



# Energy Efficiency and Green Buildings

**May 21, 2008**

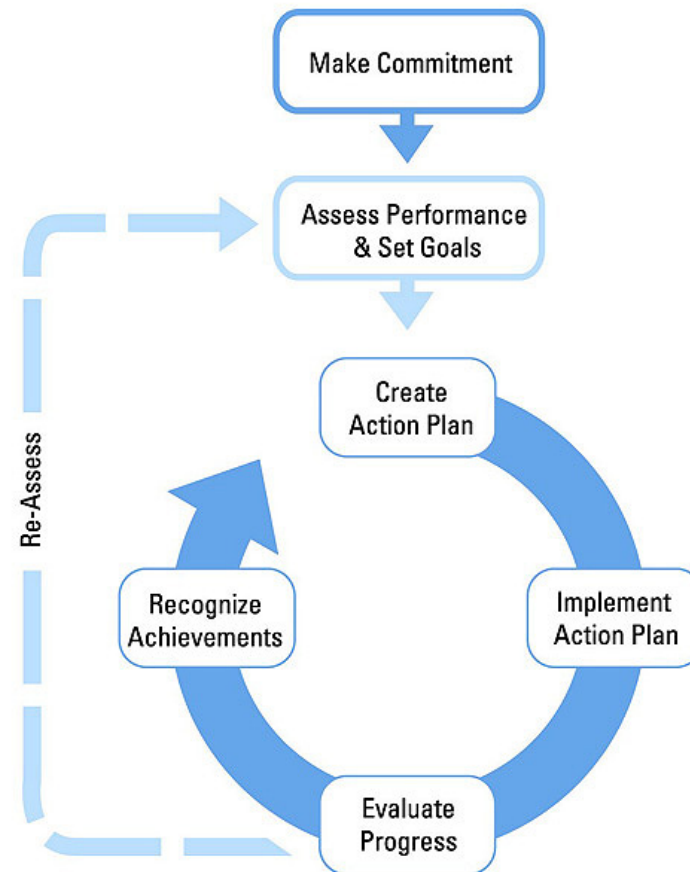
Call-in Number: 1-866-299-3188

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



- Mute – 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

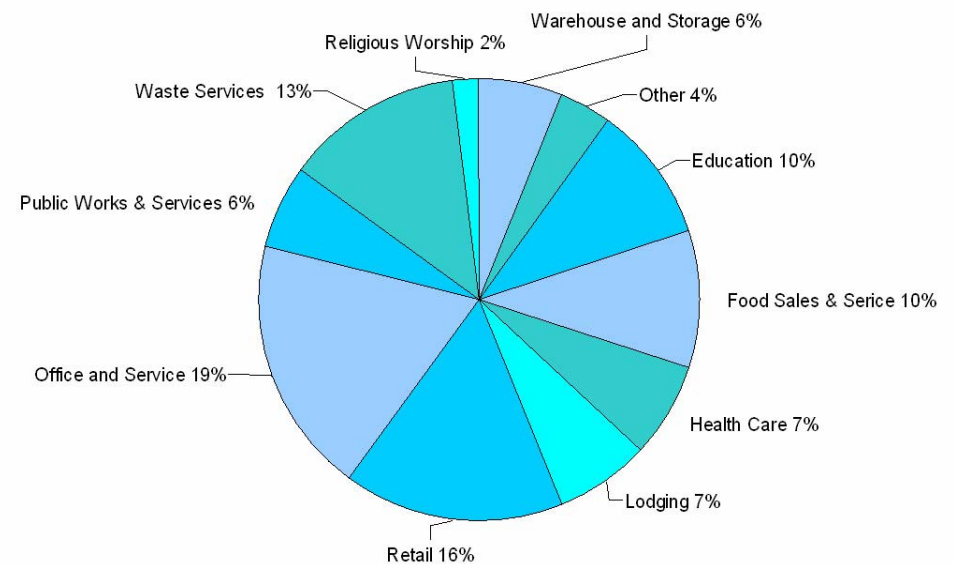
- Background – Jean Lupinacci, US EPA
- Municipal Approach – Dianne Herrin, Borough of West Chester Pennsylvania
- Corporate Approach – Jerry Lea and David Robinson, Hines
- Discussion
- Announcements

