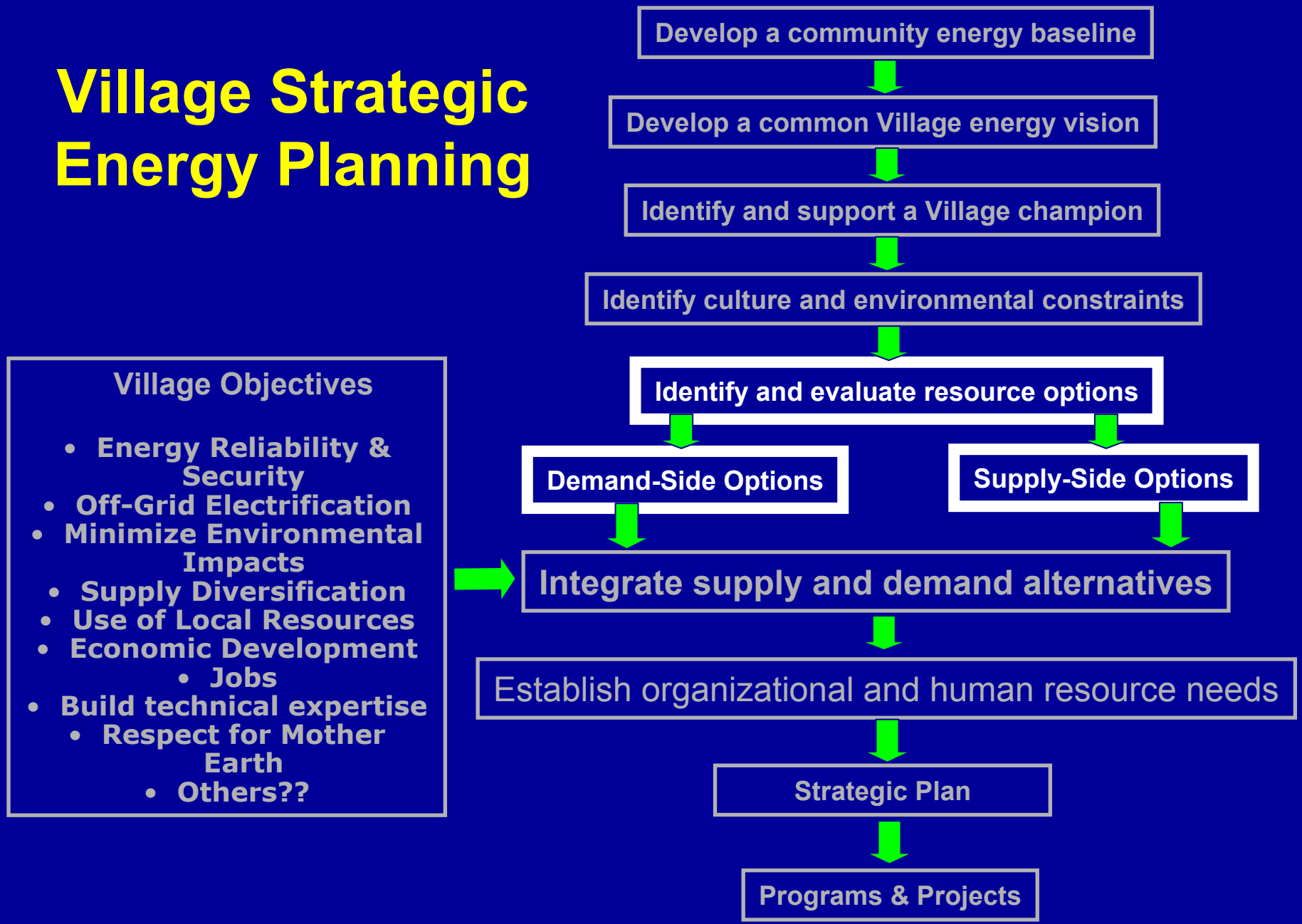
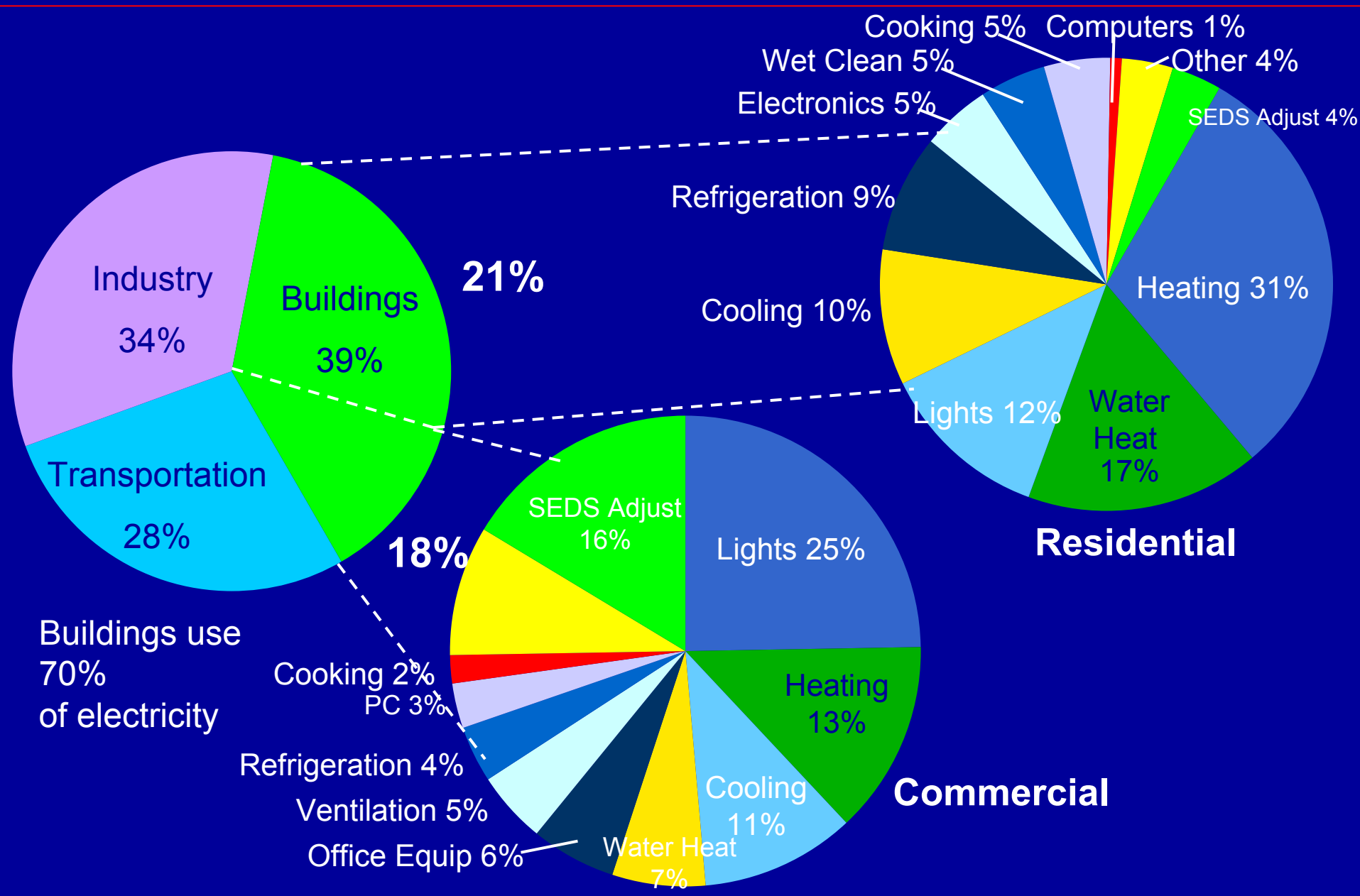
Demand-Side Options

