

The Green Face



of the Building Industry

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PA Dept. of Environmental Protection

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What is a Green Building?

It focuses on the
“triple bottom line:”

- People
- Economics
- Environment



Why Build Green?

- Less building maintenance
- Lower operating costs
- Higher student test scores
- Improved occupant health & comfort
- Increased worker productivity
- Less absenteeism
- Reduced environmental impacts

Why Build Green? (cont.)

In the United States alone, buildings account for:

- 40% of primary energy use,
- 72% of electricity consumption,
- 39% of CO₂ emissions,
- 40% of raw materials use (globally),
- 30% of waste output (136 million tons annually), and
- 13.6% of potable water consumption.

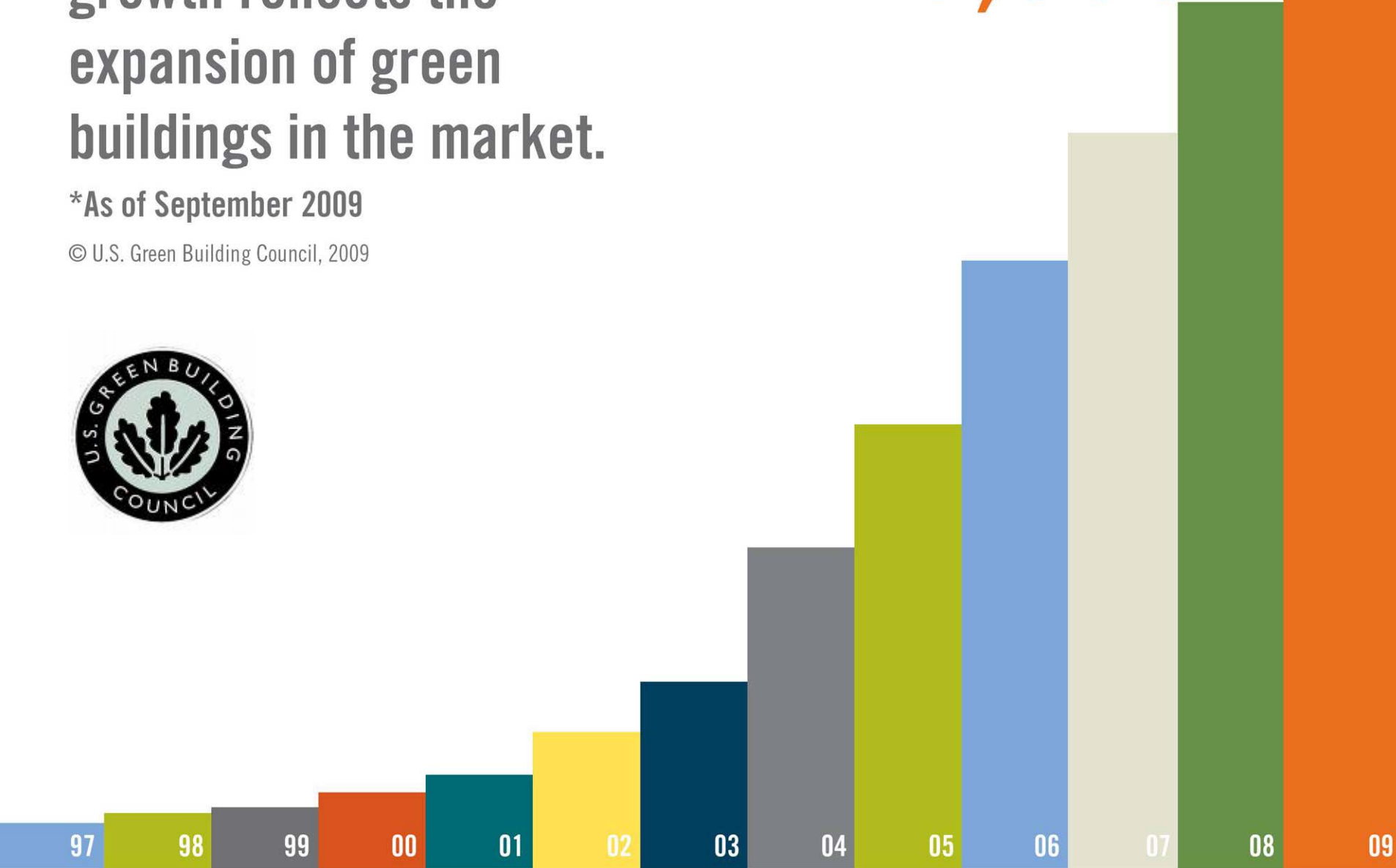
USGBC membership growth reflects the expansion of green buildings in the market.