# 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

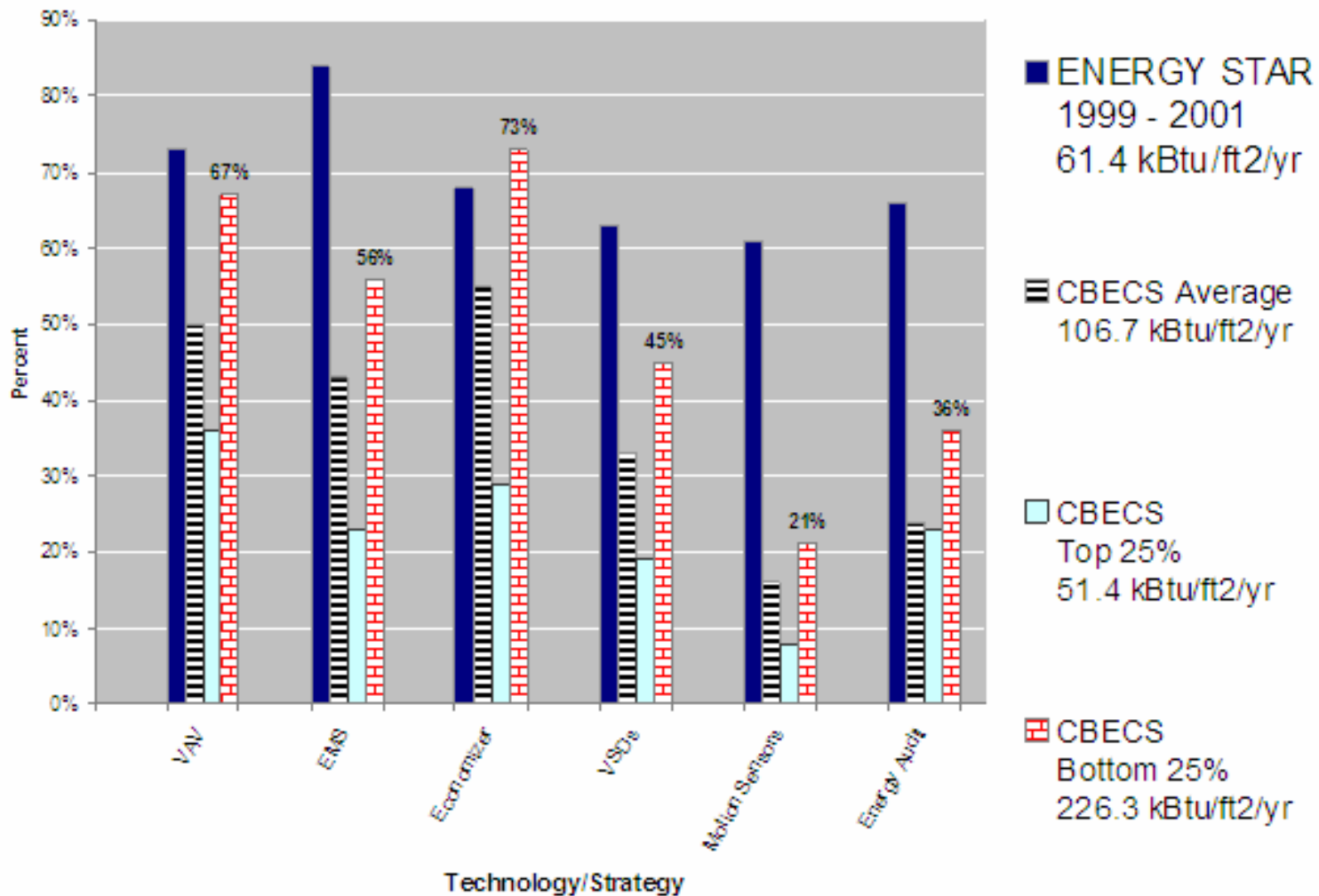


# Challenges



- 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

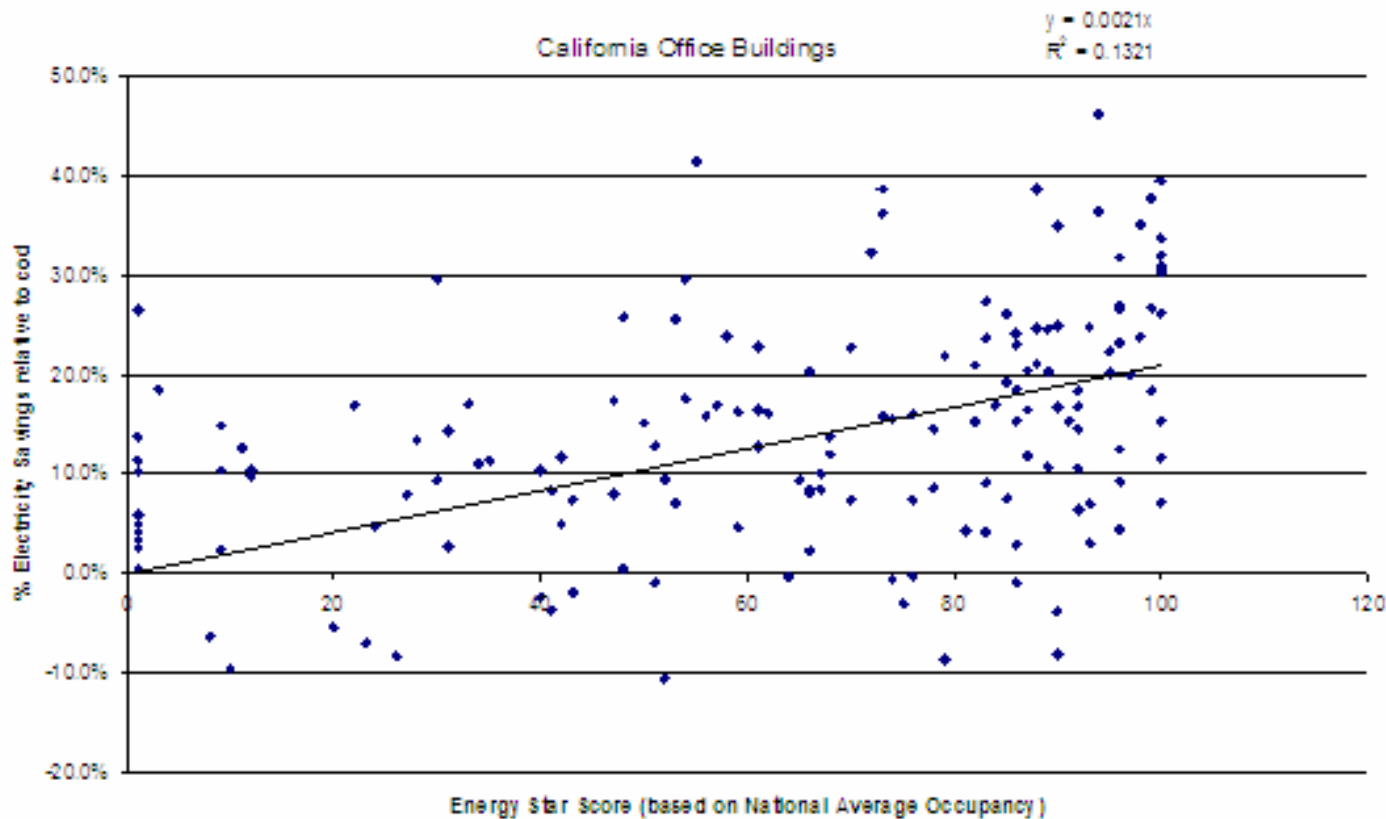


Note: CBECS = U.S. Department of Energy's Commercial Building Energy Consumption Survey

# Code and Energy Efficiency



Performance against code is weakly correlated to EUI

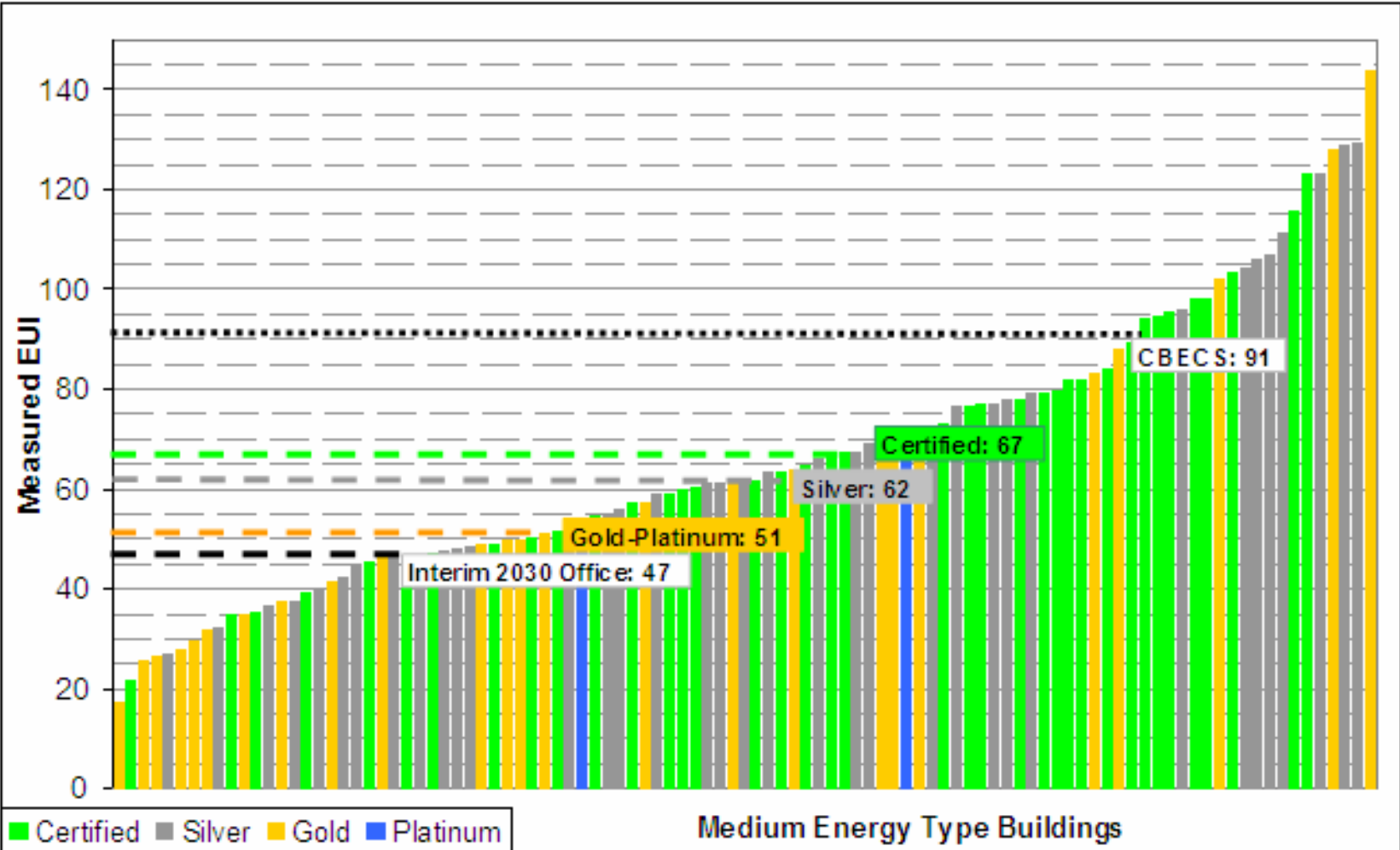


Buildings 20% better than code can have an energy performance score ranging from 1-100.

