



# A GUIDE TO ENERGY MANAGEMENT

U.S. Environmental Protection Agency  
**ENERGY STAR<sup>®</sup>**



ENERGY STAR Overview

Energy Management Guidelines

ENERGY STAR Tools & Resources

- Building Upgrade Manual
- Energy Performance Rating System
- More ...

# What is ENERGY STAR?



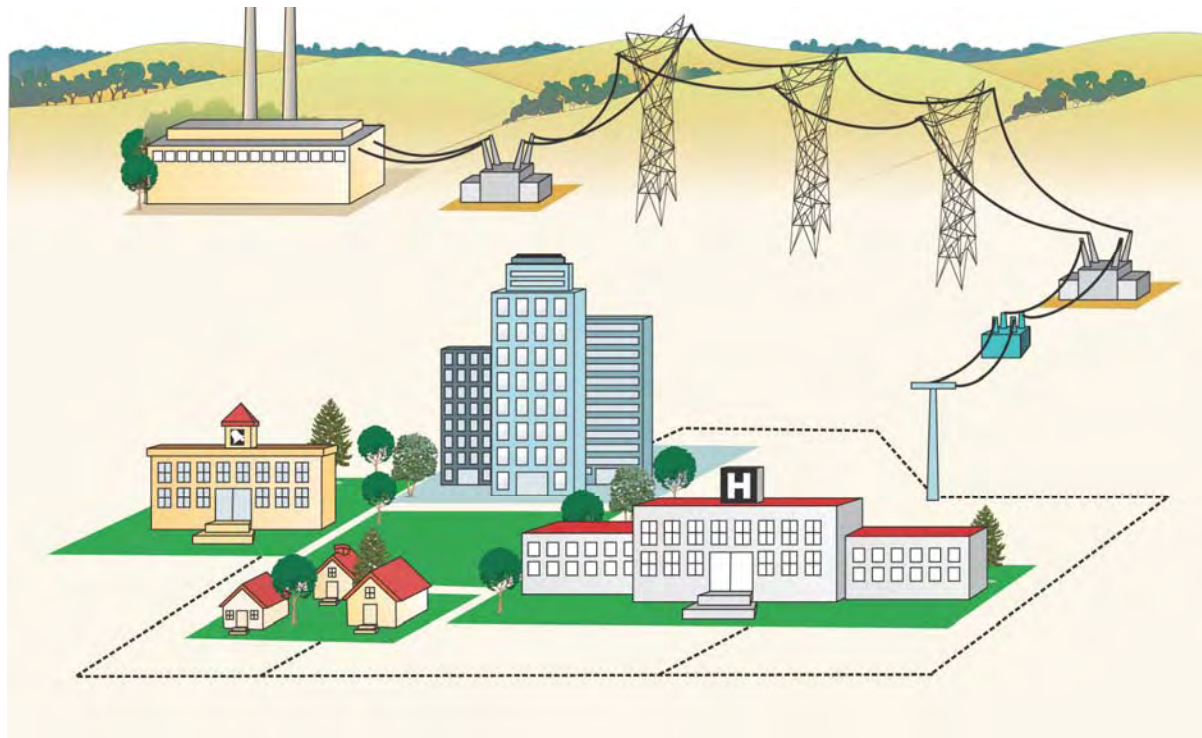
A voluntary partnership between organizations, businesses, consumers, and government, united in the pursuit of a common goal—to protect our environment for future generations by changing to energy-efficient products and practices today.

# The Challenge is Wasted Energy



Energy waste at home and at work will cost U.S. organizations and consumers billions of dollars in the next ten years.

