Making Green Homes Affordably

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Why Green Homes?

Energy Costs are Reported to be the Second Largest After Shelter Expense

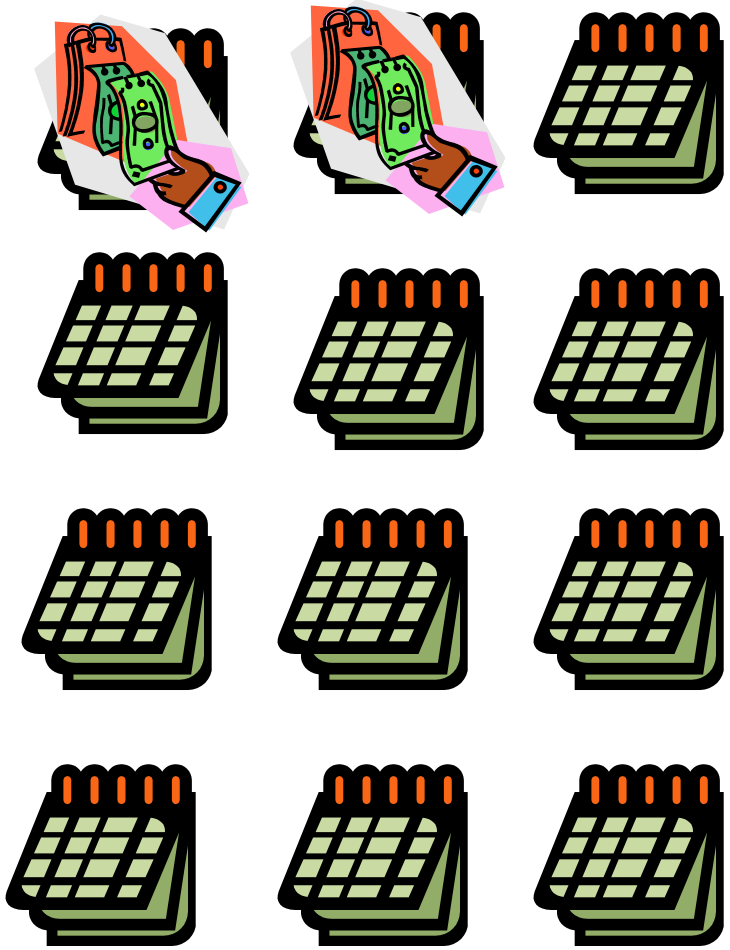
- A factor in mortgage defaults
- A contributor to homelessness
- The very-low to low-moderate income families are especially at risk
- High energy burdens can increase health and safety risks in homes

Rising energy costs impact household budgets

- 2008 average after tax income $52,586
- Energy costs >$6,200

  ~ 12-1/2%, of 1-1/2 months' income

ACCCE 7/25/08



Where does it all go?

Breakdown of Home Energy Use

Home Space Heating	50%
Water Heating	15.3%
Lighting	6.8%
Home Space Cooling	6.4%
Refrigeration	4.6%
Electronics	2.8%
Washer/Dryer	3.2%
Cooking	3.9%
Computers	6%
Others	3.9%

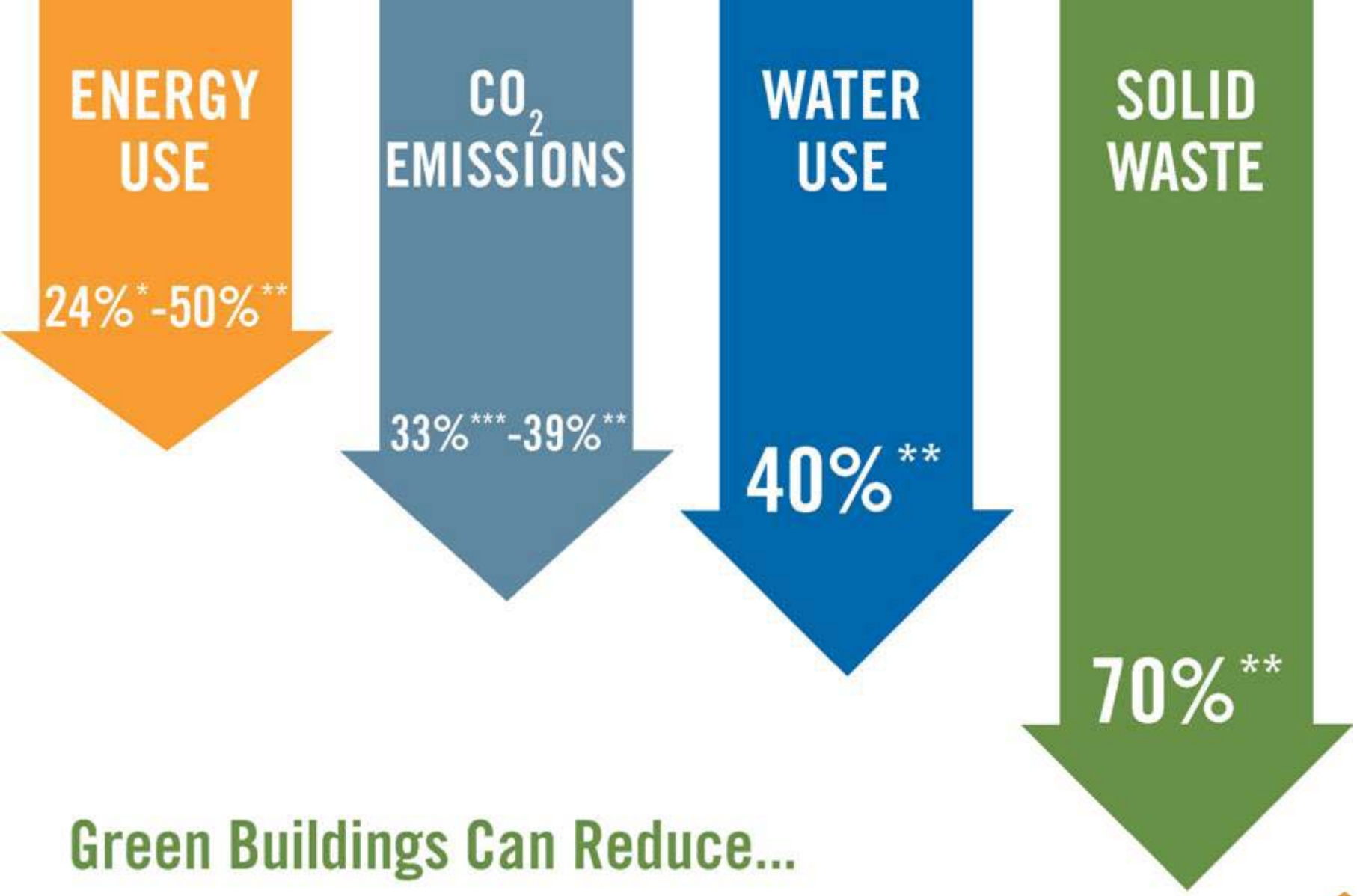
What do you think Green Buildings can reduce the most?