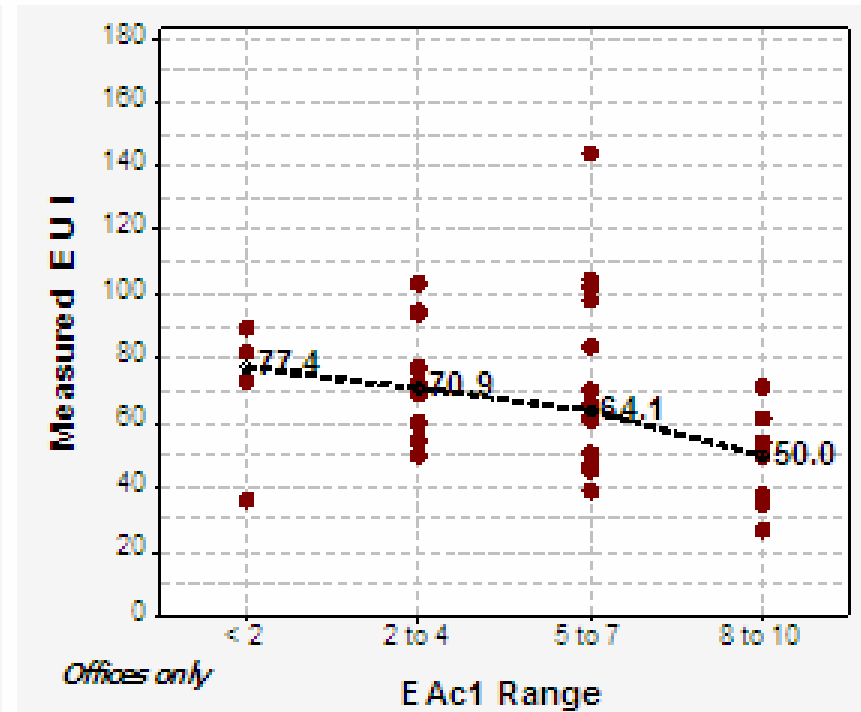
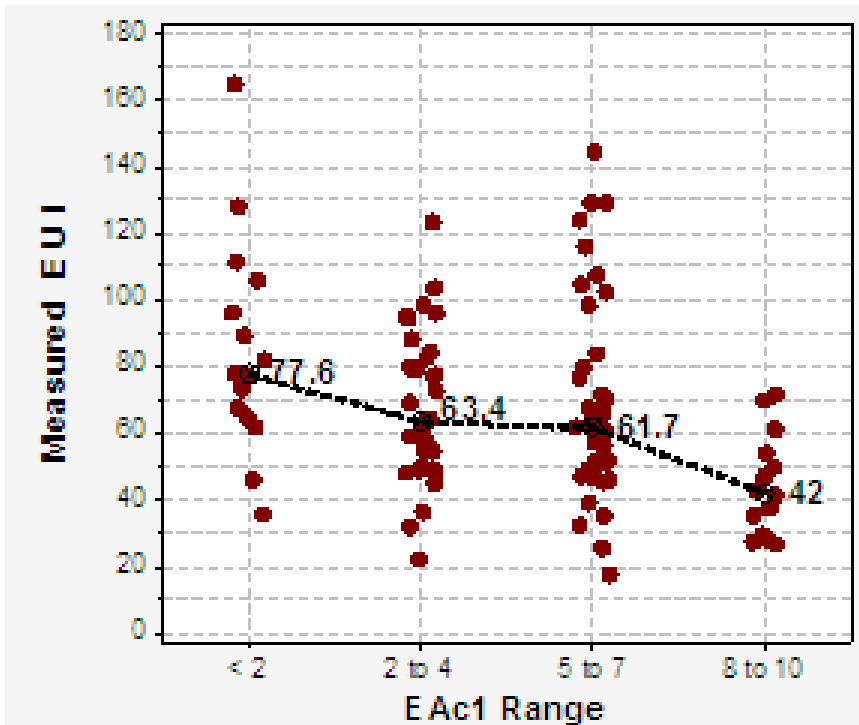
Source: NBI, California Board for Energy Efficiency, EPA



