Green Construction

2014
... definitions

California Department of Resources Recycling and Recovery:

A green building (sustainable building) is a structure that is designed, built, renovated, operated or reused in an ecological and resource-efficient manner. Green buildings are designed to meet certain objectives such as protecting occupant health; improving employee productivity; using energy, water and other resources more efficiently; or reducing the overall impact to the environment.

Environmental Protection Agency:

The practice of maximizing the efficiency with which buildings and their sites use resources—energy, water and materials—while minimizing building impacts on human health and the environment, throughout the complete building life cycle—from siting, design, and construction operation, renovation and reuse.
A little history

Designing buildings to create micro climates, take advantage of physics, etc. grew the western industrial age. The Crystal Palace in London used ventilators in vaulted ceilings to move air. Roofed in glass it allowed plants to thrive while not creating a hot house environment.

Hot weather mansions designed flues around stairs and basements to move cooler air throughout the home. Central heating and air-conditioning came which resulted in taller buildings and no need to create micro-climates.

The 1960’s re-ignited the environmental movement with a growing focus on reducing pollution.
What is Green Construction?

- Sustainable materials
- Low carbon emissions from building and manufacture of materials
- Low pollution from demolition
- Compatible with surrounding environment
- No bigger or smaller than is needed
- Occupant comfort using micro-climates
- Location – Transit, occupants, etc.
- And more…
What is **Green** Construction?

- Codes exist but not always adopted.
- Emerging business
- What percent of building constitutes green?
- What materials and who decides which is better?
LEED Certification

U.S. Green Building Council – driving the green movement within all levels of local and national government

LEED Certified (Leadership in Energy and Environmental Design) – program run to provide a universal framework for implementing green building design and construction.

- Sustainable sites
- Water efficiency
- Energy and atmosphere
- Material and Resources
- Indoor environmental quality
- Innovation

The sum of the scores in each category puts you into a class ….. Certified to Platinum.
LEED
More than plants on the roof.
Green attributes make up a Green Building

With 32 "green" buildings, Seattle has become a leader in environmentally sensitive building and design. Green construction aims to reduce pollution and reduce dependence on power plants and logging.

**ECOFRIENDLY CONSTRUCTION**

**GREEN ROOFS:** A thin layer of plants and soil on rooftops provides insulation, reduces stormwater runoff, absorbs carbon dioxide and creates oxygen.

**ALTERNATIVE ENERGY:** Roof-mounted wind turbines and solar panels reduce need for outside energy sources.

**WATER EFFICIENCY**
Cisterns collect rainwater to use for landscaping irrigation. Low-flow, waterless or composting toilets help reduce water use.

**VENTILATION:** Vents and operable windows assist in heating and cooling by circulating air better.

Source: P-I reporting

**BUILDING MATERIALS:** Recycled building materials reduce waste. Building with certified lumber helps protect forests and using non-toxic paints and carpets creates a healthier interior space.

SEATTLE POST-INTELLIGENCER
Green Construction is here to stay

Higher rent and occupancy rates

By 2015 – over 40% of new non-residential construction (by value) will be environmentally friendly

2012 - ICC Green Construction Code

Energy Codes

Waste Water Runoff
GREEN BUILDING PYRAMID

Several time-tested alternative structural systems offer higher R-values and other advantages over conventional stick framing. They include structural insulated panels (SIPs), Insulating Concrete Forms (ICFs), Polysteel and others. Don’t rule out factory-made panelization.

Various organizations will “certify” your project’s green features, including the NAHB, USGBC, and Environments for Living. Some may argue that certification belongs lower on the pyramid, but earning that green stamp of approval will come easily if you have given attention to the bottom two-thirds of the pyramid.

At a bare minimum, windows in a new home should include insulated Low-E glazings. Look for long-lasting clad wood windows or composites and install them tightly with airtight sealing around the perimeter.

Uninsulated concrete foundations can reduce HVAC efficiency by 30% to 50%. Specify exterior rigid form insulation or Insulating Concrete Forms (ICFs) for best results. Consider also frost protected shallow foundations and slab on grade construction.

For stick-framed walls and ceilings, we recommend blown-in insulation or expanding foam (rather than insulating batts) to reduce potential installation gaps. The age of 2x4 framing is over, incidentally. Specify 2x6 or 24” OC walls and look into optimal value engineering.

Well designed site plans take advantage of free solar energy and minimize damage to local ecosystems.

Carry the relationship to clients, you’re already behind the curve. Consider a cram course at Green Builder College (www.greenbuildercollege.com), or hit the books on your own.

Doubling a home’s size triples its annual energy use for the life of the home.

At the highest level of green building, the finished home recycles water, and uses little or no energy. It may include:

- Greywater systems
- Composting toilets
- Earth-sheltered roofs
- Wind energy
- Photovoltaics
- Solar walls (passive heating)

Production and transportation of materials used in building a home account for only 6% of its lifetime energy use. Reducing and recycling waste on the job is important, but a relatively small player in a home’s ecological footprint.

Durability is an often overlooked green asset. Specify metal, tile or extended life (recyclable) asphalt roofing. Use with fiber cement, cedar, brick veneer, or other long-lived products. Build outdoor structures using improved composite decking, aluminum handrails. Avoid products containing high percentage of virgin polystyrene chloride (PVC).

Lawn irrigation accounts for almost half of all residential water usage. No lawns are good lawns. Specify xeriscaping and use recycled water when possible for landscape watering.

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GREATER LESSER

KEY: Difficulty/Knowledge required for implementation. Note that some of the easiest changes have greatest green impact over the life of the home.
PERFECT STORM

Sustainability was an essential part of the business ethos of Organic Valley, a Wisconsin-based dairy cooperative, down to the materials it used to construct its offices. And that’s where it ran into problems.

BY BOB DUVAL

LA FARGE PHOTOGRAPHS COURTESY OF LA FARGE FIRE DEPARTMENT

Recycled denim
Lightweight construction
Solar Panels
Automatic fire sprinkler system
Building Envelope and Features

Recycled cotton-based denim material in concealed spaces
- fire spread vertically and horizontally in the walls
- had a “Class A” fire rating
Recycled Denim Insulation
Exterior Foam Insulation Material
Vegetative Roof Systems
Does Earth movement excl. apply??
Atrium for natural light
High Volume Low Speed Fan
Building Construction

Lightweight wood trusses - gusset plates
Faster loss of structural integrity
TJI’s
Alternative Power Sources

Photovoltaic panels couldn’t vent through the roof.
Metal roof was energized (50 volts of direct current).
Wind Turbines
Hydrogen Fuel Cells
Battery storage systems
Site Location
Urban Village
Permeable surfaces
Automatic Fire Sprinklers

The Automatic fire sprinkler system broke when roof collapsed – taking water from the hydrants.
Insurance Issues

- Firefighting obstacles
- Additional costs of Construction
- Recertification when rebuilt
- Water Intrusion
- Vegetated features and porous paving
Roundtable – What are your concerns?