

Green in Affordable Housing Design

Workshop Overview

- Environmental Concerns
- Green Programs
- Cost Concerns for Affordable Housing
- Green Strategies for New Construction
- Green Strategies for Existing Construction
- Financing + Funding for Green Affordable Housing

Green in Affordable Housing Design

Learning Objectives

- Become better clients, project managers, homeowners, property managers, etc. through raised standards and expectations for incorporating green strategies into affordable housing projects.
- Learn some essential green strategies that are low first-cost for affordable housing.
- Learn some essential green strategies that are low operating-cost for affordable housing.
- Learn some essential green strategies that have indirect cost-effectiveness in affordable housing.
- Understand the tools and methods available for payback analysis and basic concepts of life-cycle analysis.
- Become aware of some resources for financing and funding for green strategies in affordable housing.
- Understand the impact of the housing industry on the environment and become conscious of ways that green affordable housing can reduce such impacts.

Global Concerns

Global Warming + Resource Consumption

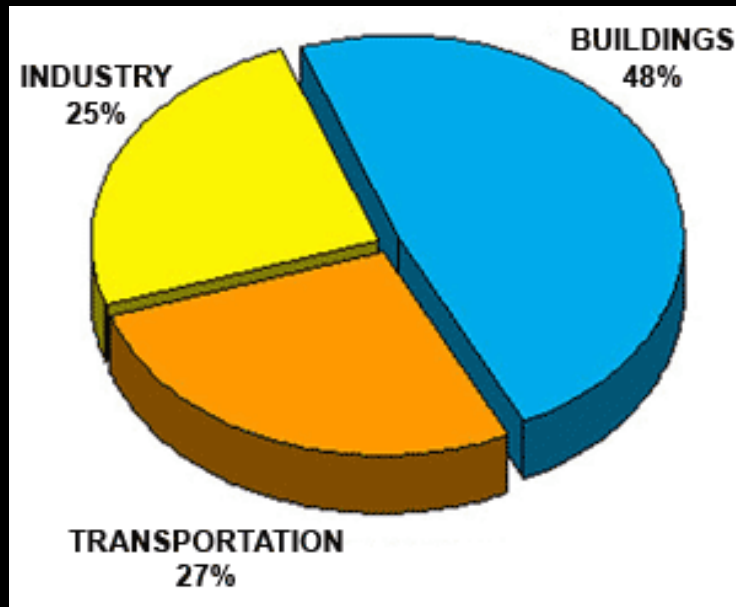
“What’s the use of a house if you don’t have a decent planet to put it on?”
-Henry David Thoreau



Global Concerns

Global Warming + Resource Consumption

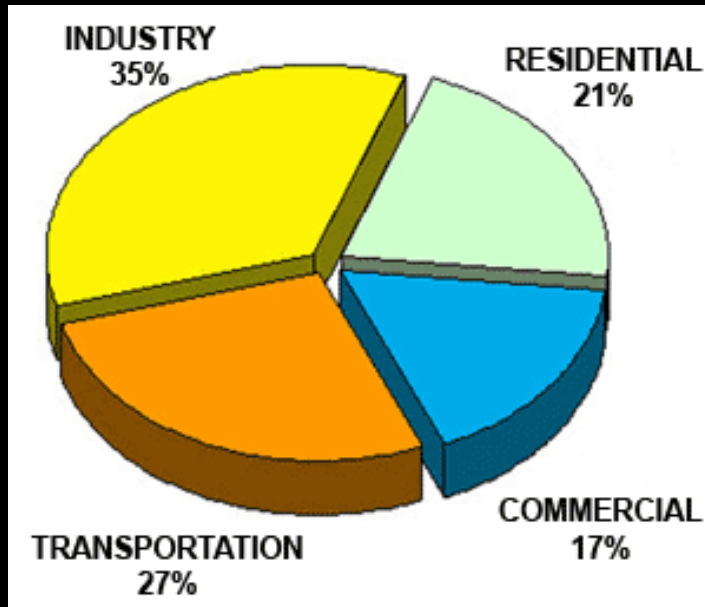
- Building Sector Contribution (U.S.) = 48% of total carbon emissions
 - 36% total energy use
 - 65% electricity consumption
 - 30% greenhouse gas emissions
 - 30% raw material use
 - 30% waste output
 - 12% potable water consumption



Global Concerns

Global Warming + Resource Consumption

- Residential Sector Contribution (U.S.) = 21% of building sector
 - a typical 1700 SF wood frame house = clear-cut of 1 acre forest
- Affordable Housing Sector Contribution (U.S.) = ? %
of total Residential Construction



Affordable Housing Concerns

Affordable Housing Crisis

- One-third of U.S. households are moderately cost-burdened (spending 30% or more of income on housing) – *according to 2004 State of Nation's Housing Report by Harvard University's Joint Center for Housing Studies*
- Number of cost-burdened households rose 67% between 1998-2004
- 13% are severely cost-burdened (spending 50% or more of income on housing) – 2004
- 850,000 people are homeless on any given night
- 2.5 – 3.5 million people are homeless at some point within a given year

Answer the affordable housing crisis with Green building stock that also answers the global warming and resource consumption crisis. Affordable housing may become the critical testing ground for the applicability of green design.



