

## Sustainable Design

### *Process*

1. Define sustainability goals
2. Identify possible sustainability measures (see below)
  - a) Create small loads
  - b) Reduce loads
  - c) Provide efficient distribution
  - d) Provide efficient plant design
  - e) Provide good controls
  - f) Provide renewable power
3. Develop evaluation criteria for measures  
cost, resource use, local, non-toxic, community-friendly, etc.
4. Test or analyze measures
5. Iterate

### **Buildings**

#### *Orientation*

- Sun
- Wind
- Roof Area
- Drainage

#### *Fenestration*

- Location
- Glazing
- Sunshades
- Lightshelves

#### *Shell*

- Skin (color)
- Insulation
- Roof (slope, size, drainage)

#### *Materials*

- Mass
- Environmental Impact (local, toxicity)

#### *Longevity*

### **Systems**

#### *Lighting*

- Daylight
- Ambient light
- Task light

#### *HVAC*

- Heat source (geo, gass, sun, electric)
- Cool source (night flush, \*DX, evaporative)
- Ventilation (natural, mechanical)
- Maintenance

#### *Plumbing*

- Water (low flow, rainwater)
- Waste (rainwater, waterless)

#### *Electric*

- Plug loads (appliances, computers)
- Renewable (wind, PV)

### **People**

#### *Culture*

- Spatial layout (open vs. closed)
- Operations
- Organization (hierarchy)
- Education (i.e. meter, challenge)

#### *Comfort*

- Light (task only?, operable shades)
- Ventilation (operable windows)
- Acoustics (venting can cause acoustical problems)

#### *Behavior*

- lifestyle choices (short showers, composting)

**Activities** Select one category for examination and apply process to one project

Identify sustainability measures for project (building, systems, people), incorporate into unit cluster & common house.

## *References*

**Whole Building Design Guide** > Design Objectives > Sustainable. Introduces major issues  
<http://www.wbdg.org/>

**Green Affordable Housing** features technology factsheets and case studies  
<http://www.greenaffordablehousing.org/>

**Green Affordable Housing Handbook** by the City of Portland  
explains why and how of sustainable measures along with costs and local resources  
<http://www.portlandonline.com/shared/cfm/image.cfm?id=122094>

Alison Kwok and Walter Grondzik's **Green Studio Handbook**, AAA RSRV TH880 .K87 2007

Daniel Chiras' **The Natural House**, AAA RSRV TH4815 .C485 2000

Sue Roaf, Manuel Fuentes, Stephanie Thomas's **Ecohouse 2** : a design guide / international case studies of sustainable homes, AAA RSRV TH4812 .R633 2003

Lynne Elizabeth And Cassandra Adams's **Alternative Construction : Contemporary Natural Building Methods** / AAA RSRV TH146 .A48 2000 [2005 edition on shelf]

Univ. of Oregon Energy Studies in Buildings Laboratory's **Natural ventilation in northwest buildings**, TH7674 .N37 2004