*As of September 2009

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20,000* +



Projected Green Building Market Value

	2006	2010
Projection U.S. Market	\$12 billion (new) \$130 billion (renovation)	\$30-\$60 billion (new) \$240 billion (renovation)
Commercial & Institutional	\$4 billion	\$10-\$20 billion
Residential	\$8 billion	\$20-\$40 billion



DEP Southeast Regional Office Building

LEED® Project # 0419

LEED Version 2 Certification Level: GOLD

March 30, 2005

47 Points Achieved **Possible Points: 69**

Certified 26 to 32 points Silver 33 to 38 points Gold 39 to 51 points Platinum 52 or more points

10 Sustainable Sites **Possible Points: 14** **7 Materials & Resources** **Possible Points: 13**

Y	Prereq	Credit	Description	Points
Y	Prereq 1		Erosion & Sedimentation Control	
1	Credit 1.1		Site Selection	1
1	Credit 1.2		Urban Redevelopment	1
1	Credit 1.3		Brownfield Redevelopment	1
1	Credit 4.1		Alternative Transportation, Public Transportation Access	1
1	Credit 4.2		Alternative Transportation, Bicycle Storage & Changing Rooms	1
1	Credit 4.3		Alternative Transportation, Alternative Fuel Refueling Stations	1
1	Credit 4.4		Alternative Transportation, Parking Capacity	1
1	Credit 5.1		Reduced Site Disturbance, Protect or Restore Open Space	1
1	Credit 5.2		Reduced Site Disturbance, Development Footprint	1
1	Credit 6.1		Stormwater Management, Rate and Quantity	1
1	Credit 6.2		Stormwater Management, Treatment	1
1	Credit 7.1		Landscape & Exterior Design to Reduce Heat Islands, Non-Roof	1
1	Credit 7.2		Landscape & Exterior Design to Reduce Heat Islands, Roof	1
1	Credit 8		Light Pollution Reduction	1

6 Water Efficiency **Possible Points: 5**

Y	Prereq	Credit	Description	Points
1	Credit 1.1		Water Efficient Landscaping, Reduce by 50%	1
1	Credit 1.2		Water Efficient Landscaping, No Potable Use or No Irrigation	1
1	Credit 2		Innovative Wastewater Technologies	1
1	Credit 3.1		Water Use Reduction, 20% Reduction	1
1	Credit 3.2		Water Use Reduction, 30% Reduction	1

9 Energy & Atmosphere **Possible Points: 17**

Y	Prereq	Credit	Description	Points
Y	Prereq 1		Fundamental Building Systems Commissioning	
Y	Prereq 2		Minimum Energy Performance	
Y	Prereq 3		CFC Reduction in HVAC&R Equipment	
2	Credit 1.1		Optimize Energy Performance, 20% New / 10% Existing	2
2	Credit 1.2		Optimize Energy Performance, 30% New / 20% Existing	2
2	Credit 1.3		Optimize Energy Performance, 40% New / 30% Existing	2
2	Credit 1.4		Optimize Energy Performance, 50% New / 40% Existing	2
2	Credit 1.5		Optimize Energy Performance, 60% New / 50% Existing	2
1	Credit 2.1		Renewable Energy, 6%	1
1	Credit 2.2		Renewable Energy, 10%	1
1	Credit 2.3		Renewable Energy, 20%	1
1	Credit 3		Additional Commissioning	1
1	Credit 4		Ozone Depletion	1
1	Credit 5		Measurement & Verification	1
1	Credit 6		Green Power	1

