



ENERGY STAR® for Higher Education in Ohio

Cost Effectively Green Your Buildings

Presented by: Julio Rovi, The Cadmus Group, Inc
for the Ohio Board of Regents
And Ohio Foundation of Independent Colleges
OH, April 25-26, 2007



Efficiency is First Step

- Clean Energy
- Green Building Programs
- Air Quality Programs
- Pollution Prevention Programs
- Sustainability
- Waste reduction



Federal Leadership

- Energy management focus:
 - Executive Orders (13123)
 - EPA Act 2005
 - MOU on Sustainability
 - OMB Scorecards
 - Green Power Purchases
 - >150 federal buildings ENERGY STAR



State Leadership

- Energy management focus:
 - Executive Order 2, 2007
 - HB 251
 - HB 264
 - Clean Energy State Partnership (EPA)
 - ENERGY STAR Partner



Energy Efficiency Good for Environment

- Commercial Buildings:
 - 18% of greenhouse gas emissions
- Savings Potential
 - 30% energy wasted
 - Waste captured by smart practices and technology
- Synergy
 - Indoor environment
 - Water efficiency
 - Refrigerant emissions



ENERGY STAR

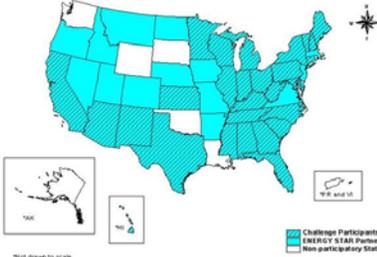
- National brand representing energy, financial & environmental *performance*
- Over 40 product categories covering appliances, residential lighting, consumer electronics & office equipment, AND
- Certification of top energy performance for new and existing homes & buildings



ENERGY STAR Challenge



ENERGY STAR Partner and Challenge Participating States (03/30/2007)



- Tracking & Measuring
- Setting Goals
- Brand Campaigns
- Training contractors
- Training A/E firms
- New Buildings
- EE Purchasing

*Not shown to scale

Superior Energy Management Approach



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



ENERGY STAR Impact



- **ENERGY STAR Label**
- More than **one billion** ENERGY STAR products have been purchased.
- More than 2,000 builders have constructed over **200,000** ENERGY STAR homes.
- EPA's Energy Performance Rating System has been used to evaluate more than 21,000 buildings; 20% of office buildings, 13% percent of schools, 21% of supermarkets, 34% of hospitals, 9% of hotels have been benchmarked. More than **4,000** buildings have earned the ENERGY STAR.

A Changing Landscape Increases Importance of Energy Efficiency



- Energy consumption and costs are rising
- Market volatility is increasing risk and uncertainty
- Managing the risk of climate change is becoming a reality for many organizations.
- Trend toward green building is not necessarily leading to energy-efficient buildings

Sustainable Building Principles



Federal MOU

- Signed by GSA, DOD, EPA, and many others at White House Summit
- Includes the following:
 - Integrated Design & Commissioning
 - Optimize Energy Performance
 - Water Efficiency – Use 20% less than potable water than indoor use baseline & reduce outdoor potable water consumption by 50%.
 - Indoor Environmental Quality –
 - ASHRAE 2004 ventilation and for thermal comfort
 - Establish moisture control strategy
 - Daylighting – achieve min of 2% daylighting factor in 75percent of space
 - Low-Emitting Material adhesives, sealants, paints, carpet systems, and furnishings
 - Protect indoor environment during construction
 - Reduce Environmental Impact of Materials – recycled content, biobased content, construction waste, ozone depleting compounds.

High Performance Cost-effective Green



Strive to build High Performance/Green Buildings while paying special attention to:

- **SITE:** Location, building orientation and the use of daylighting in the building design,
- **MATERIALS:** Energy-efficient building envelope, windows,
- **EQUIPMENT:** correctly sized energy-efficient technologies, operate at peak efficiency

High Performance Cost-effective Green



Continued

- **ENERGY:**
 - Design for low demand, low energy needs
 - Use only what is needed, only when it's needed
 - Leverage with cost-effective on-site renewable energy – (wind, geothermal, other),
 - Commission equipment to perform as intended and use zones.
- **IEQ:** Use interior materials, furnishings, and cleaning practices that minimize indoor air pollutants, and design to control space humidity

Cost Trading Principle



Using daylighting and an energy-efficient building envelope with high efficiency windows can reduce the amount, size, and capital costs of the equipment used to provide artificial lighting, heating and cooling equipment.