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

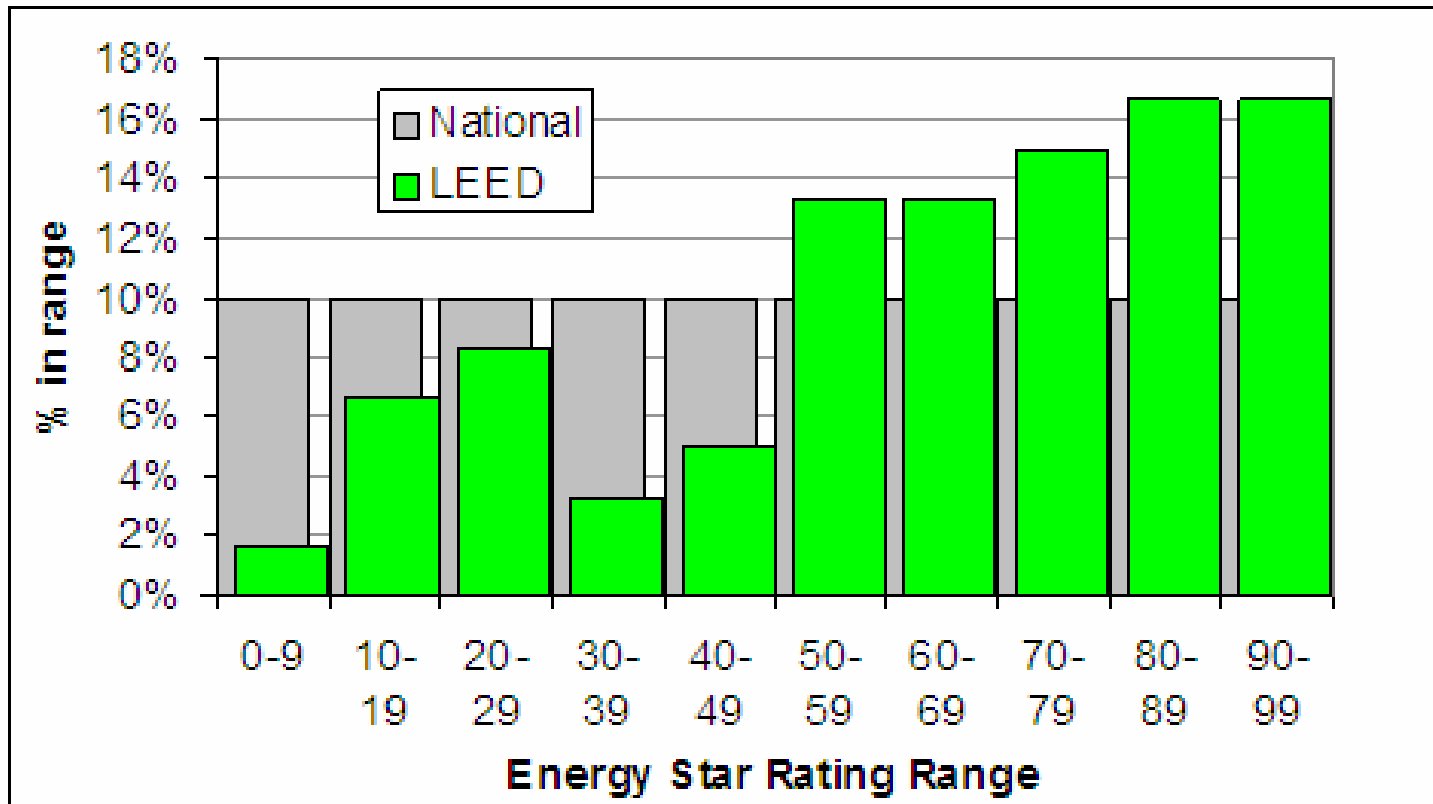


# However, Your Mileage May Vary...



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



- Good Design
  - 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



# EPA Rating at Design: Target Finder



## Target Finder Results

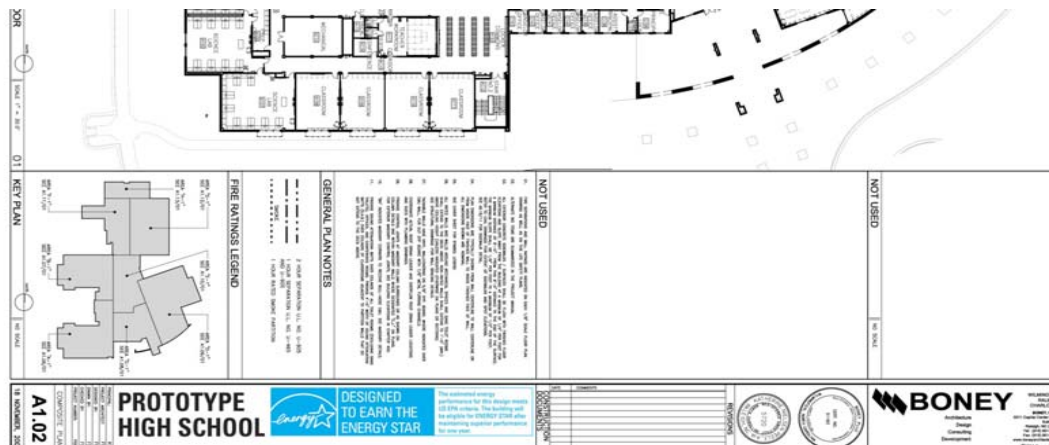
Target Energy Performance Results (estimated)			
Energy	Design	Target	Top 10%
<a href="#">Energy Performance Rating (1-100)</a>	83	80	90
<a href="#">Energy Reduction (%)</a>	35	31	45
<a href="#">Source Energy Use Intensity (kBtu/Sq. Ft./yr)</a>	195.0	206.7	164.4
<a href="#">Site Energy Use Intensity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

- EPA Target Rating
- % > Average
- Site/Source Energy
- Site/Source EUI
- Energy Costs
- CO<sub>2</sub>/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



**DESIGNED 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



WEST CHESTER BOROUGH LEADERS UNITED FOR EMISSIONS REDUCTION



B•L•U•E•R



## 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, ad-hoc 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



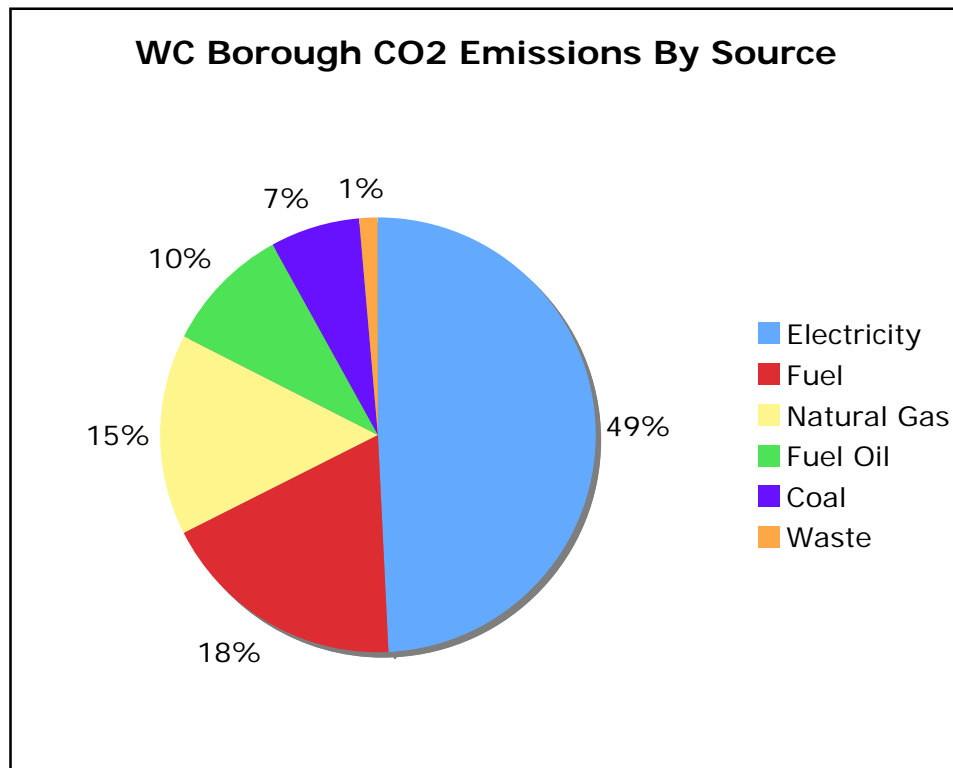
## **Mission**

West Chester BLUER will work to secure a safer and more sustainable energy future by reducing community-wide CO<sub>2</sub> and other greenhouse gas emissions 10% by 2015 over 2005 levels.



