Sustainable House Design

Sustainable Design Challenge

Goal: To design a sustainable, off-grid home

Design Criteria:

1. **Location**: can be anywhere on earth, Mars or the moon
2. **Size**: enough for two people (minimum)
3. **Energy**: must harvest and store its own energy
4. **Water**: must harvest and store its own water
5. **Waste**: provide means to dispose of waste
6. **Materials**: where possible, use local materials
7. **Heating-cooling:** must maintain a temp of 22°C (72°F) year round
8. **Lighting**: passive lighting where possible
9. **Ventilation**: airflow to keep CO2 below 800 ppm
10. **Sound**: must be below 60 dB at all times
11. **Environmental-cultural resonance:** must fit into the environment
12. **Access**: must be accessible for access to resupply
13. **Food**: where possible, grow food and/or herbs onsite
14. **Water runoff:** where possible, limit erosion and runoff into water bodies (streams, rivers, oceans)
15. **Impact**: where possible, offset ecological impact (flora, fauna)
16. **Beauty**: should inspire and create curiosity about your design
17. **Site**: where possible, include solar, wind and water orientation
18. **Toxic materials:** nothing on the red list (toxic in creation, use or disposal)
19. **Sick building syndrome:** no vapors harmful to humans

First design report:
1. location (google earth or maps)
2. biome (pick from one system)
3. water sources (rain, river, ocean, well, etc.)
4. light (seasons, shading, solar radiation)
5. wind (ventilation, power, etc.)
6. temperature extremes (insulation, thermal mass)
7. possible energy sources (wind, tidal, geothermal, PV, etc.)

Resources:

Cradle to cradle design: https://en.wikipedia.org/wiki/Cradle-to-cradle_design

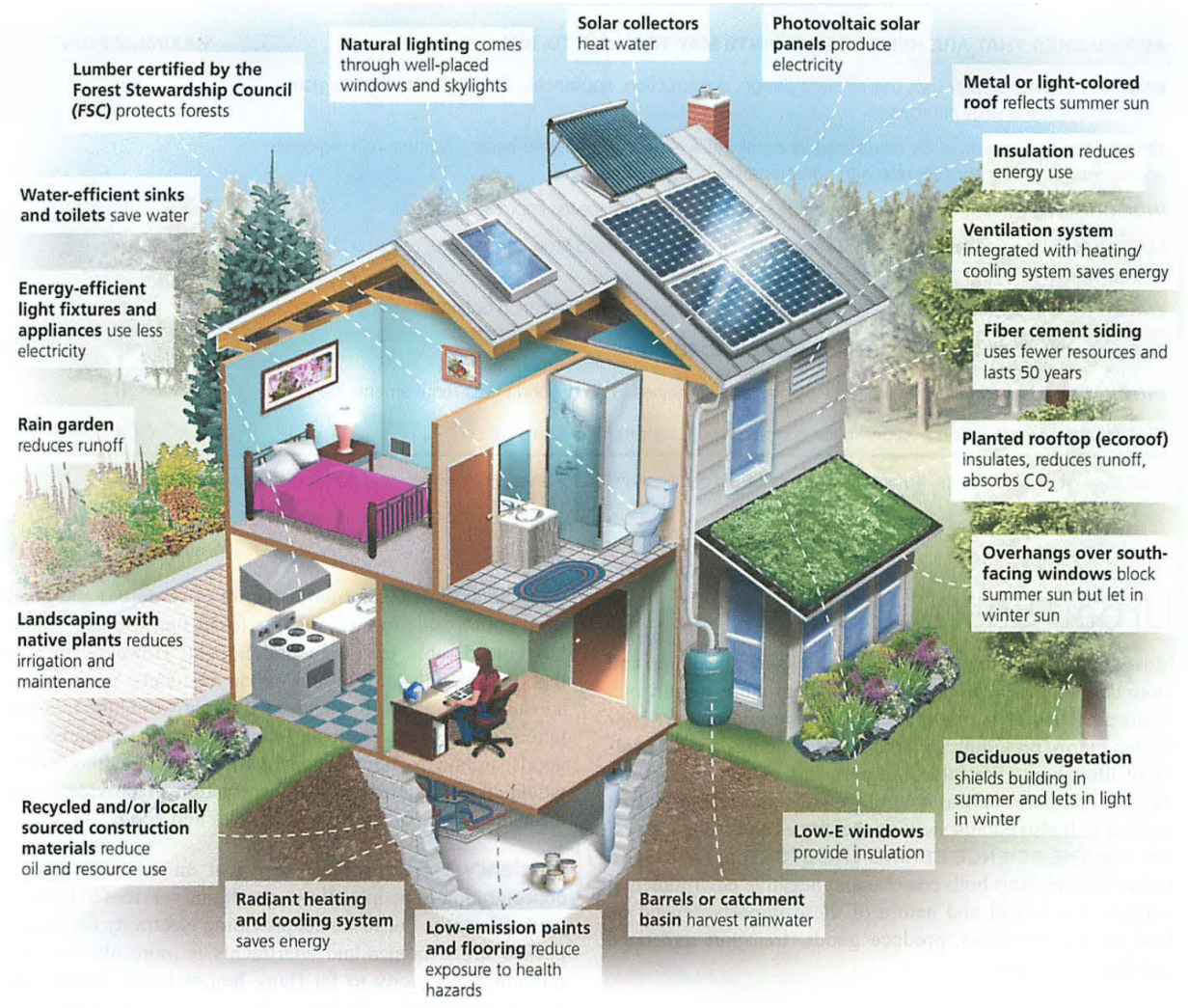
e2 videos:

- The art and science of Renzo Piano
- Green for all
- Green apple
- Druk White school in Ladakh

e2 video list:
now
future
partial

- **e2 design 1**
- **1 green apple.mov**
- **2 green for all.mov**
- 3 green machine.mov
- 4 gray to green.mov
- 5 china-red to green?.mov
- 6 deeper shades of green.mov
- **e2 design 2**
- **1 druk white lotus school-ladakh.m4v**
- 2 greening the federal government.m4v
- 3 bogota-building a city.m4v
- 4 affordable green housing.m4v
- 5 adaptive reuse in the Netherlands.m4v
- 6 architecture 2030.m4v
- **e2 design 3**
- 1 a garden in cairo.m4v
- 2 the village architect.m4v
- 3 melbourne reborn.m4v
- **4 the art and science of renzo piano.m4v**
- 5 new orleans-the water line.m4v
- 6 super use.m4v
- **e2 energy**
- **1 harvesting the wind.mp4**
- *2 energy for a developing world.mp4*
- 3 paving the way.mp4
- **4 growing energy.mp4**
- 5 state of resolve.mp4
- **6 coal and nuclear.mp4**

- **e2 transport**
- 1 London-the price of traffic.m4v
- 2 Paris-velo liberte.m4v
- **3 Food miles.m4v**
- **4 Seoul-stream of consciousness.m4v**
- *5 Portland-sense of place.m4v*
- 6 Aviation-limited sky.m4v



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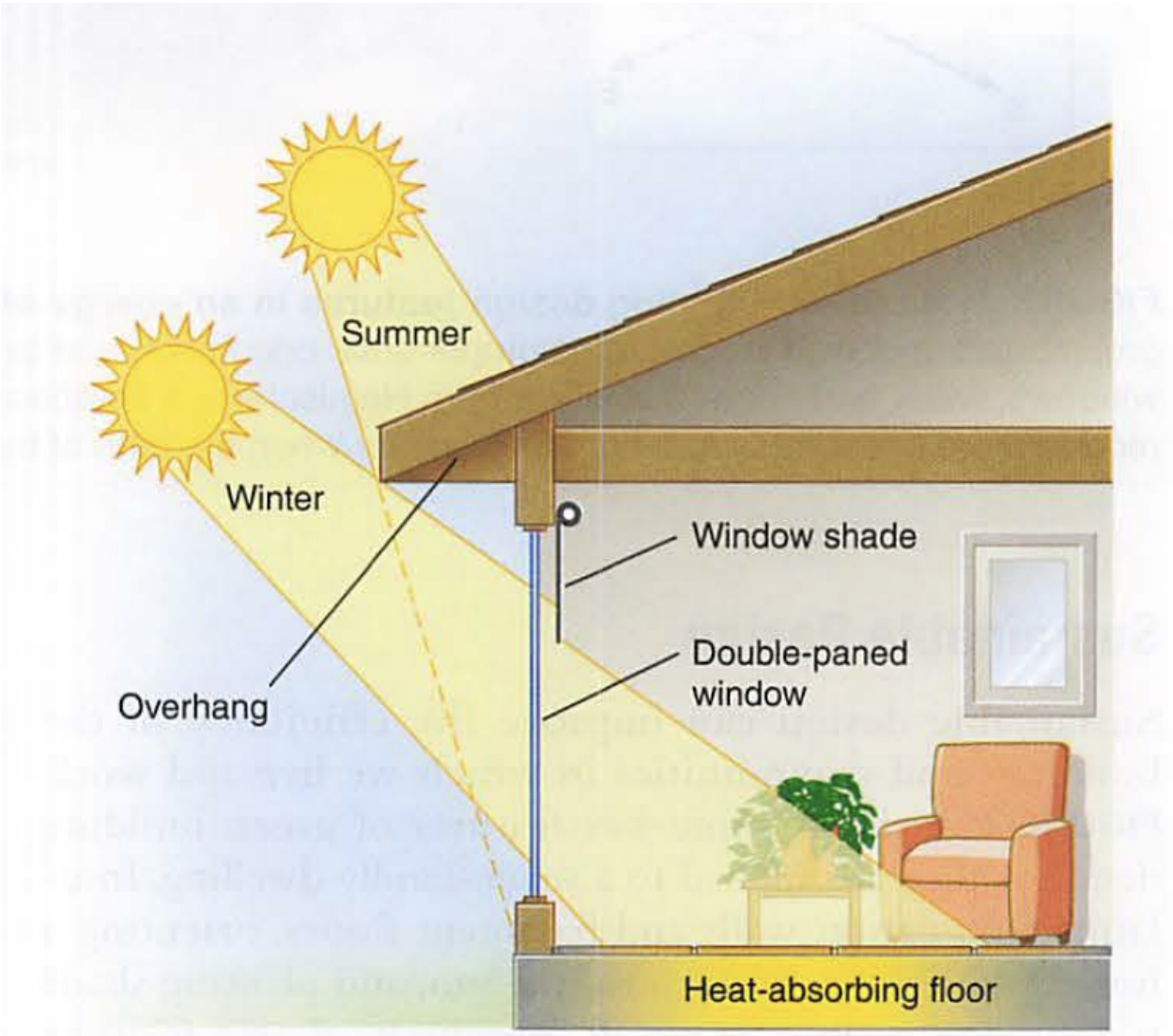


FIGURE 41.7 Passive solar design. Passive solar design uses solar radiation to maintain indoor temperature. Roof overhangs make use of seasonal changes in the Sun's position to reduce energy demand for heating and cooling. In winter, when the Sun is low in the sky, it shines directly into the window and heats the house. In summer, when the Sun is higher in the sky, the overhang blocks incoming sunlight and the room stays cool. High-efficiency windows and building materials with high thermal inertia are also components of passive solar design.

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