A. Energy Use

B. CO_2 Emissions

C. Water Use

D. Solid Waste



Green Buildings Can Reduce...

* Turner, C. & Frankel, M. (2008). Energy performance of LEED for New Construction buildings: Final report.
** Kats, G. (2003). The Costs and Financial Benefits of Green Building: A Report to California's Sustainable Building Task Force.
*** GSA Public Buildings Service (2008). Assessing green building performance: A post occupancy evaluation of 12 GSA buildings.

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PERCEPTION


REALITY

Today’s Green Homes

Benefits of a Green Home

- Healthier (better indoor air quality)
- Increased comfort
- Conserve water and energy
- Lower operating costs
- Increased durability (lower maintenance cost)
- Increased occupant safety
- Reduced construction and demolition waste
- Environmentally responsible

According to Green Home Owners, Top 3 Benefits of a Green Home are:

Green Building is all about the Triple Bottom Line: People, Planet, Profit

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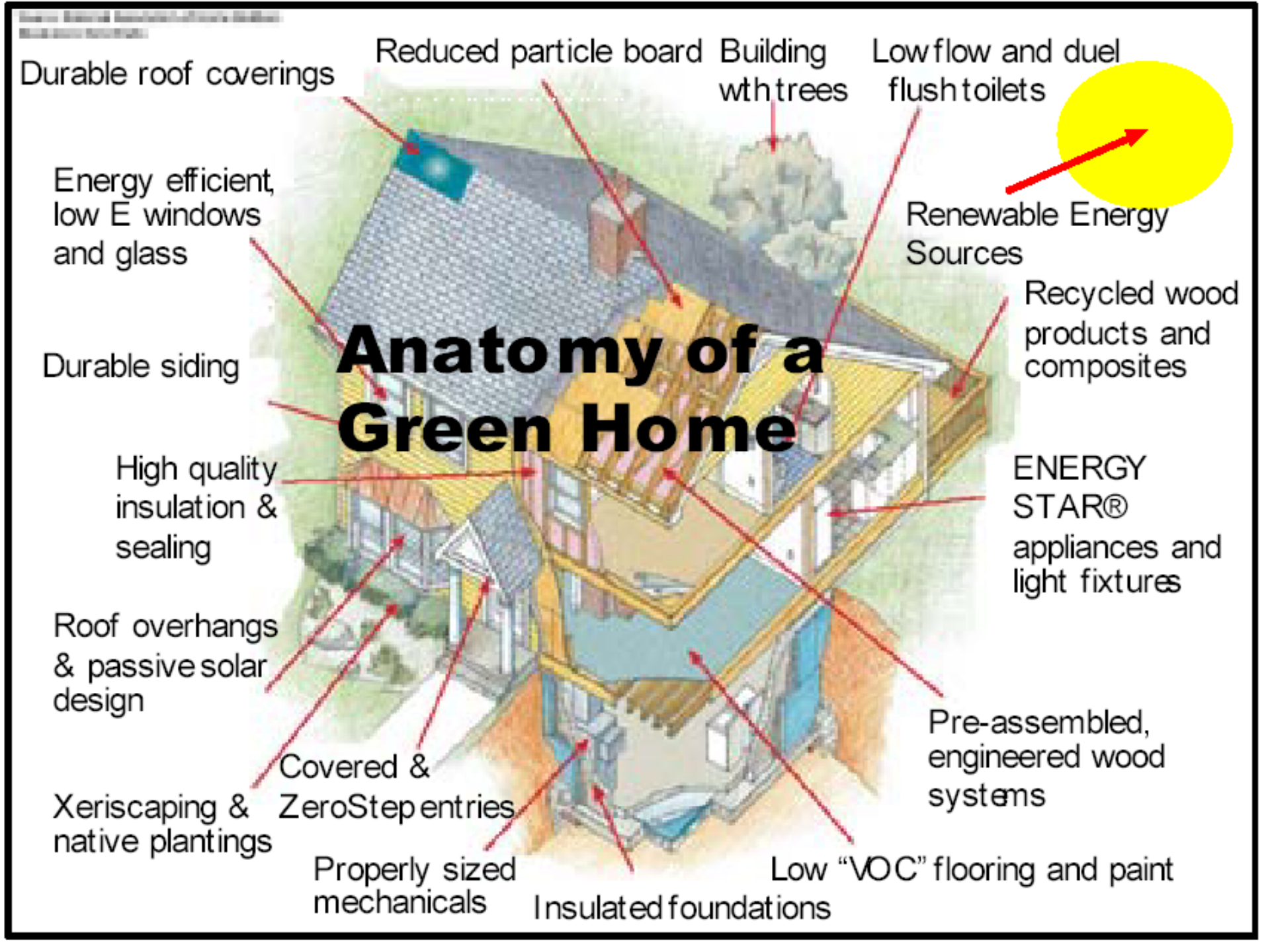
Source: SmartMarket Report, McGraw Hill Construction, 2008

What makes a green home?