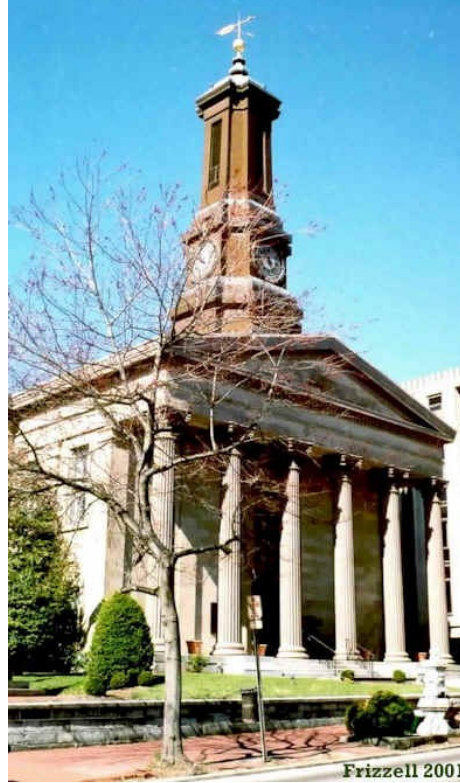
## Goal

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



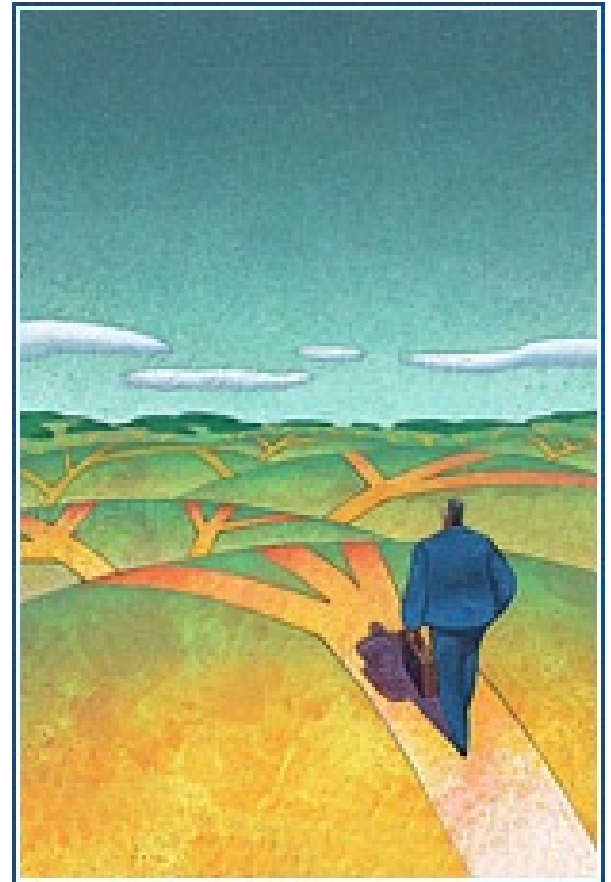
# How We Presented It

## 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?



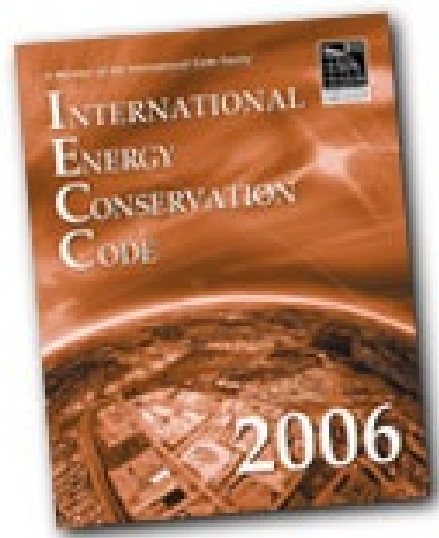


# Lessons Learned

*Lesson #1:*

*"Green" ≠ Operational Energy Efficiency*

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



# Lessons Learned

## *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

# Lessons Learned

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

# Lessons Learned

*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

# Lessons Learned

*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*** <sup>TM</sup>



- 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*** <sup>TM</sup>



## 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

**Sustainable Sites 14 Points**

Y	Prereq 1	Construction Activity Pollution Prevention	Required
<input checked="" type="checkbox"/>	Credit 1	Site Selection	1
<input checked="" type="checkbox"/>	Credit 2	Development Density & Community Connectivity	1
<input checked="" type="checkbox"/>	Credit 3	Brownfield Redevelopment	1
<input checked="" type="checkbox"/>	Credit 4.1	Alternative Transportation, Public Transportation Access	1
<input checked="" type="checkbox"/>	Credit 4.2	Alternative Transportation, Bicycle Storage & Changing Rooms	1
<input checked="" type="checkbox"/>	Credit 4.3	Alternative Transportation, Low-Emitting & Fuel-Efficient Vehicles	1
<input checked="" type="checkbox"/>	Credit 4.4	Alternative Transportation, Parking Capacity	1
<input checked="" type="checkbox"/>	Credit 5.1	Site Development, Protect or Restore Habitat	1
<input checked="" type="checkbox"/>	Credit 5.2	Site Development, Maximize Open Space	1
<input checked="" type="checkbox"/>	Credit 6.1	Stormwater Design, Quantity Control	1
<input checked="" type="checkbox"/>	Credit 6.2	Stormwater Design, Quality Control	1
<input checked="" type="checkbox"/>	Credit 7.1	Heat Island Effect, Non-Roof	1
<input checked="" type="checkbox"/>	Credit 7.2	Heat Island Effect, Roof	1
<input checked="" type="checkbox"/>	Credit 8	Light Pollution Reduction	1

Yes ? No

**Water Efficiency 5 Points**

<input checked="" type="checkbox"/>	Credit 1.1	Water Efficient Landscaping, Reduce by 50%	1
<input checked="" type="checkbox"/>	Credit 1.2	Water Efficient Landscaping, No Potable Use or No Irrigation	1
<input checked="" type="checkbox"/>	Credit 2	Innovative Wastewater Technologies	1
<input checked="" type="checkbox"/>	Credit 3.1	Water Use Reduction, 20% Reduction	1
<input checked="" type="checkbox"/>	Credit 3.2	Water Use Reduction, 30% Reduction	1

Yes ? No

**Energy & Atmosphere 17 Points**

Y	Prereq 1	Fundamental Commissioning of the Building Energy Systems	Required
<input checked="" type="checkbox"/>	Prereq 2	Minimum Energy Performance	Required
<input checked="" type="checkbox"/>	Prereq 3	Fundamental Refrigerant Management	Required
<input checked="" type="checkbox"/>	Credit 1	Optimize Energy Performance	1 to 10
<input checked="" type="checkbox"/>		10.5% New Buildings or 3.5% Existing Building Renovations	1
<input checked="" type="checkbox"/>		14% New Buildings or 7% Existing Building Renovations	2
<input checked="" type="checkbox"/>		17.5% New Buildings or 10.5% Existing Building Renovations	3
<input checked="" type="checkbox"/>		21% New Buildings or 14% Existing Building Renovations	4
<input checked="" type="checkbox"/>		24.5% New Buildings or 17.5% Existing Building Renovations	5
<input checked="" type="checkbox"/>		28% New Buildings or 21% Existing Building Renovations	6
<input checked="" type="checkbox"/>		31.5% New Buildings or 24.5% Existing Building Renovations	7
<input checked="" type="checkbox"/>		35% New Buildings or 28% Existing Building Renovations	8
<input checked="" type="checkbox"/>		38.5% New Buildings or 31.5% Existing Building Renovations	9
<input checked="" type="checkbox"/>		42% New Buildings or 35% Existing Building Renovations	10
<input checked="" type="checkbox"/>	Credit 2	On-Site Renewable Energy	1 to 3
<input checked="" type="checkbox"/>		2.5% Renewable Energy	1
<input checked="" type="checkbox"/>		7.5% Renewable Energy	2
<input checked="" type="checkbox"/>		12.5% Renewable Energy	3
<input checked="" type="checkbox"/>	Credit 3	Enhanced Commissioning	1
<input checked="" type="checkbox"/>	Credit 4	Enhanced Refrigerant Management	1
<input checked="" type="checkbox"/>	Credit 5	Measurement & Verification	1
<input checked="" type="checkbox"/>	Credit 6	Green Power	1

continued...

Yes ? No

**Materials & Resources 13 Points**

Y	Prereq 1	Storage & Collection of Recyclables	Required
<input checked="" type="checkbox"/>	Credit 1.1	Building Reuse, Maintain 75% of Existing Walls, Floors & Roof	1
<input checked="" type="checkbox"/>	Credit 1.2	Building Reuse, Maintain 100% of Existing Walls, Floors & Roof	1
<input checked="" type="checkbox"/>	Credit 1.3	Building Reuse, Maintain 50% of Interior Non-Structural Elements	1
<input checked="" type="checkbox"/>	Credit 2.1	Construction Waste Management, Divert 50% from Disposal	1
<input checked="" type="checkbox"/>	Credit 2.2	Construction Waste Management, Divert 75% from Disposal	1
<input checked="" type="checkbox"/>	Credit 3.1	Materials Reuse, 5%	1
<input checked="" type="checkbox"/>	Credit 3.2	Materials Reuse, 10%	1
<input checked="" type="checkbox"/>	Credit 4.1	Recycled Content, 10% (post-consumer + ½ pre-consumer)	1
<input checked="" type="checkbox"/>	Credit 4.2	Recycled Content, 20% (post-consumer + ½ pre-consumer)	1
<input checked="" type="checkbox"/>	Credit 5.1	Regional Materials, 10% Extracted, Processed & Manufactured Regionally	1
<input checked="" type="checkbox"/>	Credit 5.2	Regional Materials, 20% Extracted, Processed & Manufactured Regionally	1
<input checked="" type="checkbox"/>	Credit 6	Rapidly Renewable Materials	1
<input checked="" type="checkbox"/>	Credit 7	Certified Wood	1