**Wasted energy contributes to smog, acid rain, and greenhouse gases.**



# One Solution: ENERGY STAR



Helps you and your organization:

- Reduce energy use
- Save money
- Protect the environment by preventing greenhouse gas emissions

# ENERGY STAR Partners



## **PUBLIC SECTOR**

- K-12 schools
- City and county governments
- Colleges and universities
- State governments
- Federal government

## **PRIVATE SECTOR**

- Manufacturers, utilities, builders, raters, lenders
- Retailers, groceries, restaurants
- Commercial real estate
- Small and home-based businesses
- Lodging and hospitality
- Hospitals and healthcare
- Religious congregations
- Industry



## Offers organizations:

- Energy Management Strategy
- Energy Performance Rating System  
(Portfolio Manager and Target Finder)
- Objective Information
- Online Tools & Resources
- Online and Onsite Training Sessions
- Recognition

# The Path to Leadership Through Superior Energy Performance



## ENERGY STAR Guidelines for Energy Management

At every stage,  
ENERGY STAR  
can assist you in  
implementing your  
energy management  
strategy.

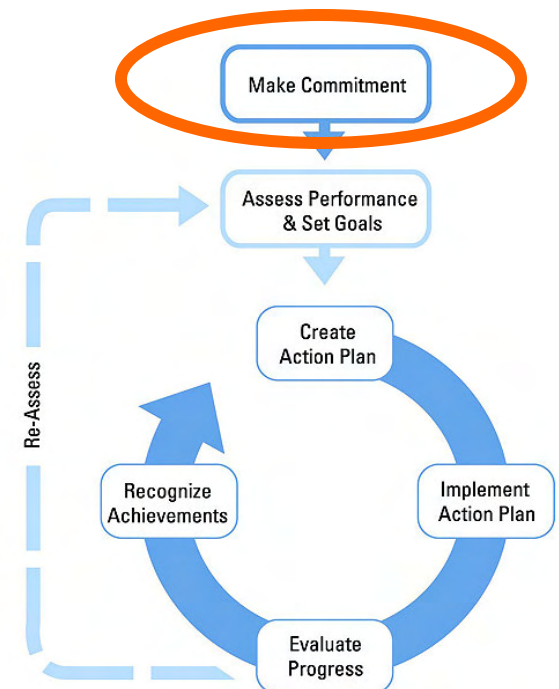




# MAKE COMMITMENT



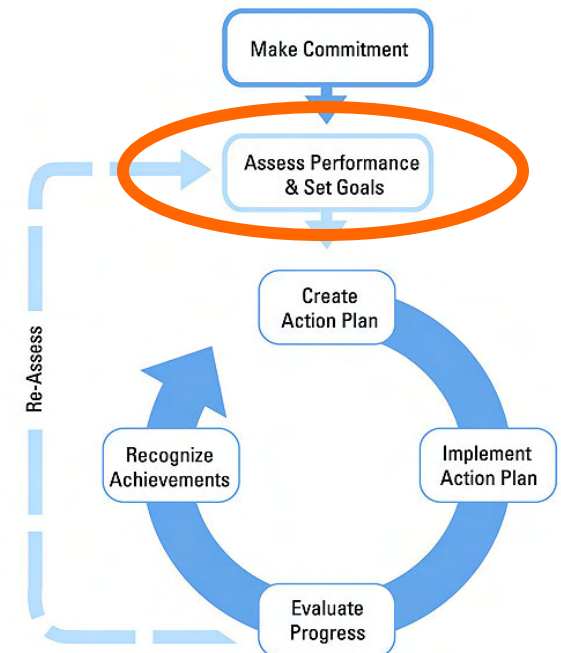
- Common element of successful energy management is **COMMITMENT**
  - Gain support from key decisionmakers
  - Partner with ENERGY STAR
  - Appoint Energy Manager and establish team
  - Adopt an energy policy



# ASSESS PERFORMANCE & SET GOALS



- Measure performance
  - Portfolio Manager (existing buildings)
  - Target Finder (new buildings)
- Evaluate opportunities for upgrades
- Estimate cost savings
  - Cash Flow Opportunity Calculator
  - Financial Value Calculator



# SET REALISTIC GOALS



- Goals drive performance
  - Goal-setting process varies by organization
- One approach
  - Rate buildings with Portfolio Manager
  - Review average rating
  - How much you can improve
  - Set a timetable



