Construction & Energy Management: Sustainable Construction Practices

Cabrillo College- CEM 162
Spring Quarter 2012
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/TRIPLE BALANCE POINT!
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”.
  - **CALGreen** and Title 24
  - Local cities/counties mandatory “Green Building” programs.
  - **LEED/B.I.G.** rating programs for commercial, residential and institutional buildings
  - **MEDIA COVERAGE EVERY DAY!!**
Sustainable Construction: Best Practices

**LEED/B.I.G. Standards:**
- Leadership in Energy and Environmental Design
- Build-It-Green

- Site considerations
- Building materials and resources
- Indoor environmental quality
- Water efficiency
- Energy and atmosphere
- Innovation
- Regional Priority
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
(LEED Rating System)

- 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’s “CALGreen” will mandate minimum sustainability standards for all buildings.
3. Local cities/counties will continue to have “reach” Green building programs that exceed minimum CALGreen standards.
4. The USGBC’s LEED rating system and Build-It-Green will continue to evolve and cover more building construction types.
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