Yes ? No

**Indoor Environmental Quality 15 Points**

Y	Prereq 1	Minimum IAQ Performance	Required
<input checked="" type="checkbox"/>	Prereq 2	Environmental Tobacco Smoke (ETS) Control	Required
<input checked="" type="checkbox"/>	Credit 1	Outdoor Air Delivery Monitoring	1
<input checked="" type="checkbox"/>	Credit 2	Increased Ventilation	1
<input checked="" type="checkbox"/>	Credit 3.1	Construction IAQ Management Plan, During Construction	1
<input checked="" type="checkbox"/>	Credit 3.2	Construction IAQ Management Plan, Before Occupancy	1
<input checked="" type="checkbox"/>	Credit 4.1	Low-Emitting Materials, Adhesives & Sealants	1
<input checked="" type="checkbox"/>	Credit 4.2	Low-Emitting Materials, Paints & Coatings	1
<input checked="" type="checkbox"/>	Credit 4.3	Low-Emitting Materials, Carpet Systems	1
<input checked="" type="checkbox"/>	Credit 4.4	Low-Emitting Materials, Composite Wood & Agrifiber Products	1
<input checked="" type="checkbox"/>	Credit 5	Indoor Chemical & Pollutant Source Control	1
<input checked="" type="checkbox"/>	Credit 6.1	Controllability of Systems, Lighting	1
<input checked="" type="checkbox"/>	Credit 6.2	Controllability of Systems, Thermal Comfort	1
<input checked="" type="checkbox"/>	Credit 7.1	Thermal Comfort, Design	1
<input checked="" type="checkbox"/>	Credit 7.2	Thermal Comfort, Verification	1
<input checked="" type="checkbox"/>	Credit 8.1	Daylight & Views, Daylight 75% of Spaces	1
<input checked="" type="checkbox"/>	Credit 8.2	Daylight & Views, Views for 90% of Spaces	1

Yes ? No

**Innovation & Design Process 5 Points**

<input checked="" type="checkbox"/>	Credit 1.1	Innovation in Design: Provide Specific Title	1
<input checked="" type="checkbox"/>	Credit 1.2	Innovation in Design: Provide Specific Title	1
<input checked="" type="checkbox"/>	Credit 1.3	Innovation in Design: Provide Specific Title	1
<input checked="" type="checkbox"/>	Credit 1.4	Innovation in Design: Provide Specific Title	1
<input checked="" type="checkbox"/>	Credit 2	LEED® Accredited Professional	1

Yes ? No

**Project Totals (pre-certification estimates) 69 Points**

Certified: 26-32 points, Silver: 33-38 points, Gold: 39-51 points, Platinum: 52-69 points



## 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

Step 1.



# 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

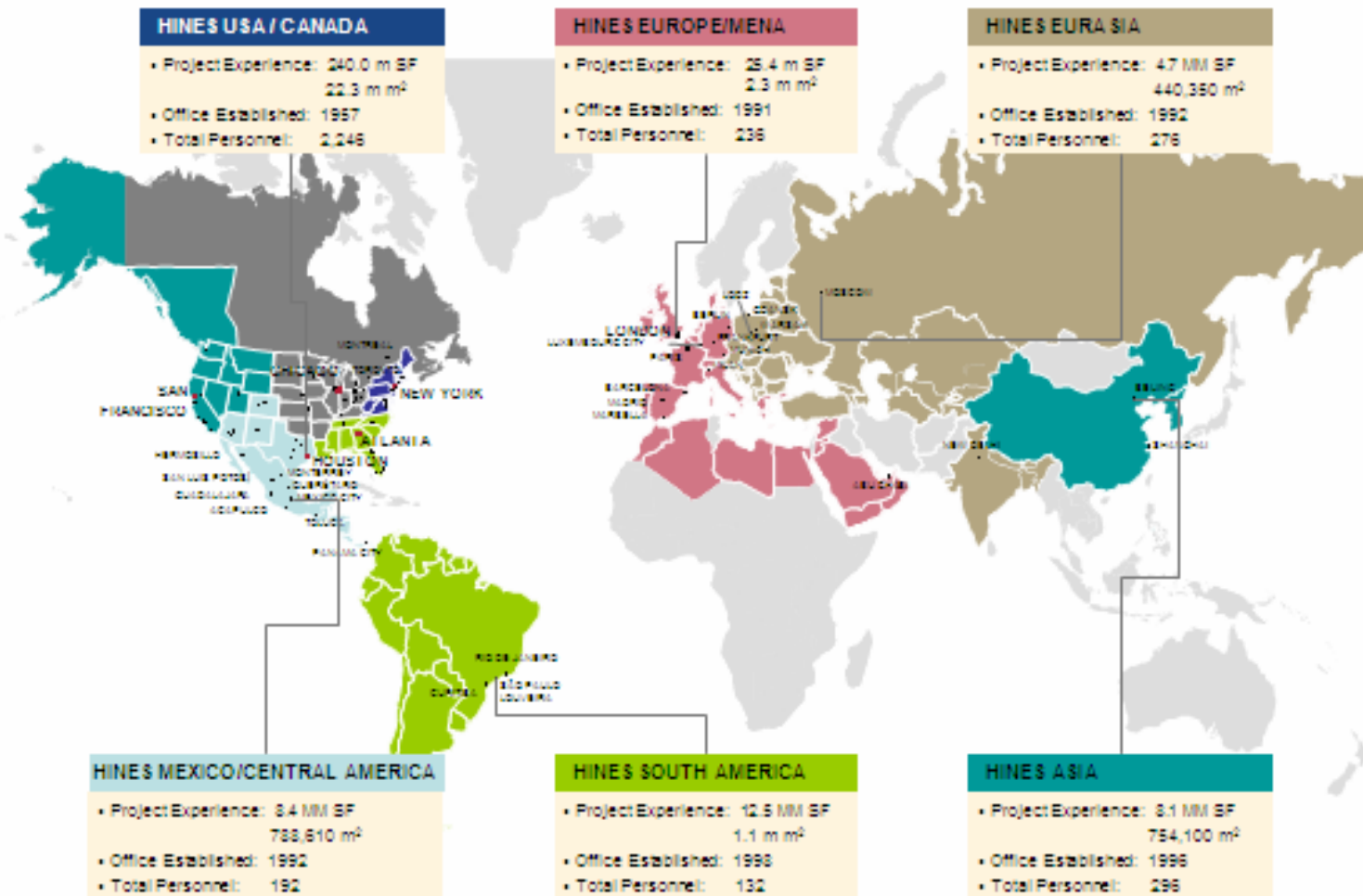
Jerry Lea, Sr. Vice President  
David Robinson, Vice President

May 21, 2008

**Hines**

# WORLDWIDE OPERATIONS

Projects completed, acquired, under development or in design



- Approx. 3,350 employees globally
- Operations in 16 countries
- 101 offices worldwide
- Local market knowledge and expertise