# CREATE ACTION PLAN



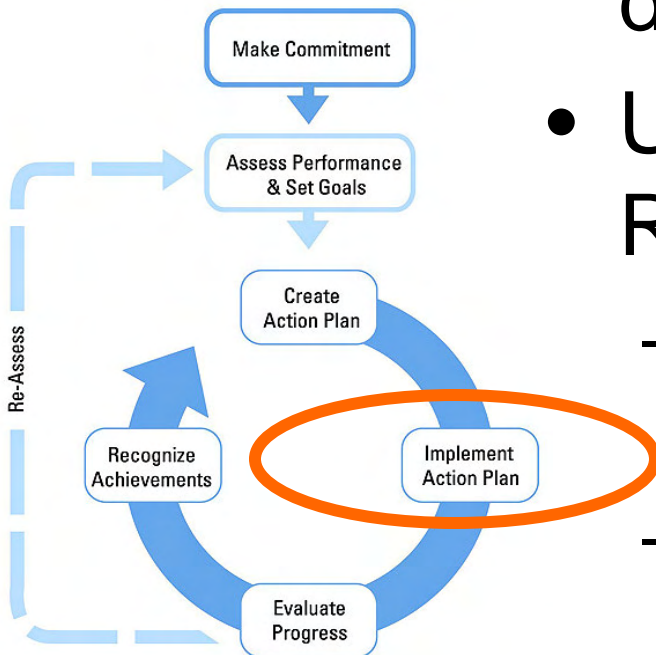
- Find sample action plans online
- Create an action plan that fits your organization's goals
- Regularly update the action plan by evaluating
  - Achievements
  - Performance changes
  - Priorities



# IMPLEMENT ACTION PLAN



- Confirm support from key decision-makers
- Use ENERGY STAR's Tools & Resources, such as
  - Upgrade your buildings by using the Building Upgrade Manual
  - Bulk Purchasing of ENERGY STAR Qualified Products
  - PC Power Management



# IMPLEMENT ACTION PLAN KEY COMPONENTS



- Technical steps and targets
- Roles and resources
  - Identify internal managers/champions
  - Set performance goals for managers, contractors, and individual buildings
  - Estimate cost/payback to secure resources
- Monitor/track progress
  - Benchmark regularly
  - Ratings can change

Eastman Kodak's largest U.S. facility held brainstorming events with a mix of employees that helped uncover \$2.5 million in energy savings.

# IMPLEMENT ACTION PLAN STAGING IMPROVEMENTS



- Existing building commissioning (Tuning)
- Lighting
- Supplementary load reduction
- Fan/motor system upgrades
- Heating/cooling system upgrades



Details about the staged approach to energy management can be found in the ENERGY STAR Building Manual, available online at [www.energystar.gov](http://www.energystar.gov)

## Slide 15

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AK4

1st bullet: "Existing Building Commissioning"

The potential for confusion is that existing bldg commissioning can encompass lighting AND load reduction AND identify upgrade opportunities. However, a building may just need e.g. load reduction so it makes sense to call these items out separately. My suggestion is to describe commissioning as you have it but add that its scope can be comprehensive, if that's what's needed in the building. (see next slide comment)

akhan, 9/1/2004



# IMPLEMENT ACTION PLAN EXISTING BUILDING COMMISSIONING



- Does building perform as intended?
  - Especially new, well-designed underperformers
- Revisit temperature setpoints
- Boiler combustion efficiency and waste heat
- Building envelope
  - Insulation/infiltration
  - Roofing material
- Light sources and quality

This step alone can significantly affect savings

## Slide 16

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AK5

... and does the building perform as it is currently used? (The design intent may not suit the building's current use)  
Light sources & quality, load reduction, and identification of equipment retrofit opportunities can be part of the scope of "existing building commissioning" if the scoping process reveals these are areas of improvement opportunity.

akhan, 9/1/2004

# IMPLEMENT ACTION PLAN LIGHTING



- Take space use into account
  - Use natural light where possible
  - Position task lighting only where needed
  - Check light levels against industry standards
- Automatic controls
  - Occupancy sensors
  - Timers
  - Dimmers
- Retrofit
  - ENERGY STAR-labeled products
  - Lights use two-thirds less energy, 10X longer



High efficiency 4-lamp T8 fixture:  
–40% fewer Watts than T12  
–40% less heat output  
–10% greater light output  
–2-4 year simple payback