Y	Prereq	Credit	Description	Points
Y	Prereq 1		Storage & Collection of Recyclables	
1	Credit 1.1		Building Reuse, Maintain 75% of Existing Shell	1
1	Credit 1.2		Building Reuse, Maintain 100% of Existing Shell	1
1	Credit 1.3		Building Reuse, Maintain 100% Shell & 50% Non-Shell	1
1	Credit 2.1		Construction Waste Management, Divert 50%	1
1	Credit 2.2		Construction Waste Management, Divert 75%	1
1	Credit 3.1		Resource Reuse, Specify 5%	1
1	Credit 3.2		Resource Reuse, Specify 10%	1
1	Credit 4.1		Recycled Content	1
1	Credit 4.2		Recycled Content	1
1	Credit 5.1		Local/Regional Materials, 20% Manufactured Locally	1
1	Credit 5.2		Local/Regional Materials, of 20% Above, 50% Harvested Locally	1
1	Credit 6		Rapidly Renewable Materials	1
1	Credit 7		Certified Wood	1

11 Indoor Environmental Quality **Possible Points: 15**

Y	Prereq	Credit	Description	Points
Y	Prereq 1		Minimum IAQ Performance	
Y	Prereq 2		Environmental Tobacco Smoke (ETS) Control	
1	Credit 1		Carbon Dioxide (CO ₂) Monitoring	1
1	Credit 2		Increase Ventilation Effectiveness	1
1	Credit 3.1		Construction IAQ Management Plan, During Construction	1
1	Credit 3.2		Construction IAQ Management Plan, Before Occupancy	1
1	Credit 4.1		Low-Emitting Materials, Adhesives & Sealants	1
1	Credit 4.2		Low-Emitting Materials, Paints	1
1	Credit 4.3		Low-Emitting Materials, Carpet	1
1	Credit 4.4		Low-Emitting Materials, Composite Wood	1
1	Credit 5		Indoor Chemical & Pollutant Source Control	1
1	Credit 6.1		Controllability of Systems, Perimeter	1
1	Credit 6.2		Controllability of Systems, Non-Perimeter	1
1	Credit 7.1		Thermal Comfort, Comply with ASHRAE 55-1992	1
1	Credit 7.2		Thermal Comfort, Permanent Monitoring System	1
1	Credit 8.1		Daylight & Views, Daylight 75% of Spaces	1
1	Credit 8.2		Daylight & Views, Views for 90% of Spaces	1

6 Innovation & Design Process **Possible Points: 5**

Y	Credit	Description	Points
1	Credit 1.1	Innovation in Design: Exemplary Performance WEc2	1
1	Credit 1.2	Innovation in Design: Exemplary Performance WEc3	1
1	Credit 1.3	Innovation in Design: Exemplary Performance MRc4	1
1	Credit 1.4	Innovation in Design: Exemplary Performance MRc5.1	1
1	Credit 2	LEED® Accredited Professional	1

Sustainable Sites

- Use of brownfield
- Urban infill
- Pervious paving
- Rainwater harvesting



Sustainable Sites (cont.)



Image provided courtesy of Abacus Lighting

- Light pollution reduction
- Green roof
- High reflectivity roof / cool metal roof
- Alternative transportation



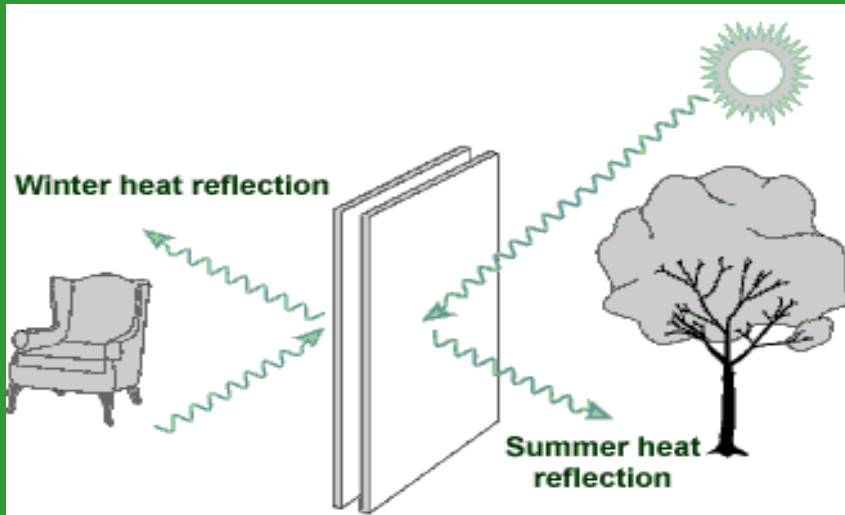
Water Efficiency

- Waterless urinals
- Graywater systems
- Landscaping using native vegetation & drip irrigation systems



Drip (trickle) irrigation waters crops efficiently.
Credit: Nova Scotia Agriculture and Fisheries

Energy & Atmosphere



- Low-emissivity (low-e) windows
- Green power
- Tankless water heater
- Daylighting controls
- Occupancy sensors

Energy & Atmosphere (cont.)

