Green Building: Public Regulation or Private Certification?

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Buildings consume 76% of the United State’s electricity, and emit almost half of the nation’s greenhouse gases.

U.S. Contribution

• The United States consumes more energy than any other country in the world
• The U.S. consumes nearly 25% of the world’s energy and only accounts for 5% of the world population.
• Our energy is increasing nearly 2% each year.

U.S. buildings are responsible for...

- 39% of CO2 emissions
- 40% of Energy Consumption
- 13% of water consumption
- 15% of GDP per year

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Average Home Size

- 2009: 2,500 sf
- 1970: 1,500 sf
- 1950: 800 sf
Number of Cubic Feet to Heat/Cool Per Person?
Smart Metering

Alternatives

International Building Codes

- Materials
- Electrical
- Energy
- Fire Prevention
- Mechanical: HVAC, Plumbing
- Historical
- Earthquake Stability

Major Green Building Certification Programs

- LEED (U.S.)
- BREEAM (U.K.)
  - BRE’s Environmental Assessment Method
- Green Star (Australia)

Great Britain: BREEAM

- BRE Environmental Assessment Method

- Leading and most widely used environmental assessment method for buildings.

- Sets the standard for best practice in sustainable design and has become the de facto measure used to describe a building’s environmental performance.
Australia: Green Star

- Green Star is a national, voluntary environmental rating system that evaluates the environmental design and construction of buildings and, with 11 per cent of Australia’s commercial office buildings Green Star certified, building green is now a business imperative.

Green Star Purpose:
- Establish a common language
- Set a measurement standards
- Promote integrated, whole-building design
- Identify building life-cycle impacts

Differences in Programs?

- LEED, BREEAM, & Green Star similarly focus on energy conservation, but pay little attention to chemical lifecycles and human health.

“US Green Building Council”

- USGBC organized in 1993 as a voluntary, non-profit, with no government affiliation.

USGBC Benefits Claims:

- Sustainable sites
- Water Efficiency
- Energy & Atmosphere
- Materials & Resources
- Indoor Environmental Quality
- Innovation in Design

Rating Systems and Categories

- Environmental
- Economic
- Health and Community

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U.S. Green Building Council’s “Leadership in Energy and Environmental Design”

- LEED is a rating system designed by USGBC to “evaluate the environmental performance of the design, construction, and operation of green buildings.” - USGBC

Certification: Scoring Performance

- 100 base points possible + 10 bonus
  - Certified 40-49 points
  - Silver 50-59 points
  - Gold 60-79 points
  - Platinum 80-110 points

Development of LEED

- The LEED board consists of architects, real estate agents, engineering firm executives, building materials executives, and chemical company representatives.
- In 1997, the U.S. DOE agreed to fund the LEED pilot program, which was launched in August of 1998.

Purpose of LEED

- According to USGBC, LEED was developed to
  - Protect the environment, occupant health, and become economically beneficial
  - Provide a standard of “GREEN”
  - Prevent inaccurate claims of being “green”
  - Promote an integrated design process

LEED’s Rating Systems

- New Construction & Renovation
- Schools
- Core & Shell
- Neighborhood Development
- Retail Facilities
- Healthcare Facilities
- Commercial Interior Projects
- Homes

USGBC’s Benefits of Green Building

Environmental benefits:
- Enhance and protect occupant and biodiversity
- Improve air and water quality
- Reduce solid waste
- Conserve natural resources

Economic benefits:
- Reduce operating costs
- Enhance asset value and profits
- Improve employee productivity and satisfaction
- Optimize life-cycles economic performance

Health and community benefits:
- Improve air, thermal, and acoustic environments
- Enhance occupant comfort and health
- Minimize stress on local infrastructure
- Contribute to overall quality of life
Categories
- Sustainable Sites
- Water Efficiency
- Energy and Atmosphere
- Materials and Resources
- Indoor Environmental Quality
- Innovation of Design

Certification
- 100 base points possible + 10 bonus
  - Certified 40-49 points
  - Silver 50-59 points
  - Gold 60-79 points
  - Platinum 80-110 points

Certification
- In order to become certified, buildings must first meet several basic mandatory requirements. Examples include that the building must be a permanent structure, or the site/building must comply with environmental laws.
- Then, buildings can earn points for meeting a variety of "credits" in each section.
- In most categories, there are additional prerequisites that must be met in order to become certified.

Sustainable Sites
- 26 possible points
  - 24\% of total
  - Credits buildings for being built on previously developed land
  - Promotes a minimal impact on ecosystems and waterways
  - Promotes landscaping that is regionally appropriate
  - Encourages public transportation
  - Controls stormwater runoff, erosion, light pollution, heat island effects, and pollution from the construction process

Hazardous Site Cleanup Standards? Pierson Sage Power Plant→Kroon Hall Yale.
Water Efficiency
10 points
9% of total

- Encourages efficient appliances, fixtures, and fittings
- Promotes “water-wise landscaping” to help reduce water use and improve conservation

Energy and Atmosphere
35 points
32% of total

- Credits involve
  - Energy consumption monitoring
  - Efficient design and construction
  - Efficient appliances, systems, and lights
  - Use of renewable and clean sources of energy
  - Other strategies involving energy efficiency
Materials and Resources
14 points
13% of total
• Promotes recycling
• Rewards waste reduction
• Encourages use of sustainably grown, harvested, produced and transported materials

Indoor Environmental Quality
15 points
14% of total
• Developed to improved indoor air quality
• Promotes natural daylight and views
• Rewards improved acoustics

On average, Americans spend nearly 90% of the time indoors or within vehicles
Building materials posing possible health hazards

- Paint, stain
- Sealants, caulking
- Appliances
- Lighting
- Fans
- Electronics
- Fireplaces
- HVACs
- Insulation
- Concrete
- EMFs
- Drywall
- Roofing
- Siding
- Rugs
- Wood
- Plastics
- Air ducts
- Air purifiers
Air Exchange: HVAC Systems

Tighter, more energy efficient structures often have one-tenth the air exchange rates of older structures with windows, doors and walls that are less well-insulated and sealed.

Nestle Bottling Plant

Acqua Liana, Manalapan, FL