Durable roof coverings
Reduced particle board
Building wth trees
Low flow and duel flush toilets
Energy efficient, low E windows and glass
Renewable Energy Sources
Recycled wood products and composites
Anatomy of a Green Home
Durable siding
High quality insulation & sealing
ENERGY STAR® appliances and light fixtures
Roof overhangs & passive solar design
Pre-assembled, engineered wood systems
Covered & ZeroStep entries
Xeriscaping & native plantings
Properly sized mechanicals
Insulated foundations
Low "VOC" flooring and paint

How Do You Define Green?

Builder A

Builder B

Builder C

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ANIMALS
HIPPOPOTAMUS
ZEBRA
Nutrition F cts
Serving Size 8 crackers (28
Servings Per Container Abo 2
Amount Per Serving
Calories 120 Cal es From Fat 30
% Daily Value*
Total Fat 3.5
5%
Satu ed Fat 1g
5%
Trans Fat 0g
Polyunsaturated Fat 1.5g
Monounsaturated Fat 0.5g
Cholesterol 0mg
0%
Sodium 140mg
6%
Total Carbohydrate 22g
7%
Dietary Fiber Less than 1g
3%
Sugars 7g
Protein 2g
Vitamin A 0% • Vitamin C 0%
Calcium 10% • Iron 4%
* Percent Daily Values are based on a 2,000 calorie diet.
CONTINUED ON OTHER SIDE

LEED = Leadership in Energy and Environmental Design

Huron Band of the Potawatomi
Pine Creek Reservation, Michigan

LEED® Facts

Huron Band - Potawatomi
Pine Creek Reservation, MI

LEED for Homes
Certification Awarded

Gold	80
Locations & Linkages	6
Sustainable Sites	8.5
Water Efficiency	5
Energy & Atmosphere	27
Materials & Resources	11.5
Indoor Environmental Quality	15
Innovation & Design	5
Awareness & Education	2