# IMPLEMENT ACTION PLAN

## REDUCE LOADS



- Ventilation systems
  - Economizer cycle, occupancy sensors cut loads
  - New ASHRAE 62 standard for auditoriums, etc.
- Equipment
  - ENERGY STAR-labeled products power down
  - Vending machine lights on timers/dimmers
  - Domestic hot water tanks' heat loss
- Building envelope
  - Window films/shading to reduce solar gain
  - Insulation, weathersealing to reduce infiltration

# IMPLEMENT ACTION PLAN SYSTEM UPGRADES



- Variable air volume/speed fans/motors
  - Motors operate 98% of the time at part-load
  - VAV air systems: 30% less energy than constant
- Heating/cooling systems
  - New chillers 15% to 50% more efficient
  - Replacement cost-effective if chiller 10+ years old
- Ongoing maintenance
  - Clean coils, ducts, fan blades
  - Calibrate sensors, adjust boilers
  - Replace filters
  - Treat scale buildup on towers

St. Francis Hospital in Minneapolis:  
– Improved rating from 51 to 91  
– Used \$ saved from right-sizing water pump to buy new boilers  
– Used \$ saved from new boilers to fund new DDC controls

# IMPLEMENT ACTION PLAN



Every one percent reduction in energy consumption increases the energy performance rating by approximately one point.

**REDUCE CONSUMPTION and INCREASE RATING**

# PEOPLE ARE KEY TO SUCCESS!

## TRAINING STAFF



- Training
  - Provide training for:
    - appropriate use of technologies
    - approaches to energy management
    - concept of continuous improvement
  - Ensure staff has required knowledge of building performance
    - Actual energy use, rating, costs
    - Equally important as technical knowledge

### Energy Manager Skill-Sets

- Understands energy management
- Understands building operating dynamics
- Is aware of new technologies
- Thinks outside the box
- Calculates payback
- Incorporates change

# PEOPLE ARE KEY TO SUCCESS! INVOLVE OCCUPANTS



- Identify energy champions
- Educate building occupants
  - Email newsletters
  - Lobby posters
  - More ... learn from others
- Every Watt counts
  - Put computers in “sleep” mode
  - Turn machines off when not in use
  - Shut off lights when you leave
  - Request janitorial contractors minimize lights

Each year,  
Americans use  
4 billion kWh to  
brew 30 billion  
pots of coffee.

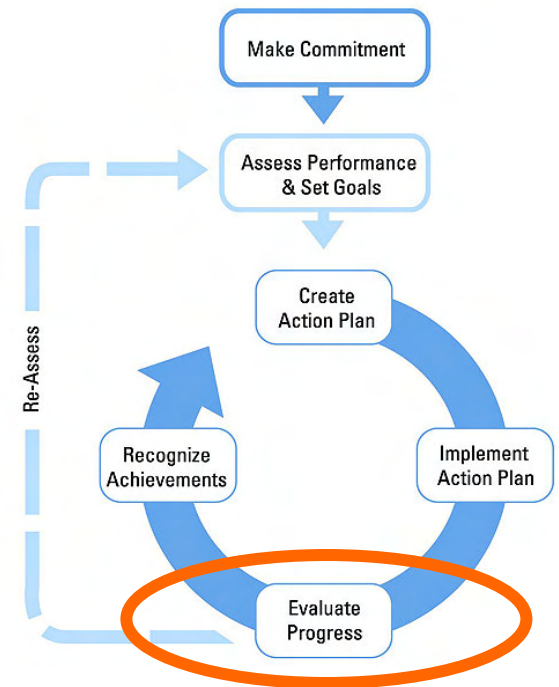


# EVALUATE PROGRESS



Routine evaluation is key to success!

