Construction & Energy Management: Sustainable Construction Practices

Cabrillo College - CEM 162
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Sustainable Construction: Best Practices

- **Sustainability** (definition)
  - **Sustain**: “continue, extend, keep alive, keep up, maintain, prolong” (Oxford dictionary)

- **Sustainable development:**
  “meets the needs of the present without compromising the ability of future generations to meet their own needs”

  (1987 Brundtland Report- World Commission on Environment and Development)
Sustainable Construction: Best Practices

- Sustainable = “GREEN”
- GREEN = GREEN ($$$)
- Sustainable design considerations-
  “Synergistic approach balancing economic, environmental and community concerns”.
  - Economic: life-cycle cost analysis NOT just 1st cost!!
  - Environmental: reduce natural resource consumption and preserve habitat
  - Community: improve quality of life and minimize strain on local infrastructure

TRIPLE BOTTOM LINE!
Sustainable Construction: Best Practices

- Sustainable Construction “Waves of Opportunity”
  - State of California EXECUTIVE ORDER D-16-00, August 2000 for sustainable buildings:
    “to site, design, (re)construct, renovate, operate and maintain state buildings that are models of energy, water and materials efficiency; while providing healthy, productive and comfortable indoor environments and long-term benefits to Californians”.
  - “California Solar Initiative” (CSI) program
  - City of Santa Cruz mandatory “Green Building” program.
  - LEED rating program for commercial, residential and institutional buildings
  - MEDIA COVERAGE EVERY DAY!!
Sustainable Construction: Best Practices

**LEED Standards:**
- Site considerations
- Building materials and resources
- Indoor environmental quality
- Water efficiency
- Energy and atmosphere
- Innovation
- Regional Priority
  (Leadership in Energy and Environmental Design)

US Green Building Council
Site Considerations

- Building orientation for **PASSIVE SOLAR**
  - Southern exposure for solar heat gain
  - Northern exposure for daylighting
  - Minimize east/west exposures as much as possible
  - Exterior shading with deciduous trees
- Erosion/sedimentation control
- Reduce site disturbance
- Stormwater management
Building Materials and Resources

- Utilize sustainable and recycled materials wherever possible
- Reuse existing building construction rather than “tear-down and re-build”
- Utilize FSC “Certified Lumber”, engineered-wood products as much as possible
- Separate construction waste for recycling and landfill diversion
- Utilize regional products to cut down on transportation costs and related effect on environment
Indoor Environmental Quality

- Ensure adequate supply of ventilation air for building occupants.
- Utilize “low-emitting” materials
  - Adhesives and sealants
  - Paints and coatings
  - Carpet
  - Composite wood products
  - Ventilation “purge” prior to occupancy
- Utilize “daylighting” wherever possible
- Thermal comfort
Water Efficiency

- Water efficient landscaping
- Water use reduction
  - “low-flow” fixtures
  - Use of waterless/low-flow urinals for commercial spaces
- Rainwater cisterns for landscape irrigation and toilet flushing
Energy and Atmosphere

- Insulate buildings to exceed minimum Title 24 requirements. Utilize cellulose or urea/formaldehyde-free fiberglass insulation
- Install “low-E” windows
- Utilize alternative building envelope construction (i.e. “straw-bale” and adobe) to cut down on building heat gain/losses.
- Ensure that building mechanical, electrical and plumbing systems operate as efficiently as possible.
Energy and Atmosphere

- Utilize renewable energy systems wherever possible:
  - PhotoVoltaic (PV) Solar electric
  - Solar Thermal for heating hot water
  - Wind energy
Energy and Atmosphere

- Maximize efficiency/operation of all equipment and appliances
  - EnergyStar™
  - High EER cooling equipment
  - High-efficiency “condensing” furnaces/boilers
  - Non-CFC cooling equipment
- Encourage use of “green power” from renewable energy sources that are “net-zero” pollution source.
Innovation/Regional Priority Credits

- Innovation or EXEMPLARY performance
  - 95% construction waste diversion
  - 2 year renewable energy purchase agreements
  - Use of green cleaning materials

- Regional Priority Credits
  - Based on postal zip code
  - Bonus points for achieving certain credits
    (water efficiency, renewable energy, daylighting)
Sustainable Construction: Best practices

**Conclusions:**

1. California will be at the forefront of sustainable building construction for the foreseeable future.
2. California/Governor Schwarzenegger’s “California Solar Initiative” will help to publicize and expand this important shift towards SUSTAINABLE buildings.
3. City of Santa Cruz mandatory “Green Building” program is now reality and is a model for other local municipalities.
4. USGBC’s LEED rating system has expanded to cover residential building construction.
5. The California Community College system will continue to play a leadership role in providing an educated workforce to take part in this future.
Sustainable Construction: Best Practices

“We shape our buildings, and afterwards our buildings shape us” - Winston Churchill

“When we build, let us think that we build forever” - John Ruskin