39%

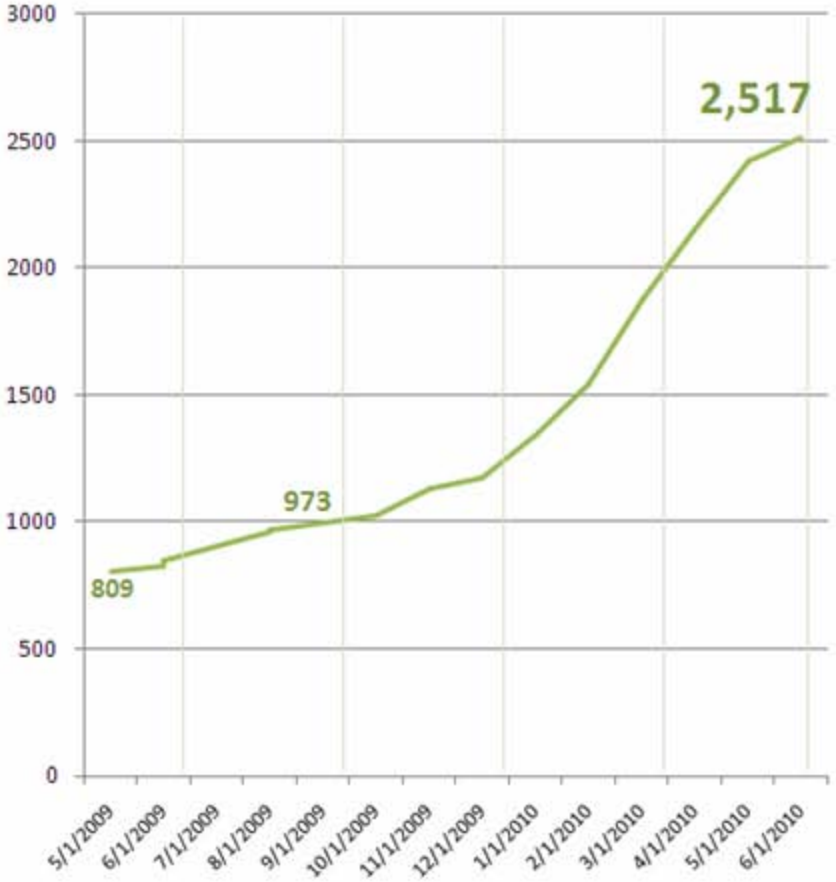
of Certified LEED Homes are

Affordable Homes

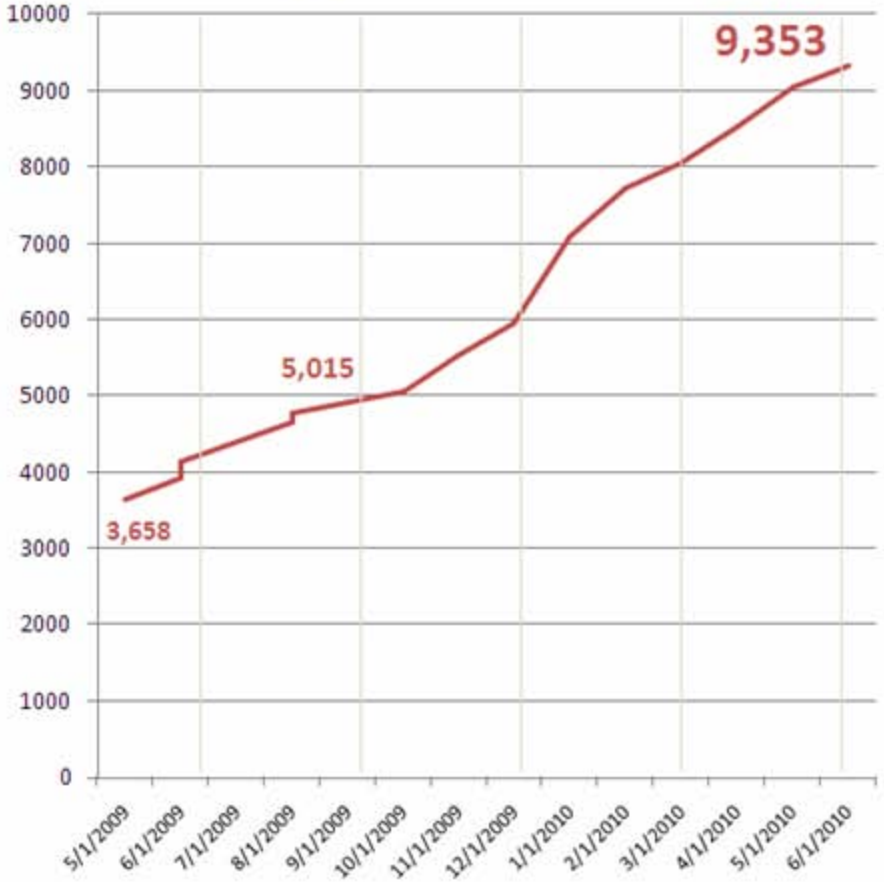
From those guidelines for eligibility for HDF funds: Low income housing is defined as less than or equal to 80% of the local area median income (AMI) or the local jurisdiction standard of affordable housing. We mandate that the number of affordable, low income units must be at least 75% of the units in each building.

LEED for Homes: Affordable

Certifications



Registrations



How Does LEED Define a Green Home?

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How Does LEED Define a Green Home?

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USGBC has four levels of LEED:

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Program Scope and Applicable Building Types

Single-Family Homes

Mixed Use / Mid-Rise

Low-Rise Multifamily

Single-Family Production

Gut Rehab

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Green Begins with Blue

Energy Efficiency

- Envelope
- Distribution
- Equipment
- Lighting
- Appliances

Indoor Environment

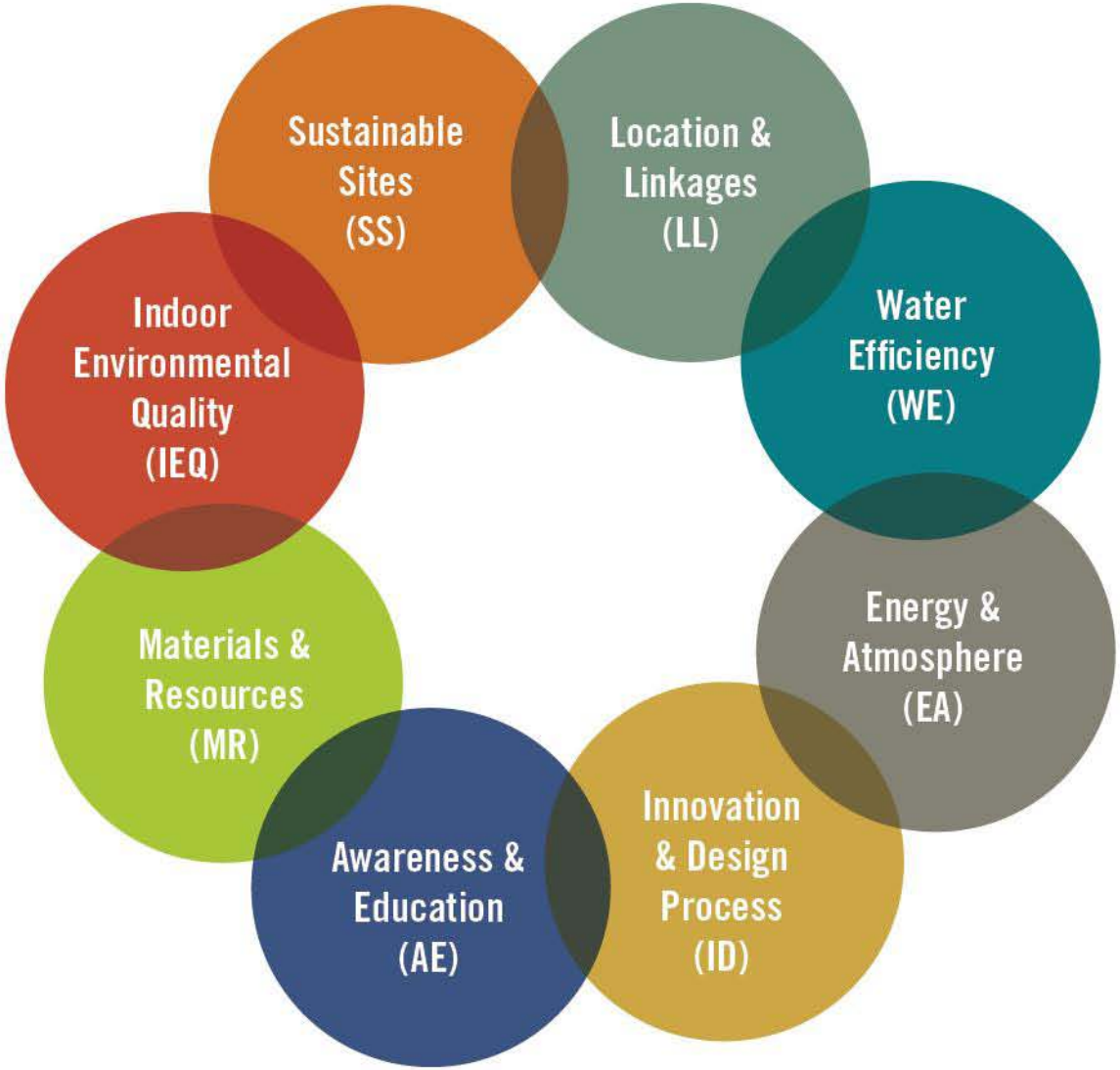
- Bulk Moisture
- Radon
- Pest Control
- HVAC
- Combust. Safety
- Materials
- Commissioning