- Review the data
  - Portfolio Manager
- Identify the best practices
- Set new performance goals



# ONGOING ASSESSMENT



- Re-assess building performance
  - Update utility data monthly
    - Spot trends and address issues
  - Conduct an annual review of goals and achievements (including financial)
    - Calculate portfolio-wide improvements vs. goal
    - Set new goals



# RECOGNIZE ACHIEVEMENTS

## Achieving Success



- Financial benefits
- Environmental benefits
- Demonstrate stewardship



# RECOGNIZE ACHIEVEMENTS EARN RECOGNITION FROM EPA



- Building level
  - ENERGY STAR Label
    - Existing buildings rating 75 or higher
  - Designed to earn ENERGY STAR
    - Building plans in design phase
- Organization-wide
  - ENERGY STAR Leaders
    - 10, 20, or 30 point increase portfolio-wide
  - ENERGY STAR Partner of the Year awards

## NEW BUILDING DESIGN



Help protect our environment by designing buildings with superior energy performance. Top performing facilities that are designed to earn the ENERGY STAR require less money to operate and are responsible for fewer greenhouse gas emissions from power plants. Take advantage of tools and resources from EPA, and join building design professionals from around the country who are demonstrating their commitment to creating sustainable architecture.



# ENERGY STAR ONLINE BUILDING PROFILES



**Building Owner**  
Los Angeles County, CA

**Property Manager**  
Internal Services Dept.  
LA County

**Project Summary**  
Year Label Received: 2002  
Score (By Years): 82

Space Type: Office

Total Floor space: 215880 sf  
Year Constructed: 1960  
Energy Intensity: 85.71 Btu/sf/yr



**Long Beach Courthouse**  
415 W Ocean Blvd  
Long Beach, CA 90802

Los Angeles County's Long Beach Courthouse, constructed in 1960, is home to various county departments such as the Superior Courts, Sheriff, Probation, and the District Attorney.

In 1996, the County undertook a major energy efficiency upgrade. The County's Energy Management Division implemented the project, investing more than \$1.8 million (\$5.94/GSF) using a Shared Savings Performance Contract with an energy services company, which included energy efficiency incentive payments of \$422,000 from Southern California Edison's (SCE) Demand Side Management program.