- Renewable energy
- Commissioning
- Passive solar
- Light shelves
- Indirect lighting



Materials & Resources



- FSC-certified wood products
- Rapidly renewable materials
- Material reuse
- Construction waste management
- Building reuse
- Recycled content materials
- Locally harvested / manufactured goods



Indoor Environmental Quality

- Daylighting
- Low-emitting materials
- Better ventilation
- Control of thermal comfort

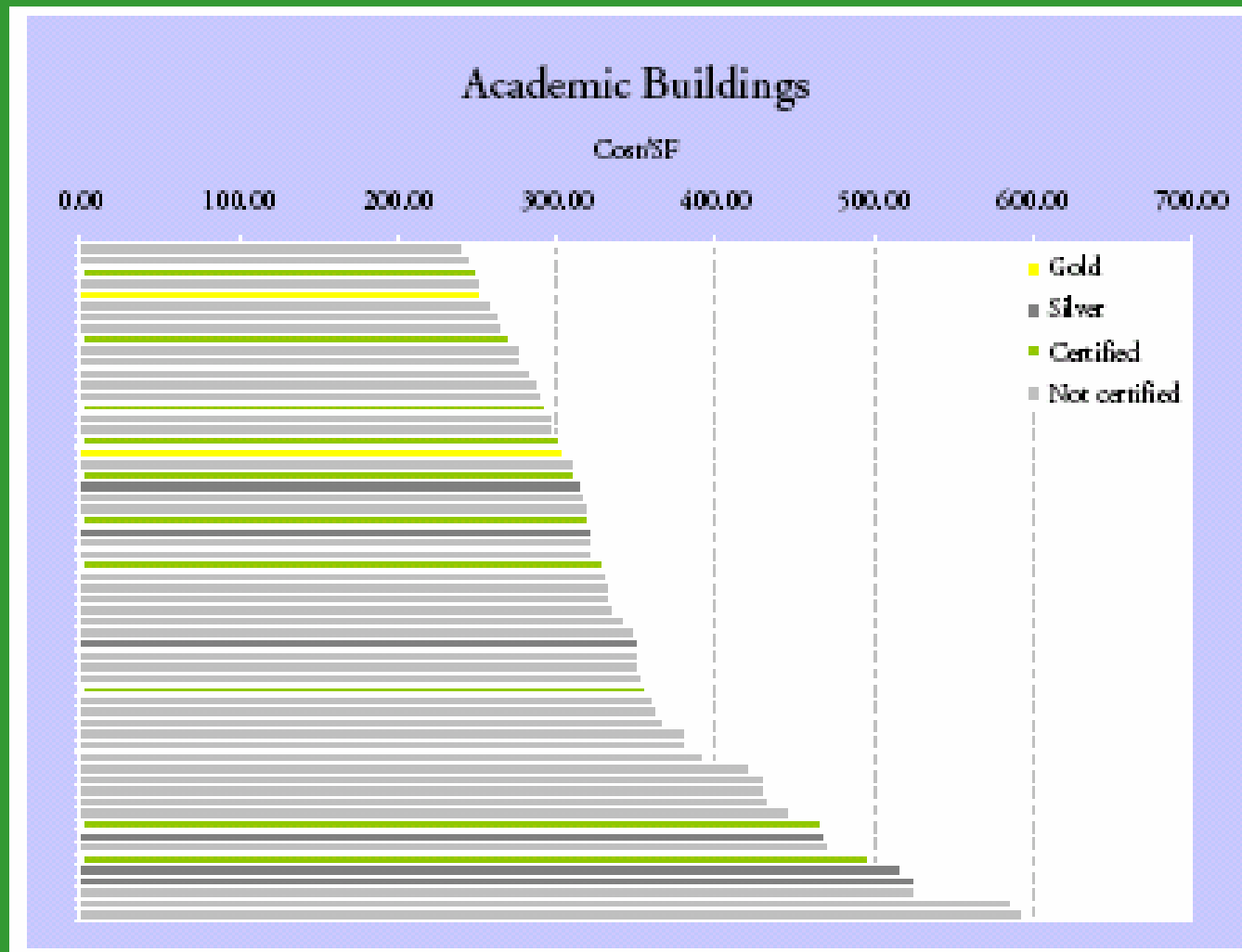


So, how much does it cost?

