

Energy Efficiency and Green Buildings

May 21, 2008

Call-in Number: 1-866-299-3188 Conference Code: 202 343 9965

About The Web Conferences



- Monthly
- Topics are structured on a strategic approach to energy management
- Opportunity to share ideas with others
- Slides are a starting point for discussion
- Open & Interactive



Web Conference Tips



- <u>Mute</u> To improve sound quality, all phones but the presenters will be muted.
- Use # 6 to un-mute and * 6 to mute
- Presentation slides will be sent by email to all participants following the web conference.

Today's Web Conference



Energy Efficiency and Green Buildings

- Background Jean Lupinacci, US EPA
- Municipal Approach Dianne Herrin, Borough of West Chester Pennsylvania
- Corporate Approach Jerry Lea and David Robinson, Hines
- Discussion
- Announcements

Context



- 18% of US GHG Emissions are associated with building energy use.
- Energy efficiency is a key strategy for reducing GHG emissions.
- Increased media attention on building use and climate change.
- Green buildings are increasingly seen as a "climate solution."

Distribution of US commercial building GHG emissions



Challenges



- Technological optimism
 - New technology is believed to ensure whole building energy efficiency.
- High "code" expectations
 - Exceeding building code specifications is expected to increased energy performance.
- Green guarantees efficiency
 - Green building certification serves a guarantee of higher energy efficiency.

Technology Doesn't Always Equal Performance

ENERGY STAR



Note: CBECS = U.S. Department of Energy's Commercial Building Energy Consumption Survey

Code and Energy Efficiency



Performance against code is weakly correlated to EUI



Source: NBI, California Board for Energy Efficiency, EPA

LEED NC buildings use 25 – 30% less energy than national average





However, Your Mileage May Vary...



However, actual performance varies within LEED certification level and EAc Credits



Energy Star Rating of LEED Buildings



And relative performance also varies...

Elements for Energy Efficiency

ENERGY S



- Set an energy target
- Right size building systems
- Tight envelope
- Controls and metering
- Smart choice of green attributes
- Quality Construction
- Commissioning
- Proper building energy management

Design Through Operation



DESIGN PROCESS USING ENERGY STAR



EPA Rating at Design: Target Finder



Target Energy Performance Results (estimated)			
Energy	Design	Target	Top 10%
Energy Performance Rating (1-100)	83	80	90
Energy Reduction (%)	35	31	45
Source Energy Use Intensity (kBtu/Sq. Ft./yr)	195.0	206.7	164.4
<u>Site Energy Use Intensity (kBtu/Sq. Ft./yr)</u>	85.7	90.8	72.3
Total Annual Source Energy (kBtu)	9,750,552.6	10,332,984.3	8,217,896.9
<u>Total Annual Site Energy (kBtu)</u>	4,286,376.6	4,542,415.6	3,612,615.8
Total Annual Energy Cost (\$)	\$ 80,933	\$ 85,768	\$ 68,212
Pollution Emissions			
CO2 Emissions (1000 lbs/year)	1,860.0	1,954.4	1,554.3
CO2 Emissions Reduction (%)	34%	31%	45%

Target Finder Results

- EPA Target Rating
- % > Average
- Site/Source Energy
- Site/Source EUI
- Energy Costs
- CO₂/lbs. &
 % prevented

Designed to Earn the ENERGY STAR

- Achieve of rating 75 >
- Submit "Statement of Energy Design Intent"
- Get Recognized by EPA
- Distinguish projects as ENERGY STAR ____





TO EARN THE ENERGY STAR

The estimated energy performance for this design meets US EPA criteria. The building will be eligible for ENERGY STAR after maintaining superior performance for one year.





Design to Earn Catches On



- Architects steps up to the Challenge:
 - 46 Designed to Earn projects; 120 million lbs CO2 prevented, \$5 million cost savings
- Owners incorporate into energy management approach:
 - Hines, JCPenney, US EPA, others
- Municipalities incorporate into policies:
 - West Chester, PA, District of Columbia, others





About West Chester

- 25 mi west of Philadelphia
- 1.8 square miles
- Population 18,000+
- National Register of Historic Places
- County seat
- University town



West Chester's Focus on Energy Efficiency

- Borough Council-appointed, all-volunteer, adhoc committee of five
- ICLEI-Local Governments for Sustainability Climate Protection Program



ICLEI Milestones

- Resolution
- Baseline emissions inventory & forecast
- Emissions reduction target
- Local action plan
- Implementation
- Monitoring



Mission

West Chester BLUER will work to secure a safer and more sustainable energy future by reducing community-wide CO₂ and other greenhouse gas emissions 10% by 2015 over 2005 levels.