Incorporating Green in Affordable Housing

Affordable Housing Development is Already Green

- Infill sites
- Adaptive reuse
- Small lots
- Small building footprints
- Multi-family / Attached Single-family
- Near public transportation + amenities
- Low water-use landscaping

Green Building Guidelines

AIA Affordable Green Guidelines

- *Community Context*
- *Site Design*
- *Building Design*
- *Water Conservation and Management*
- *Energy Efficiency*
- *Reduced and Sustainable Material Use*
- *Recycling During and Post Occupancy*
- *Indoor Environmental Quality – Healthy Buildings (homes)*
- *Quality Assurance / Commissioning*
- *Innovative Design Strategies*

Green Building Guidelines

Smart Communities Green Building Principles

- Energy Efficiency and Renewable Energy Resources
- Environmental Impact
- Resource Conservation
- Indoor Air Quality
- Community Issues

Green Communities Criteria

- Integrated Design Process
- Location and Neighborhood Fabric
- Site Improvements
- Water Conservation
- Energy Efficiency
- Materials Beneficial to the Environment
- Healthy Living Environment
- Operations and Management

Green Building Guidelines

LEED for Homes

- Innovation in Design Process
- Locations + Linkages
- Sustainable Sites
- Water Efficiency
- Energy and Atmosphere
- Materials + Resources
- Indoor Environmental Quality
- Awareness + Education

LEED for Neighborhood Development

- Locations + Linkages
- Neighborhood Pattern + Design
- Green Construction Technology
- Innovation + Design Process

American Lung Association Health House

Certification Programs

Green Residential Building Programs

- *LEED for Homes*
- *LEED for Existing Buildings*
- *LEED Neighborhood Development (Pilot Program)*
- *Scottsdale Green Building Program*
- *National Association of Home Builders (NAHB) Green Building*

Certification Programs

Energy Programs

- *Energy Star (US EPA and DOE program)*
- *RESNET (Residential Energy Services Network)*
- *Tucson Electric Power Home Guarantee Program*

Certification Programs

Rating Systems

- *LEED Green Building Rating System*
- *Energy Star Rating System*
- *HERS (Home Energy Rating System)*

Cost Concerns for Affordable Housing

Low First Costs

- Keep Construction or Renovation Cost Low:
 - the more costly the home, the smaller pool of people who can afford it
 - higher first costs reduce the number of affordable units that can be completed within a given project budget
- Major Strategies:
 - Small home size
 - Integrated design approach

Cost Concerns for Affordable Housing

Low Operating Costs

- Utilities account for major portion of a small monthly budget :
 - Ensuring low operating costs sometimes justifies higher first costs
 - Strategies with less than 7-10 year payback should be considered
- Energy Efficiency
 - insulate well, seal air leaks, energy-efficient fixtures + appliances
- Water Efficiency
 - low-flow fixtures, dual-flush toilets, (fix leaks)
 - native + drought-tolerant landscape, irrigate with collected rainwater
- Durability + Low-Maintenance
 - prevent premature deterioration (esp. of building envelope: i.e. due to water damage or high-UV exposure deterioration)
 - flexibility for future reuse and/or universal design for various users

Cost Concerns for Affordable Housing

Indirect Costs

- Occupant Health
 - 40% of childhood asthma cases are caused by substandard living conditions (Enterprise Foundation)
 - lead poisoning still affects ~400,000 children each year
 - carbon-monoxide poisoning, radon poisoning, exposure to formaldehyde and VOCs (byproducts in particle board, paint, etc.)
 - decent lighting and acoustic conditions
- Materials
 - Recycled content, regional, sustainable wood, etc.: generally do not lower first or operating costs – more difficult to justify in affordable housing projects
 - Reflectivity of materials (can lower energy costs)
 - Durable materials (can lower maintenance + life-cycle costs)
 - Low-VOC materials (can lower health impacts, improve IAQ)

Cost Concerns for Affordable Housing

Indirect Costs

- Security
 - Majority of affordable housing remains concentrated in areas with above-average crime-rates
 - Indoor + outdoor spaces that allow for “eyes-on-the street” and provide security while fostering sense of comfort
 - Engage community interaction (i.e. front porches)

- Beauty
 - provide a sense of pride through design (allows for mental and emotional health)