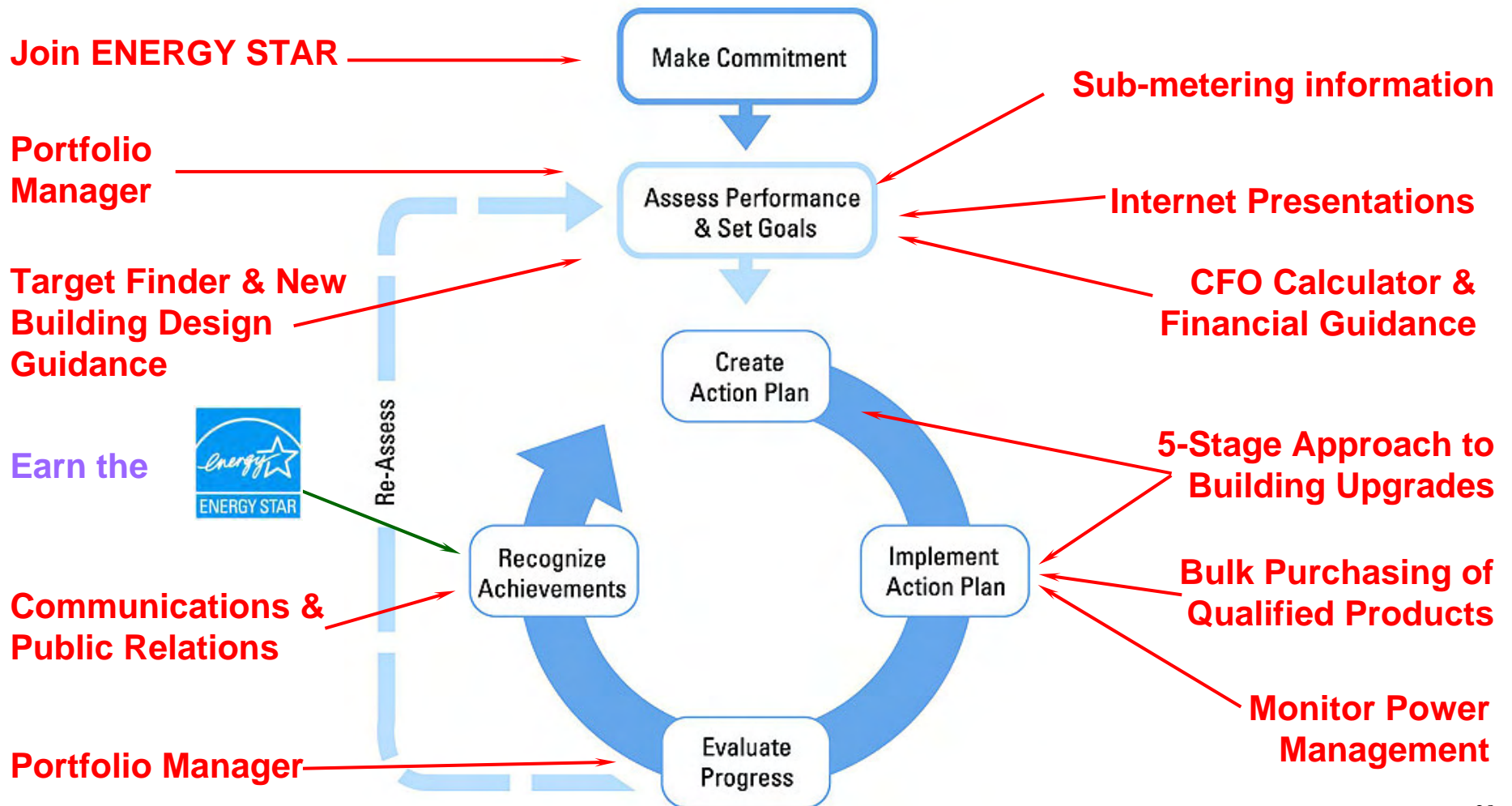
This 6-story, 215,880 sq. ft., air-conditioned facility (302,896 GSF including parking lot and garage) received two new chillers; two sets of chilled water and condenser water pumps, each with premium efficiency pump motors, 24 variable frequency drives and compatible premium efficiency motors for air handling units; an airside economizer cycle; and a new analog/digital energy management system with centralized and local HVAC access control of the entire facility. The building's lighting system was also retrofitted with T8/electronic ballasts (from T12/magnetic ballast fluorescent); compact fluorescent lamps (from incandescent), high pressure sodium lamps (from mercury vapor); and LED exit signs.

This project also included an investment grade audit, a computer simulation analysis, construction management, commissioning, and detailed measurement and verification procedures. Through this undertaking, the County realizes an annual energy savings of 1,145,269 kWh (23.7% - due to the lighting retrofit) and 450,289 kWh (9.3% - due to the HVAC improvements). This translates to annual cost savings of \$158,493 (\$0.52/GSF, under SCE's pre 2001 rates). Due to recent rate increases, the annual cost savings have jumped to \$207,423.

# What have we learned? Energy Management Strategy



## EPA Resources Support Your Planning & Process



# ENERGY STAR Public Sector Online Trainings



- **ENERGY STAR Overview**
- **Benchmarking with ENERGY STAR's Portfolio Manager**
- **PC Power Management**
- **Designing Top Energy Performing Buildings for Your Clients**
- **Money for Your Energy Upgrades**
- **Purchasing and Procurement**
- **Introduction to the Cash Flow Opportunity (CFO) Calculator Spreadsheet**
- **Higher Education ENERGY STAR Overview**

*For details, visit [www.energystar.gov](http://www.energystar.gov)*



You have the opportunity and  
the power to make a

**CHANGE FOR THE BETTER  
WITH ENERGY STAR.**



# ENERGY STAR

## Information Sources



- [www.energystar.gov](http://www.energystar.gov)
- 1-888-STAR-YES (1-888-782-7937)
- **Katy Hatcher, U.S. EPA**  
**ENERGY STAR National Manager, Public Sector**  
[hatcher.caterina@epa.gov](mailto:hatcher.caterina@epa.gov)
- **Kudret Utebay**  
Working in support of EPA's ENERGY STAR  
The Cadmus Group, Inc.  
[kutebay@cadmusgroup.com](mailto:kutebay@cadmusgroup.com)