- “An upfront investment of $< 2\%$ of construction costs yields life-cycle savings of over 10x the initial investment.”
- If more time is spent in design phase, then actual construction costs may not be more than that of conventional bldg.
- If less expensive green technologies are blended w/ green technologies that cost same or slightly more, then possible to construct a green bldg. that costs same as conventional one.
- Hire an architect/general contractor with green experience.



So, how much does it cost?



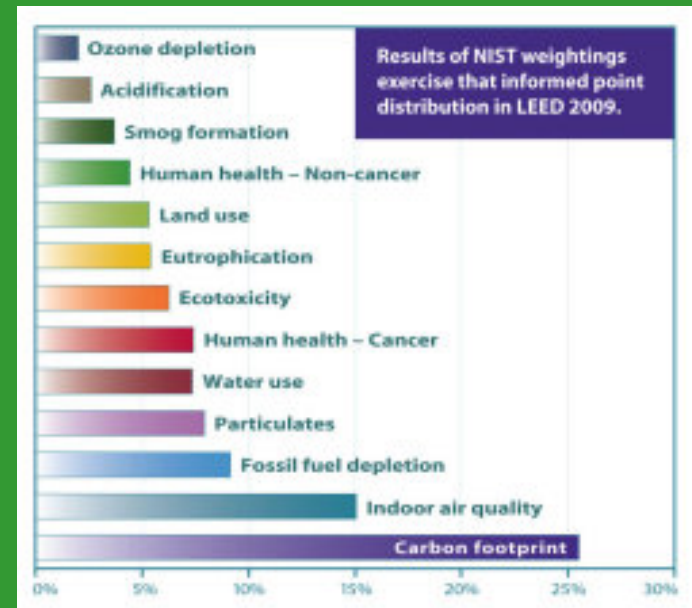
LEED Rating Systems

- LEED for New Construction
- LEED for Existing Buildings
- LEED for Core & Shell
- LEED for Commercial Interiors
- LEED for Schools
- LEED for Homes
- LEED for Healthcare
- LEED for Neighborhood Development
- LEED for Retail



Overview of LEED 2009

- Re-weighting credits based on human health & environmental impacts
- All non-residential LEED rating systems have 100-point scale, with extra points available in regional priority & innovation in design credits
- Beginning on June 27, 2009, all new projects must register for LEED 2009



Who's "going green" in our area?

- Aerzen USA (Coatesville)
- Swarthmore College
- Haverford College
- PSU
- Liberty Property Trust
- Muhlenberg College
- Twin Valley School District
- PNC Bank
- Geisinger Medical System
- Scott Honda of West Chester
- Lower Merion School District
- Downingtown School District
- Coatesville School District
- Radnor School District
- West Chester Univ.
- Philadelphia School District
- Chestnut Hill Academy
- Villanova University
- Nestle Bottling Plant (Lehigh Valley)
- Lehigh Valley Hospital
- Waste Management (Phila.)
- PECO
- Chester County
- Dansko
- Mercy Suburban Hospital
- LL Bean Store (Center Valley)
- Tasty Baking Company
- Commonwealth of PA
- PP&L (Allentown)

LEED Initiatives

- In the form of legislation, executive orders, resolutions, ordinances, policies, & incentives
 - Incentives include tax credits, tax breaks, density bonuses, fee reductions or waivers, expedited permitting, & free technical assistance
- Established in
 - 138 cities
 - 36 counties
 - 28 towns
 - 34 state governments
 - 17 public schools
 - 41 institutions of higher education
 - 14 federal agencies