Green and Energy Goals



Complementary Approach

US Green Building Council, LEED™ Rating System

- Consensus based.
- Stakeholders in all areas of building design and manufacturing
- Five Areas of design process.
- New Buildings, Existing Buildings, Interiors, other

The Green Building Initiative (GBI), Green Globes™

- Web-based environmental design and rating system.
- Created by architects and builders for architects and builders
- Web-based system
- Eight-stage design process.

EPA Performance Rating System



- **Normalize building energy consumption**
 - weather, hours, occupant density, plug load
 - Whole building energy intensity (kbtu/sf/yr.)
- **Benchmark for comparison**
 - Measure and track any facility
 - 1-100 rating scale for select building types
- **Recognition for Individual Building**
 - Top 25% can qualify for Energy Star label
- **Recognition for Portfolio Improvement**
 - Improvements over baseline earn **Leader** award
- **Earn LEED-EB points**
 - Required score 60

Ratable Space Types



Offices



Hospitals



K-12 Schools



Supermarkets



Hotels



MOBs



Others include: Warehouse, Residence Halls, Courthouses, Financial Centers

Benchmark Space Types



- Any building type
 - Whether or not it's in CBECs
- Any campus configuration
 - Universities
 - Central office loops
 - Multi-facility complexes
- Any combination of meters
 - One building one meter
 - One building many meters
 - Many buildings one meter
 - Many buildings many meters

Portfolio Manager Enhancements



- Measure and track any facility or campus
- Master Account feature
- Grouping Capability
- Percent Energy Reduction Tracking
- National rating for select building types
- Water Tracking
- Automated benchmarking

Automated Benchmarking



- Automated benchmarking provides utilities and energy information service providers with a powerful platform to:
 - Securely exchange building and utility data with the EPA ENERGY STAR program
 - Leverage the ENERGY STAR Rating within their own systems
 - Reduce the burden on energy end users of benchmarking their energy performance

Lessons



- ENERGY STAR qualified offices demonstrate:
 - 35% less energy use
 - \$0.50 per square foot less to operate
 - Energy performance persists over multiple years
 - Increase asset value and occupancy
- No single technology path
 - Lighting, controls, management
- Design to Earn ENERGY STAR:
 - Set energy targets to perform at top levels
 - stay within conventional construction budget



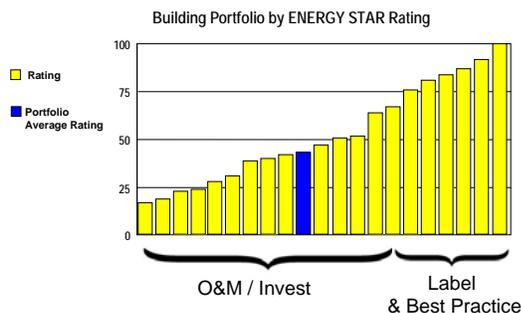
5 Successful Strategies



- 1. Assess Portfolio-wide Energy Use**
 - Understand potential savings/set goals
 - Target investment resources
 - Evaluate progress continuously
- 2. Adopt Whole Building Framework**
 - Achieve greater savings than component framework
 - Reduce capital investments
 - Capture O&M savings
- 3. Pursue energy savings even if capital constrained**
 - Low cost operational savings
 - Financing options
- 4. Motivate Occupants**
 - Behavior and practices part of solution
- 5. Validate Accomplishments**
 - 3rd party recognition powers continued success.