## TENURE OF HINES EXECUTIVES

TITLE	NO. OF EMPLOYEES	AVG. TENURE (YEARS)
EVP	9	30
SVP	29	21
VP	147	13

### ■ Regional Offices

■ Offices  
as of 30-June-07



# Hines has a legacy of building high quality buildings



*Two Twenty Two Berkeley*



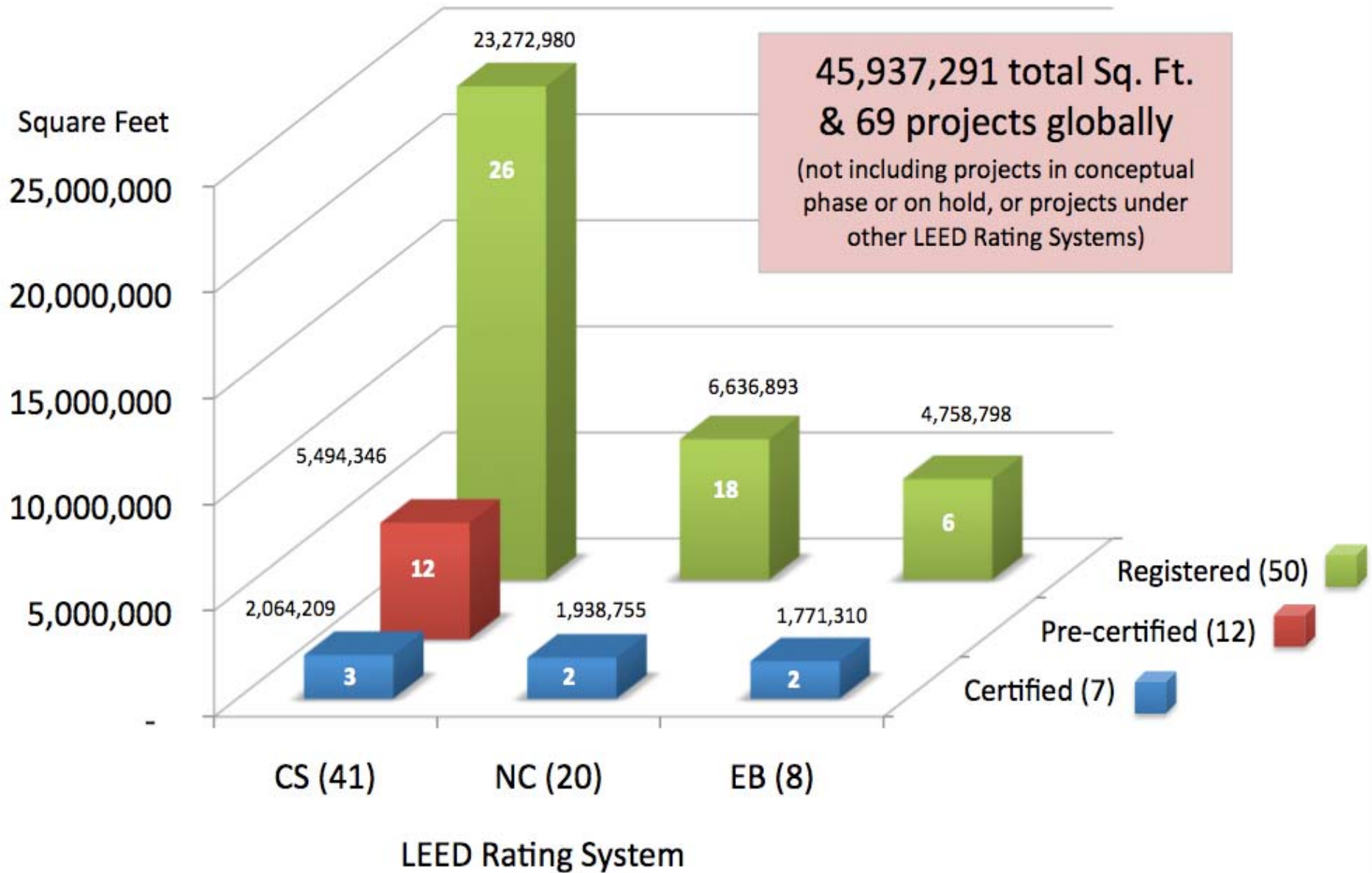
*600 Thirteenth Street*



*Five Hundred Boylston Street*

**Hines**

# 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

**Hines**

Do the “right thing” vs. what you can sell



*One South Dearborn*



*Union Pacific Center*



*24<sup>th</sup> at Camelback*

**Hines**

# 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.

**Hines**

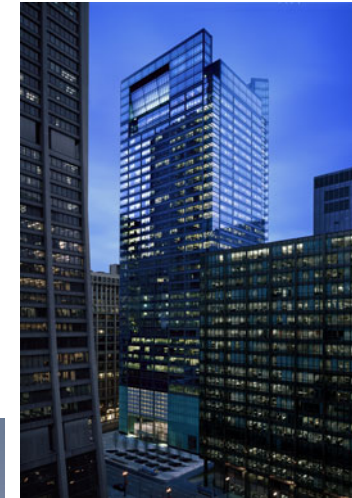


# Landlord Benefits

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



*1180 Peachtree*



*One South Dearborn*

**Hines**

# LEED Core and Shell Precertification

Design to Earn Energy Star



*South Station*

**Hines**

# Technology that helps earn Energy Star



*717 Texas*



*Pennzoil Place*

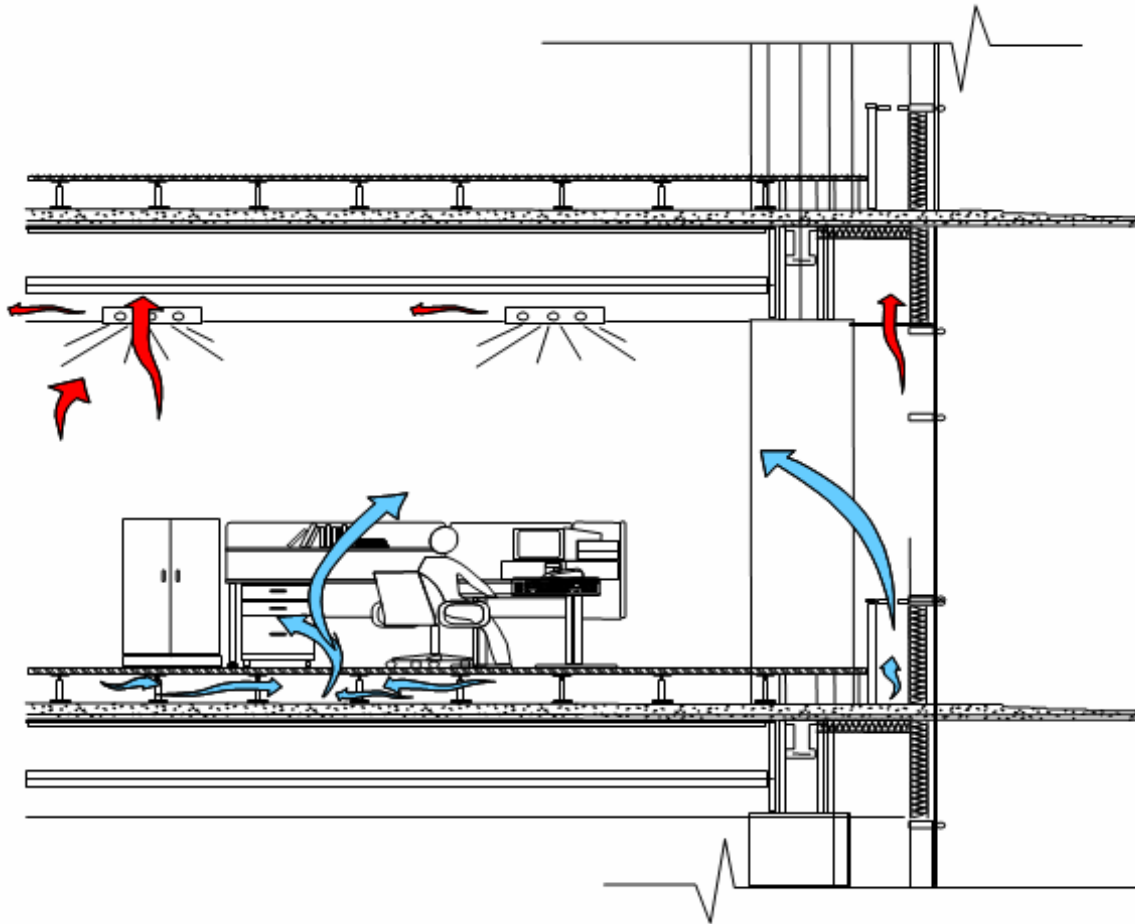


*Williams Tower*