Green Homes

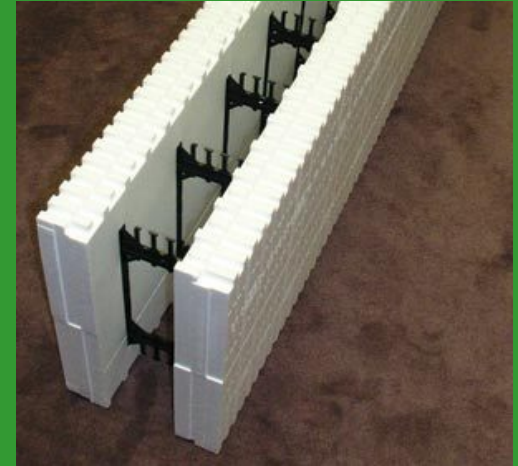
NAHB's National Green Building Standard™

- ANSI-approved standard as of Jan. '09
- Designed by builders for builders
- Home size adjustment is less stringent
- Has online scoring tool
- Certification fee of \$200/home (members) and \$500/home (non-members)
- Service fee also charged by NAHB verifier
- Bronze, silver, gold, or emerald designation

LEED for Homes

- Launched Nov. '07
- Meant to be a leadership standard
- Home size adjustment is more stringent
- Certification & reg. fees are \$375/home (members) and \$525/home (non-members)
- Service fee also charged by LEED provider
- Certified, silver, gold, or platinum designation

Green Homes (cont.)



This ICF home in the Cayman Islands withstood the Category 5 devastation of Hurricane Ivan (2004)

Green Homes (cont.)



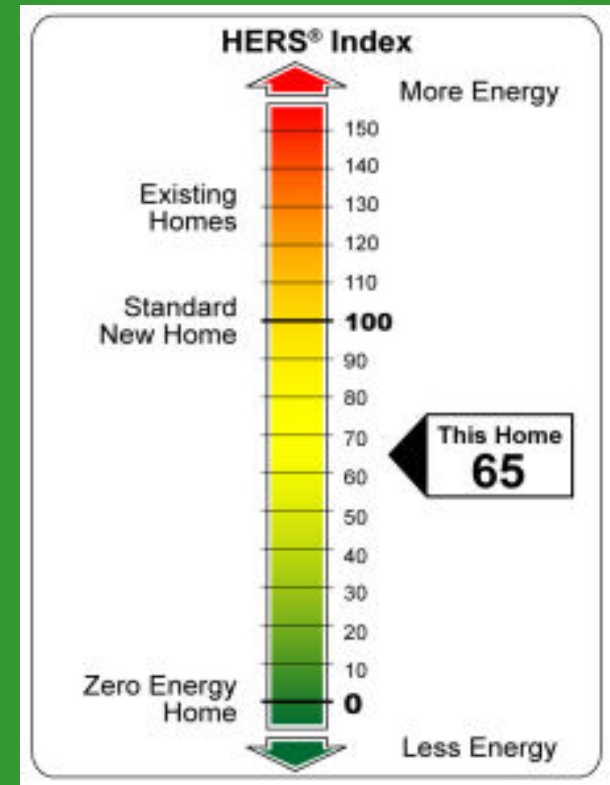
First Steps

Energy audit via:

- RESNET HERS Rater
<http://www.natresnet.org/>
- BPI accredited professional
<http://www.bpi.org/>

Online Energy Audits

- Home Energy Saver
<http://hes.lbl.gov/>
- Home Energy Yardstick
<http://www.energystar.gov/>



Green Resources

Organizations

Dela. Valley Green Bldg. Council

www.dvgbc.org

National Assoc. of Home Builders

www.nahbgreen.org

TV channel

Planet Green

www.planetgreen.discovery.com

Labeling program

EPA's WaterSense program

www.epa.gov/watersense

GREENGUARD Environmental Institute

www.greenguard.org

Green home websites

USGBC's Green Home Guide

www.greenhomeguide.org

Regreen

www.regreenprogram.org

Green Building Advisor

www.greenbuildingadvisor.com



Green Resources (cont.)

Stores

Environmental Home Store

www.environmentalhomestore.com

Earth Mart

www.earthmartonline.com

Greenable

www.greenable.net/

Alternative Energy, Inc.

www.altern-energy.com/

Home Depot

www.homedepot.com/ecoptions

Habitat for Humanity ReStores

www.habitat.org/env/restores.aspx



Questions?