1. Assess Portfolio



Example: Veterans Administration

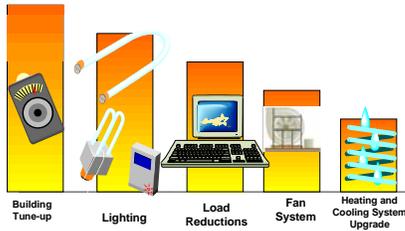


- Asset Enterprise Management commitment
 - Track and manage portfolio
 - Develop web based tracking
 - Link with ENERGY STAR
- ~18 ENERGY STAR qualified
- Some buildings labeled multiple years
- Require ENERGY STAR for leased office space

2. Adopt Whole Building Strategy



Whole Building Upgrade Strategy



Whole-Building Upgrades Deliver Twice the Savings as Equipment Efficiency Improvements Alone

Example: St. Francis Hospital



- 150,000 sq. ft hospital- Maryville, Missouri
 - Initial rating 51
 - Methodological review
 - Commissioning, lighting and ENERGY STAR procurement policy
 - Used \$ saved from right-sizing water pump to buy new boilers
 - Used \$ saved from new boilers to fund new DDC controls
 - In one year:
 - Score: 91
 - Gas bill cut in half
 - Electricity reduced 17%

"Benefits to patient comfort... savings put into patient services"



3. Pursue Energy Savings: O&M



- Do buildings 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
- Commissioning focus in LEED-EB
- **This step alone can significantly impact the rating**

Example: Hines



- 1900 K St, Washington DC-1996 construction
 - 1999 scored 32
 - 2002 scored 70
 - By 2003 earned ENERGY STAR
- Found quality construction with energy efficiency in mind, but oversized
 - VFDs on chillers to match measured demand
 - Improved operating standards- static pressure, set points
 - Tracked and managed energy use continuously
 - Improved lighting controls
- Savings based on synergies and management practices
 - "did not really cost us anything to implement—just a change in the way things get done."



Example: GSA



- Richard B. Russell Federal Building
 - Atlanta, GA; 1.23 million sq. ft.
 - Upgrades through FEMP Super ESPC
 - Project expanded to 3 buildings
 - Significant additional savings
 - ENERGY STAR 2001; 2004
 - FEMP 2001 Energy Saver Showcase award
 - Upgrades include:
 - EMS, Lighting, roof insulation
 - VSD on fan, high efficiency chiller
 - Co-generation
 - \$6.44 million investment (3 buildings)
 - GSA payments: 20 years
 - Guaranteed savings: 18%



4. Motivate Occupants



- Identify energy champions
- Educate tenants
 - Email newsletters
 - Lobby posters
- Procurement Strategies
 - Buy ENERGY STAR products
- 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.

Example: EPA



- Energizing EPA:
 - employee newsletter on EPA successes; advice for employees
- Btu Buster Awards:
 - Employee practices recognized:
 - Retro commissioning saved 7% in RTP
 - HVAC adjustments saved 11% in New England
- Procurement practices:
 - Green practices when purchasing

Example: Bell South



- Energy Champion Program:
 - 122 energy champions
 - Program guide
 - Monthly call to roll out new activities
 - Energy tips & facts, posters, flyers, slides, prizes...
 - Web site with access to tools and information
 - Contributed to a \$2.6 million or 2% reduction in energy costs in 2002.

5. Third Party Validation



- EPA:
 - ENERGY STAR Label
 - ENERGY STAR Leaders
 - ENERGY STAR Partner of the Year awards
- DOE/FEMP
- USGBC:
 - LEED-EB



Comprehensive Framework



- Demonstrate commitment
 - Adopt ENERGY STAR: a tested methodology compatible with clean energy and green building goals
- Use proven measurement tools: Portfolio Manager
 - Set baseline and goals for existing buildings
 - Design energy efficiency into new buildings
 - Measure performance and progress
- Educate staff, peers, community
 - Guidelines for energy management and other tools
 - Compare results
- Provide motivation and recognition
 - Third party validation
 - Make performance part of culture

State Examples



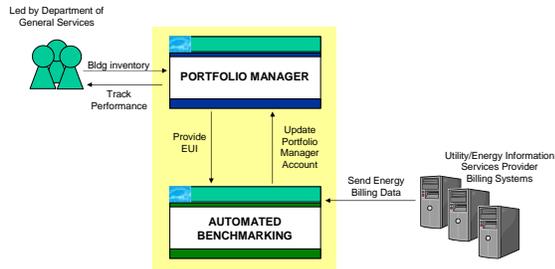
- California
- Michigan
- New Mexico
- Ohio
- Minnesota
- AL, FL, GA, MS, and SC