Goal

Make West Chester a model "energy smart" community that practices energy conservation and waste reduction, and relies substantially on cleaner, renewable energy sources for its remaining energy needs.



Accomplishments to Date

- Borough-wide GHG inventory
- Student collaboration: High school & University
- Business collaboration: Awards program
- Industry collaboration: EPA audits
- GROUNDBREAKING ENERGY STAR ORDINANCE!



Opportunity Knocked

- New height ordinance necessitated updating of our "conditional use approval" criteria for tall buildings
- Supportive council member issued the challenge

How We Presented It

The Challenge:

How can we "green" our conditional use criteria for buildings higher than 45'?

Our Approach:

- What are the options?
- What makes sense for us?
- What are the incentives?





Lesson #1:

"Green" *≠* Operational Energy Efficiency

 13% of LEED buildings constructed to date had no improvements in operational energy efficiency



Lesson #2:

There's a difference between "building to code" and creating truly energy efficient buildings

- Building "to code" (IECC) helps but is a minimum standard
- Building "to code" looks at individual elements (lights, HVAC, insulation, etc.) but not at their interrelationships
- "Integrated design" is key

Integrated Design: The Whole is *Less Than* the Sum of Its Parts

Example of Integrated Design



Neptune Community School, NJ:

- \$250K in first-cost savings due to 40% reduction in ground source heat pump load
- 10% estimated reduction on energy bills

Lesson #3: Incentives are already built in to integrated design



- No need to add more incentives
- Permit building fee reductions would unnecessarily burden taxpayers
- Fast-track approvals would unnecessarily burden the Borough
- Density/height over 45' is already an incentive

Lesson #3 (cont'd.): Incentives are already built in to integrated design



- Federal tax credits are available for significant efficiencies (\$1.80/sq ft if energy use is 50% less than IECC/ASHRAE)
- Energy efficiency saves building owners \$\$
- Energy efficiency boosts financial performance and value of commercial real estate holdings and residences (CoStar)







Integrated Design Options

We evaluated:

- LEED
- Energy Star for New Construction

LEED-NC TM



- Green Building Rating System (USGBC)
- Integrated approach to whole-building design
- Building performance based on 6 categories
- 69 points total; 26 needed to be "LEED certified"

LEED-NC TM



BLUER Analysis for West Chester:

- 5-12 points easily obtained here (e.g., Credit 1–Site Selection)
- 17 total points can come directly from energy category
- 8 more points come from other categories but still reduce energy consumption (e.g., Daylighting [EQ 8.1] affects energy performance)

Project Name: Project Address:

Yes ? No		
Sus	tainable Sites	14 Points
Y Prereq 1 Credit 1 Credit 2 Credit 3 Credit 4.1	Construction Activity Pollution Prevention Site Selection Development Density & Community Connectivity Brownfield Redevelopment Alternative Transportation, Public Transportation Access	Required 1 1 1 1
Credit 4.2 Credit 4.3 Credit 4.4 Credit 5.2 Credit 5.2 Credit 5.2 Credit 6.1 Credit 6.1 Credit 7.1 Credit 7.2 Credit 7.2 Credit 8	Alternative Transportation, Bicycle Storage & Changing Rooms Alternative Transportation, Low-Emitting & Fuel-Efficient Vehicles Alternative Transportation, Parking Capacity Site Development, Protect of Restore Habitat Site Development, Maximize Open Space Stormwater Design, Quantity Control Stormwater Design, Quantity Control Heat Island Effect, Non-Roof Heat Island Effect, Roof Light Pollution Reduction	1 1 1 1 1 1 1 1 1
Wat	er Efficiency	5 Points
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What is ENERGY STAR for New Building Design?

- Energy performance rating based on whole building energy performance: "mpg" rating
- Benchmark system: 1 to 100 efficiency rating
- Top 25% (score of 75+) qualify for ENERGY STAR rating



ENERGY STAR is Feasible:

- Improves energy efficiency 30% above average, comparable building
- Represents approximate 6% improvement over fully compliant IECC building
- Training and on-line tools readily accessible at no cost



Example:



DEP Cambria Office Building, Ebensburg, PA:

• Reduced energy demand reduced HVAC requirement (first-cost savings)



Example: (energy element only)



Clearview Elementary, Hanover, PA:

• Reflective paint reduced lighting requirements 25%



Example:



Custom House, Philadelphia, PA:

• \$390,000 annual savings due to energy upgrades



Steps to ENERGY STAR



Step 2.



BLUER Recommendation

Integrated Design Aimed at Improving Operational Energy Efficiency:

ENERGY STAR for New Commercial Construction



ENERGY STAR is a Win-Win!