Resource Efficiency

- Site Planning
- Water
- Materials
- Waste Mgt.
- Renewables

Credit Categories

Designing with LEED



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Innovation & Design Process (ID)

- Include all team members
- Draft LEED Score Card
- Define member roles
- Get help / training if needed
- Brainstorming 1+1=5

1. **Integrated** Project Planning
2. **Durability** Management Process
3. Innovative or Regional Design

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Innovation & Design Process (ID)

Construction Costs

- **Many green features have no additional cost**

  e.g. orientation on the East-West axis, proper placement of shade trees

- **Some green features result in a cost-savings**

  e.g. reducing construction waste, putting in less turf, optimal value engineering

- **Other green measures have an initial increased cost, but result in long term savings**

  e.g. solar hot water heating, radiant heating

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Energy and Atmosphere (EA)

1. Optimize Energy Performance **
2. Insulation
3. Air Infiltration
4. Windows
5. Heating & Cooling Distribution
6. Space Heating and Cooling Equipment
7. Water Heating **
8. Lighting
9. Appliances
10. Renewable Energy
11. Residential Refrigerant Management **

ENERGY STAR HOMES

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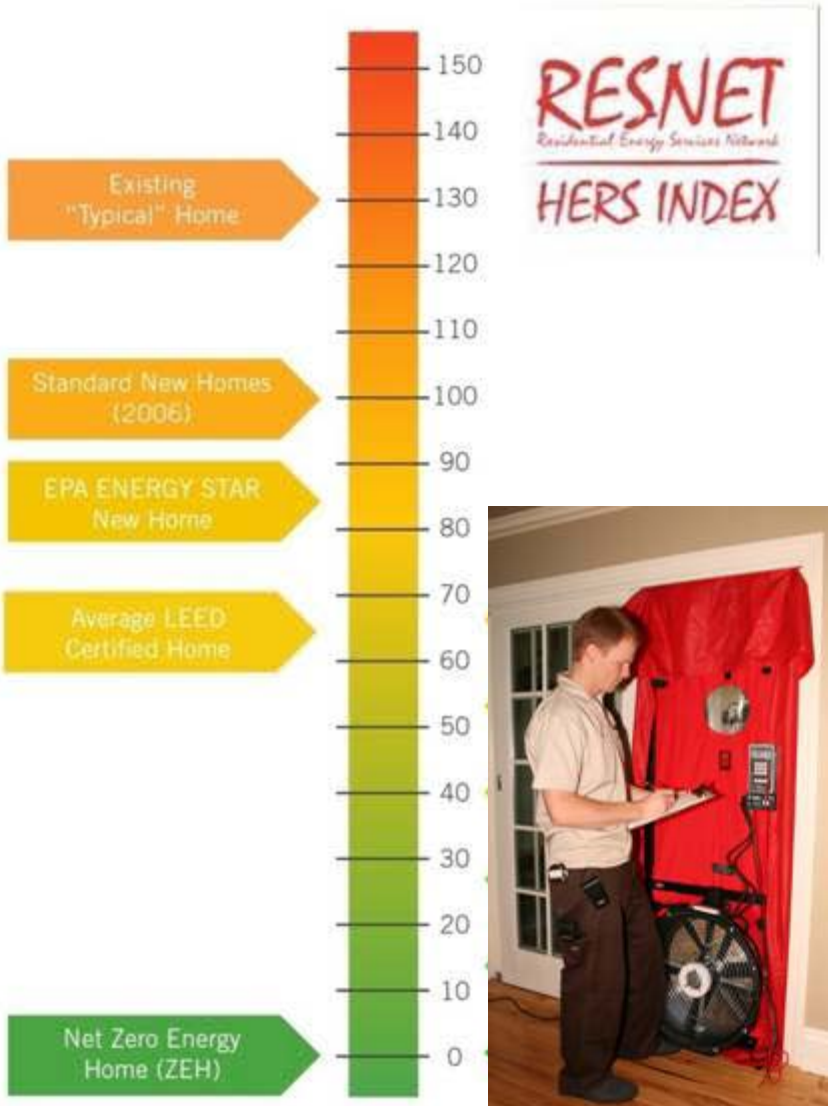
Home Energy Rating System (HERS)

Performance Testing:

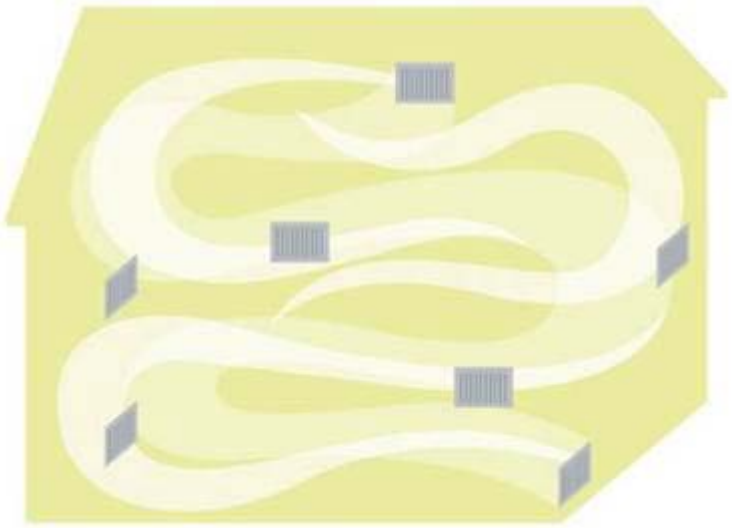
- Heating and cooling
- Water heating
- Lighting
- Appliances
- Building envelope