Energy is First Step to Green: CA DGS and State Buildings



- Portfolio = 1,566 buildings or complexes
 - Green Building Executive Order S-20-04
 - Set energy reduction goal: 20% by 2015
- Uses EPA energy performance rating
 - Started tracking using manual and bulk upload
 - Identified facilities to improve
 - Portfolio Manager output demonstrates progress
 - First step in plans for LEED-EB
 - Working with IOUs to automate benchmarking

California Automated Model



State Energy Tracking: Michigan



- Portfolio = estimated at 800 buildings
- Executive Order No. 2005-4
 - Energy reduction goal: 10% reduction in energy use by December 31, 2008 and a 20% reduction in grid-based energy purchases by Dec 31, 2015
- Uses EPA energy performance rating system
 - Uses for tracking & to identify facilities to improve
 - Portfolio Manager output demonstrates progress
 - Automation after baseline is established

New Mexico: Clean Energy State



- Portfolio = Over 7,500 buildings, many in complexes
 - Executive Order 2004-019, Green Buildings (2006-001), Renewable Fuels (2005-049) and Climate Change Action (2006-69).
 - Set energy reduction goal: 20% by 2020
- Plans to EPA energy performance rating system
 - Integrated into several Exec Orders and Chicago Climate Exchange
 - Leveraging various ENERGY STAR program areas
 - Portfolio Manager output demonstrates progress
 - Complementary to USGBC LEED™

Focus on Energy: Ohio



- Portfolio = State buildings and Challenge to Higher Education
 - HB 251 ... energy efficiency and conservation standards relating to facility construction and leasing
 - Exec Order 2007 -02S Coordinating OH Energy Policy
 - Goal: 5% reduction year 1, 15% in by end of 4th year
- Will use EPA energy performance rating system
 - OH Building Authority Leases ENERGY STAR labeled buildings
 - OH Schools Facilities Authority trained project managers, commissioning agents and Architects on ENERGY STAR tools

1000 Labels: Minnesota

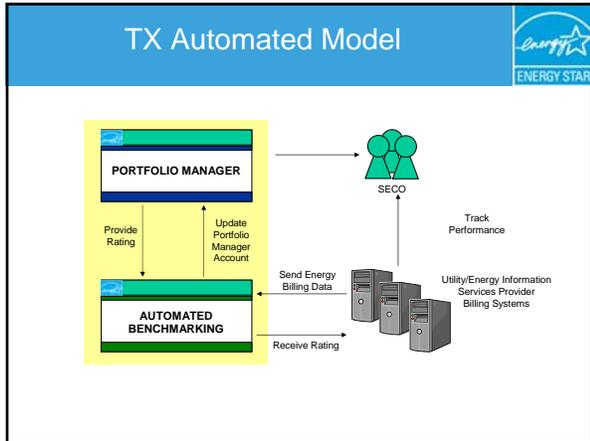


- Governors Goal: 1000 top performing buildings by 2010
 - Will use EPA energy performance rating system
- Improve performance across the state
 - State and local government facilities
 - Schools and universities
 - Healthcare
 - Corporate and commercial real estate
 - Hospitality

Portfolio-Wide Focus: Texas SECO



- Portfolio = estimated at 7,000 buildings
- Texas, through the State Council on Competitive Government (SCCG), has committed to a 4-year project that will collect historical energy use data.
 - Web based tracking
 - Automated ENERGY STAR benchmarking
- Paid through cost recovery
- Ownership and control of project transferred to the State of Texas when project ends



- ### Southeast Rebuild Collaborative
- AL, FL, GA, MS and SC project
 - Leveraging brand to promote energy efficiency
 - STAC Grant / NASEO-FL Mgt
 - States focus on K-12 and state and local governments
 - ENERGY STAR used to track results

States Leverage ENERGY STAR

This section features a collage of images related to ENERGY STAR:

- Three photographs of modern buildings.
- The ENERGY STAR logo with the text "LEARN MORE AT energystar.gov".
- A "DESIGNED TO EARN THE ENERGY STAR" sign.
- Icons for a washing machine, a dryer, a refrigerator, and a microwave, with the word "EXIT" written across them.

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