of heat and power from the same fuel source.
 - Electricity primarily used on-site, but may be sold back to grid. Grid can serve as back-up or swing provider.
 - Thermal energy used for heating/cooling or process applications.
 - CHP can work with numerous technologies and fuels.

Advantages of CHP

CHP is more efficient than separate generation of electricity and heat:

- Higher efficiency translates to lower operating cost, but requires capital investment.
- On-site electric generation reduces grid congestion and avoids distribution costs.
- Higher efficiency reduces emissions of all pollutants.
- *Increased reliability and power quality can*

On-Site Renewable Energy



- Broader application and lower cost than you may expect
 - State incentives available
 - Even small installation can have a big impact on costs and risks
- Technologies
 - Wind
 - Solar
 - Ground Source Heating and Cooling
 - Dependent on site conditions and other factors

Purchasing Clean Energy: EPA's Green Power Partnership



- Voluntary Recognition Program for Organizations that purchase Green Power
- Direct Purchases or RECs
- Minimum percentage of green power based on organization's total electric demand
 - Sliding scale
- Goal is to use market demand to stimulate development of additional renewable power supply throughout the US

How do I pay for it?



- Massachusetts has among the best incentives in the country for:
 - Energy efficiency - Utility programs
 - Renewable energy – MA Renewable Energy Trust
- Energy efficiency cuts energy bills by 10-30+%
- money that can spent on upgrades to facilities
- Energy efficiency and clean and renewable energy reduce financial risks for businesses and institutions
- Efficiency and supply upgrades increase asset value

Companies and Institutions can also earn Valuable Recognition



- EPA Voluntary Programs

- ENERGY STAR Label;
- Partner of the Year
- Green Power Partnership
- CHP Partnership



- State and Regional Awards/Recognition

- Environmental Merit Awards



➤ *It's not only about saving money!*



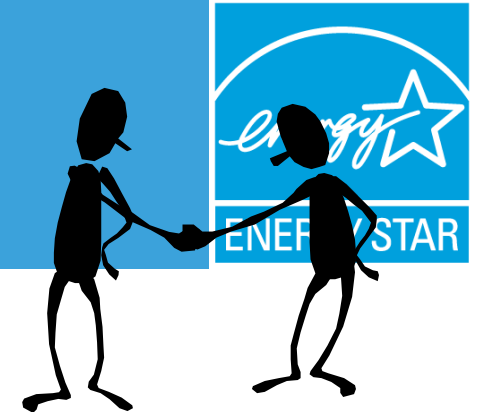
ENERGY STAR Resources



- Free Training for ENERGY STAR tools
- Performance benchmarking tools
- Financial calculators
- Manuals and best practices guides
- Web conferences
- ENERGY STAR is used in many utility energy efficiency incentive programs
- Recognition

Learn more at www.energystar.gov

How to partner with ENERGY STAR:



1. Institute a corporate policy for continuous improvement of energy performance
2. Measure, track and benchmark energy use for all facilities
3. Develop and implement a plan for improving energy performance in all facilities
4. Educate employees and the public about energy efficiency, the successes the company has and partnership with ENERGY STAR

Learn more at: www.energystar.gov

Contact Us



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www.energystar.gov