Indoor Environmental Quality (EQ)

*6 point minimum

1. Energy star with IAP **
2. Combustion Venting
3. Moisture Control
4. Outdoor Air Ventilation **
5. Local Exhaust **
6. Distribution of Space Heating and Cooling
7. Air Filtering **
8. Contaminant Control **
9. Radon Protection
10. Garage Pollutant Protection



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Awareness & Education (AE)

1. Education of Homeowner or Tenant

   & Public Awareness

2. Education of Building Manager

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Cornerstone Senior Apartments

Largest LEED Gold development in Ohio

31% more energy efficient than conventional construction

Water efficient plumbing fixtures reduce water by 350,000 gallons/year.

Ventilation provided by continuously running Energy Star bath fan.

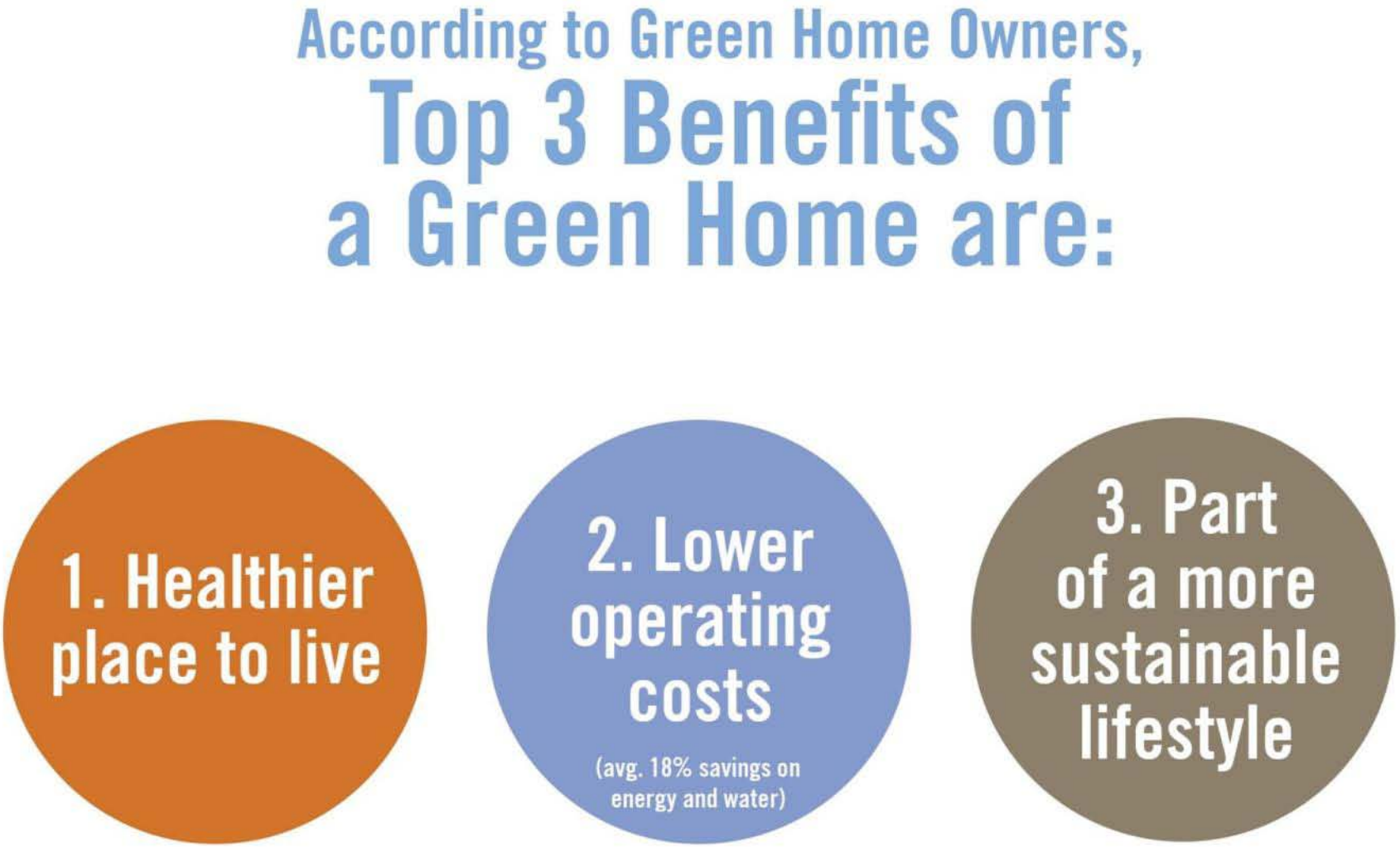
Developer: NRP Group was named the NAHB's 2009 Multifamily Development Firm of the Year

Extensive training provided to building managers and tenants.

Economics and Value

How much
does this cost
and why are we
doing this?

What do we get out of this deal?



LEED Homes are Healthy Homes

"One of our tenants has severe asthma. We offered to move them into our LEED certified project. Once they moved into the LEED building the asthma symptoms were significantly reduced."