**Hines**



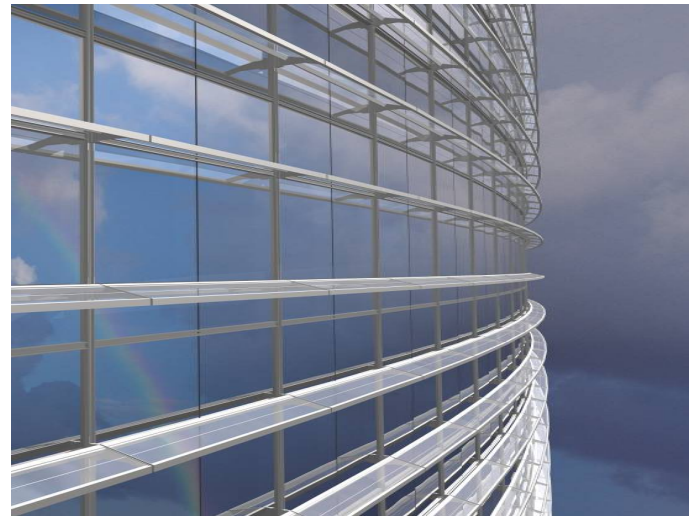
## Raised Floor Air Distribution



- Reduced Fan Horsepower
- Reduced Heating Load

Hines

## Sunshades



**Hines**

## Lighting Technology & Controls



Deep-Cell Parabolic



Recessed Direct / Indirect



Suspended Indirects

**Hines**

## 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)

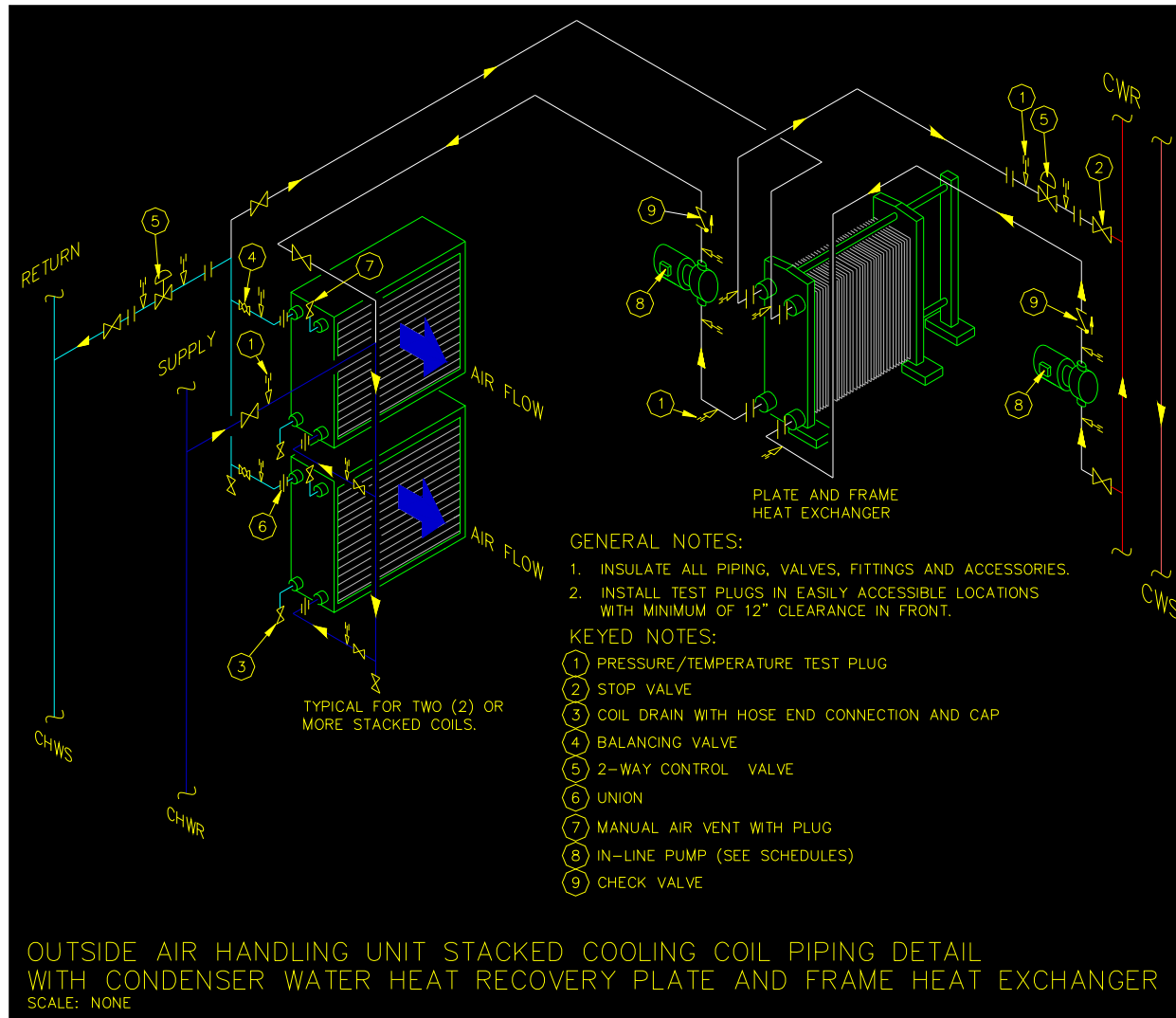
### Harmonic Mitigating Transformers



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

Hines

# 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

Hines

## **New Technologies in Our Buildings – Under Consideration**

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

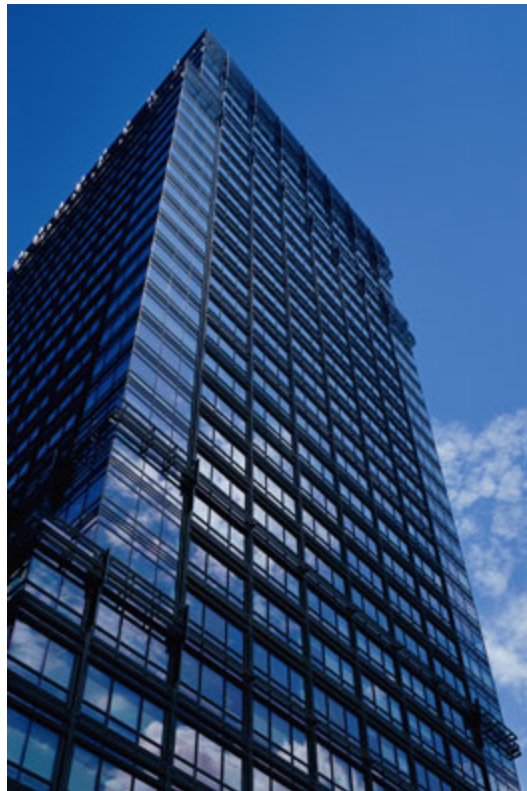
**Hines**



## People Earn Energy Star



*101 California*



*560 Mission*



*Figueroa at Wilshire*

**Hines**



## 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

**Hines**



**Questions?**

**Hines**



# Questions & Discussion

# 2008 Web Conferences



Month	Topic
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](http://energystar.gov)



Thank You!