Ordinance Effective Jan 19 2008

- "Conditional use" standards
- New buildings over 45' must be *Designed to Earn* ENERGY STAR to obtain building permit
- Building owners must submit for ENERGY STAR label
 after one year of operation
- Requirement waived if LEED certified



How We Rolled It Out

- Press coverage: Local paper, Phila Inquirer, DEP Website
- Regional Training Session March 2008
- Developer support packet/meetings
- Plans to use ENERGY STAR tools to create master account, track local progress



• ENERGY STAR ordinance helped position BLUER for future success.



THANK YOU!

Energy Efficiency and Green Buildings

Energy Star Monthly Partner Meeting

Jerry Lea, Sr. Vice President David Robinson, Vice President

May 21, 2008



WORLDWIDE OPERATIONS

Projects completed, acquired, under development or in design



Hines has a legacy of building high quality buildings



Two Twenty Two Berkeley



600 Thirteenth Street



Five Hundred Boylston Street



Hines' LEED Experience & Pipeline (Sq. Ft. as of 4/28/08)



HINES AND THE ENERGY STAR PROGRAM

Total Energy Star Square Footage

72,886,401 in 124 buildings

		<u># of Buildings</u>	<u>Total Sq. Footage</u>
Energy Star Rated	70 – 80	61	38,540,730
Energy Star Rated	81 – 90	53	26,729,898
Energy Star Rated	91 – 100	10	7,615,773



Do the "right thing" vs. what you can sell



One South Dearborn



Union Pacific Center



24th at Camelback



Tenant Benefits

- •Good Indoor Air Quality
- •Daylight and Views =
- Location, Location, Location
- •Healthy Employee Environment

Employee Retention / Recruiting
Increased Productivity / Fewer Sick Days

- •Energy Efficiency
 - •Hines Energy Star buildings save \$55,595,372 annually over other Hines non-Energy Star buildings.
 - •We project with continued upgrades on non-Energy Star labeled properties this savings will exceed \$100,000,000.



Landlord Benefits

- •Premium rents
- •Quicker lease up and higher retention
- •Financing
- •Lower cost insurance
- •Higher sales price





One South Dearborn

1180 Peachtree



LEED Core and Shell Precertification

Design to Earn Energy Star



South Station



Technology that helps earn Energy Star



717 Texas

Pennzoil Place

Williams Tower

Hines

Raised Floor Air Distribution





Sunshades







Lighting Technology & Controls



Deep-Cell Parabolic



Recessed Direct / Indirect





Suspended Indirects



Building Transformers

- Transformers waste 60-80 *Billion* kWh/yr
- = 9 days of all the power generated in the US each year
- Standard and K-Rated = 85-92% efficient

Energy Efficient (NEMA TP-1) Harmonic Mitigating Transformers



- 97-98% efficient with <u>non-linear</u> loads
- Cancel the significant odd order harmonic currents
- First cost premium payback < 1 year



Condenser Water / Outside Air Heat Recovery Systems



Hines

River Water for Cooling

•Eliminates Cooling Tower

- No make up water
- No fans
- •Free cooling
- •More efficient WCU operation



300 North LaSalle



New Technologies in Our Buildings – Under Consideration

- •Fuel Cells
- •Photovoltaic Panels
- •Geothermal Energy
- •Wind Power



People Earn Energy Star



101 California





Figueroa at Wilshire

560 Mission



Human Interface

•Understand the MEP system and its components

- Performance characteristics
- Efficiencies

•Proficient utilization of the building's EMS

- Economizer operation
- Load / demand management
- Operational optimization

•Understand utility rate structures and impact



1900 K Street Case Study

Prior to Hines operation – Energy Star Rating of 32

Since Hines has been operating the building – Energy Star Rating of 75

In last 5 years:
Saved 1,810,513 KWh/year
Equals \$170,000/year
Capitalized value increase to project of \$2,615,000 or \$7.76/sf
Equates to removing 4,042 cars from the highway per year



1900 K Street Washington, DC



Questions?





Questions & Discussion

2008 Web Conferences



Month	Торіс			
January	ES Update			
February	Green Power Strategies			
March	Engaging Employees in Energy Efficiency			
April	Leading Energy Programs – ES Partners of the Year			
May	Energy Efficiency and Green Buildings			
June	Our Top 3 Energy Projects			
July	Motivating and driving facility performance			
August	"Cool" Energy Savings Strategies			
September	Supply Chain Energy & Climate Initiatives			
October	Energy & Climate Risk Management			
November	Energy Strategy & Project Financing			
Past Presentations – See "Networking Opportunities" @ energystar.gov				



Thank You!