— Harold J. Mast Director, Genesis Non-Profit Housing Corporation

Cost of LEED Homes

- Potential learning curve costs
- Design and construction costs
- Verification
- Registration/Certification costs

Single family: $2,500 - $3,000

Multi family: Depends on total # of units
Typically $300 - $1,000 per unit

More units = More economies of scale

Why LEED for Homes?

- National program, internationally-recognized standard
- Rigorous, true third-party certification
- Required third-party Performance Testing
- Partner to many regional green programs
- Homeowner assurance of home's green measures through thrid-party verification
- Strong marketing support for LEED in 2009-2010
- Superior way to differentiate your offering

LEED → "Leadership" for Market Innovators

VALUE OF 3RD PARTY CERTIFICATION

INDEPENDENT
VERIFICATION OF ACHIEVEMENTS
QUALITY ASSURANCE
AUDITABLE RESULTS

LEED provides accountability to funding sources

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Resources

Rating System Synergies

- Enterprise Green Communities
  - Charrette grants
  - Homeowner education grants
- LEED Neighborhood Development
  - 10% fee discount
  - Meets verified green building prerequisite
- National Green Building Standard
  - Many of the same crossovers due to code requirements
  - Shared documentation
- Energy Star
  - Every LEED Home is tested to meet Energy Star performance

NEW Inter-agency Partnership for Sustainable Communities

Guided by 6 “Livability Principles”:

- Transportation Planning
- Environmental Protection, and
- Housing Investments

at the respective Federal Agencies

Designed to break-down the traditional silos of the Federal government.

More points for grant applications meeting the livability principles.

Affordable and Green:
The Greenbuild 2010 Legacy Home Project

Innovation & Design Process (ID)

Insulated Concrete Forms (ICF's)

Conventional 'Stick' Built Construction

Same floor plan, elevation, & mechanicals but different construction!

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LOGIX

Goals of Greenbuild Project "Legacy"

- Energy Star, LEED, NGBS certifications
- "No-Cost" Design Strategies
- Program Performance Comparison
- Healthier indoor air quality
- More comfortable & More durable (less maintenance)
- 40% - 50% more energy-efficient

* Based on third-party verified market sales analyzed in GreenWorks Realty ECert Report.

Home Size Adjuster = -10

1900 SF	45 pts	60 pts	75 pts	90 pts
1200 SF	35 pts	50 pts	65 pts	80 pts
2500 SF	52 pts	67 pts	82 pts	97 pts

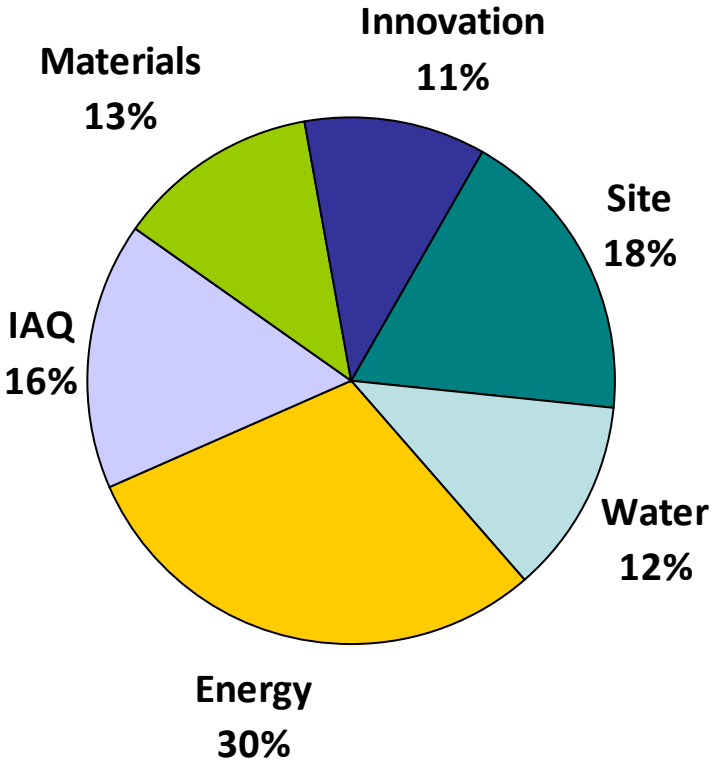
Three Bedroom Example

Legacy Project Case Study

- SS: rain gardens and pervious pavers
- WE: low-flow plumbing fixtures
- EA: radiant heating
- MR: ICF’s and SIP’s
- EQ: all hard flooring

Case Study LEED Points

Category	Points	%
Sustainable Sites / Locations and Linkages	23	23.5
Water Efficiency	4	10.9
Energy & Atmosphere	22.5	27.9
Materials & Resources	11	11.8
Indoor Air Quality	17	15.2
Innovation, Education	9	2
Total	86.5	100%

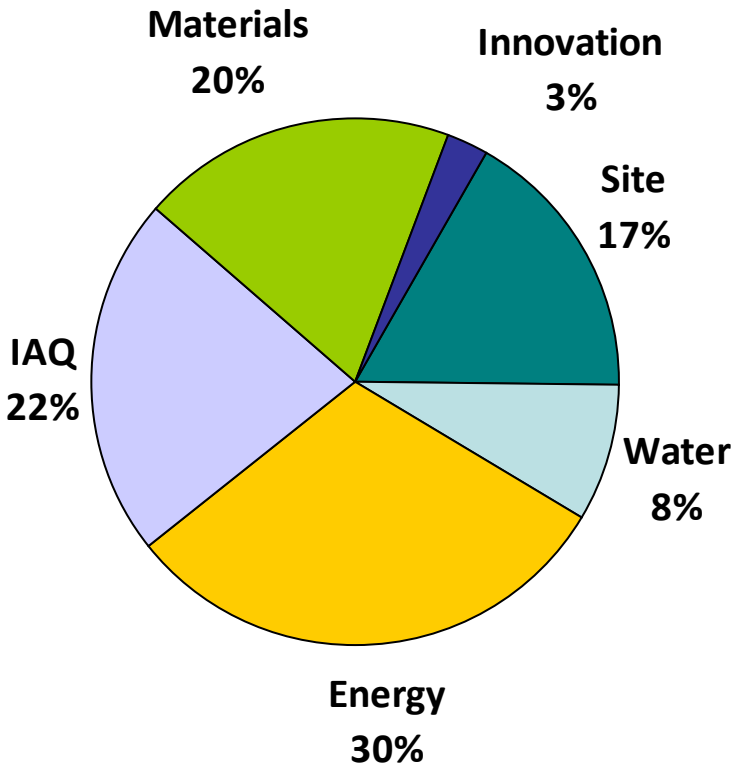


Habitat for Humanity – Case Study

- NAHB Green Building program was used to certify both 1517 & 1521 11th St. Waukegan, IL
- Compared the ICF home to the Wood Frame home with foam insulation.
- Not a significant difference in point totals

Actual 1517 - NGBS Point Summary

Category	Points	%
Sustainable Sites / Locations and Linkages	101	17.0
Water Efficiency	50	8.4
Energy & Atmosphere	181	30.4
Materials & Resources	116	19.5
Indoor Air Quality	132	22.2
Awareness, Education, Innovation	15	2.5
Total	595	100%



Gold Scoring Analysis

Chapter	Required Points	Claimed Points	Additional Claimed Points Above Gold	Point Shortfall	Mandatory Status
Chapter 5: Lot Design, Preparation, and Development	93	101	8		Not Applicable
Chapter 6: Resource Efficiency	113	116	3		Met
Chapter 7: Energy Efficiency	100	181	81		Met
Chapter 8: Water Efficiency	41	50	9		Met
Chapter 9: Indoor Environmental Quality	100	132	32		Met
Chapter 10: Operation, Maintenance, and Building Owner Education	11	15	4		Met
SECTION TOTALS	458	595	137	0	
Additional Points Above Gold	100	--	137	0	
TOTAL POINTS	558	595	--	0	

To achieve Gold:

- Reach required Gold score for each chapter
- Reach required Additional Points for this project
- Meet all mandatory items
- Meet the requirements of 801.6 & 802.2 - High Efficiency or Waterless Toilets
- For Chapter 7 - Energy Efficiency
  - Claim at least 30 points from Section 702 (Performance Path) or Section 703 (Prescriptive Path)
  - Select a minimum of 2 items from Section 704

CONCLUSIONS

PROGRAM COMPARISON

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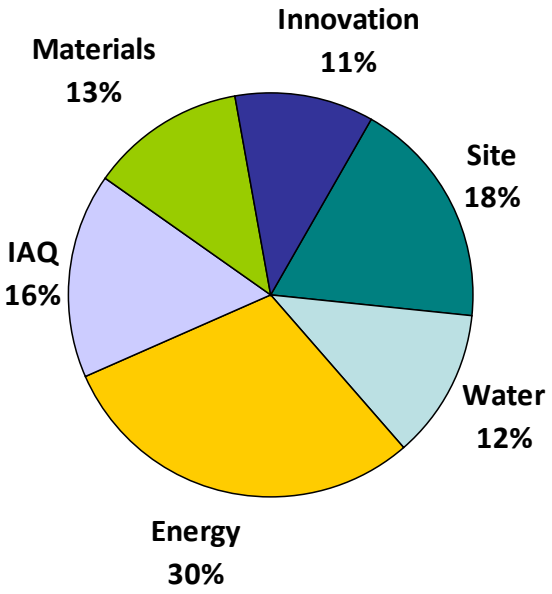
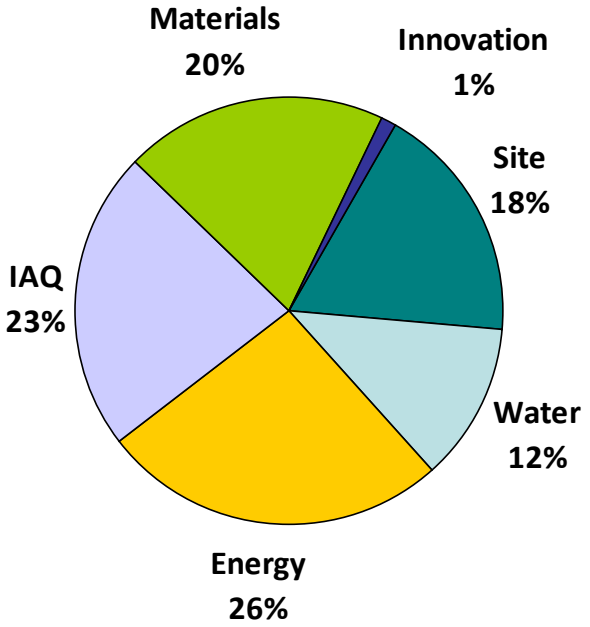
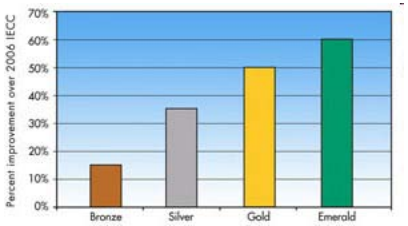
NATIONAL GREEN BUILDING STANDARD™







LEGACY HOME COMPARISON

Category	LEED	NGBS
Sustainable Sites / Locations and Linkages	18	101
Water Efficiency	4	50
Energy & Atmosphere	24	181
Materials & Resources	11	116
Indoor Air Quality	17	132
Awareness, Education, Innovation	8	15
Total	82	595
	Platinum	Gold


QUESTIONS
ANSWERS

Making Green Homes Affordably

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