Village Strategic Energy Planning



Village Strategic Energy Planning

Building Energy Use



Building Design

"Whole Buildings" Strategy:

Existing R&D programs, building technologies, and components tied together by Systems Integration and Computerized Design Tools.

Passive Solar Strategies

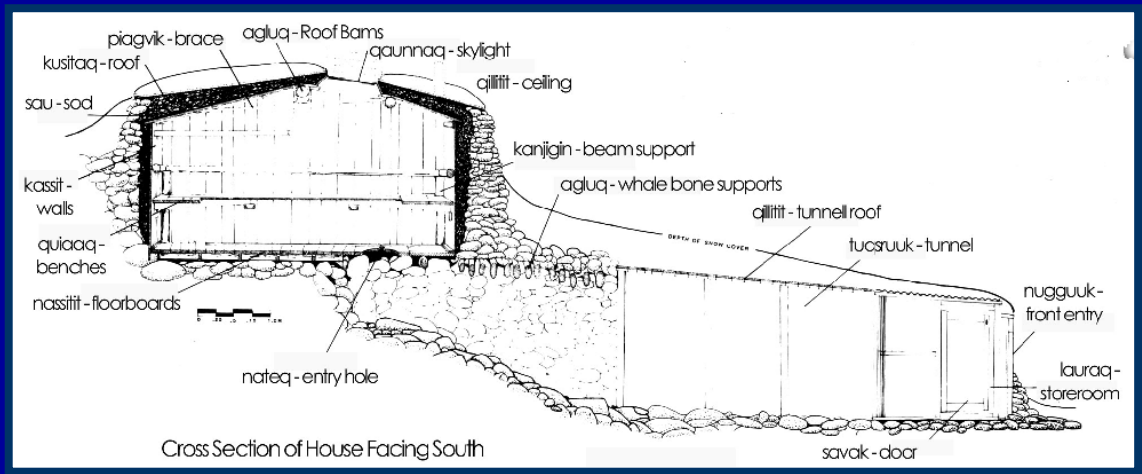
Siting and orientation, glazing size and location, and shading strategies contribute to a passive solar, or "climate-responsive," building.

Advanced Technologies

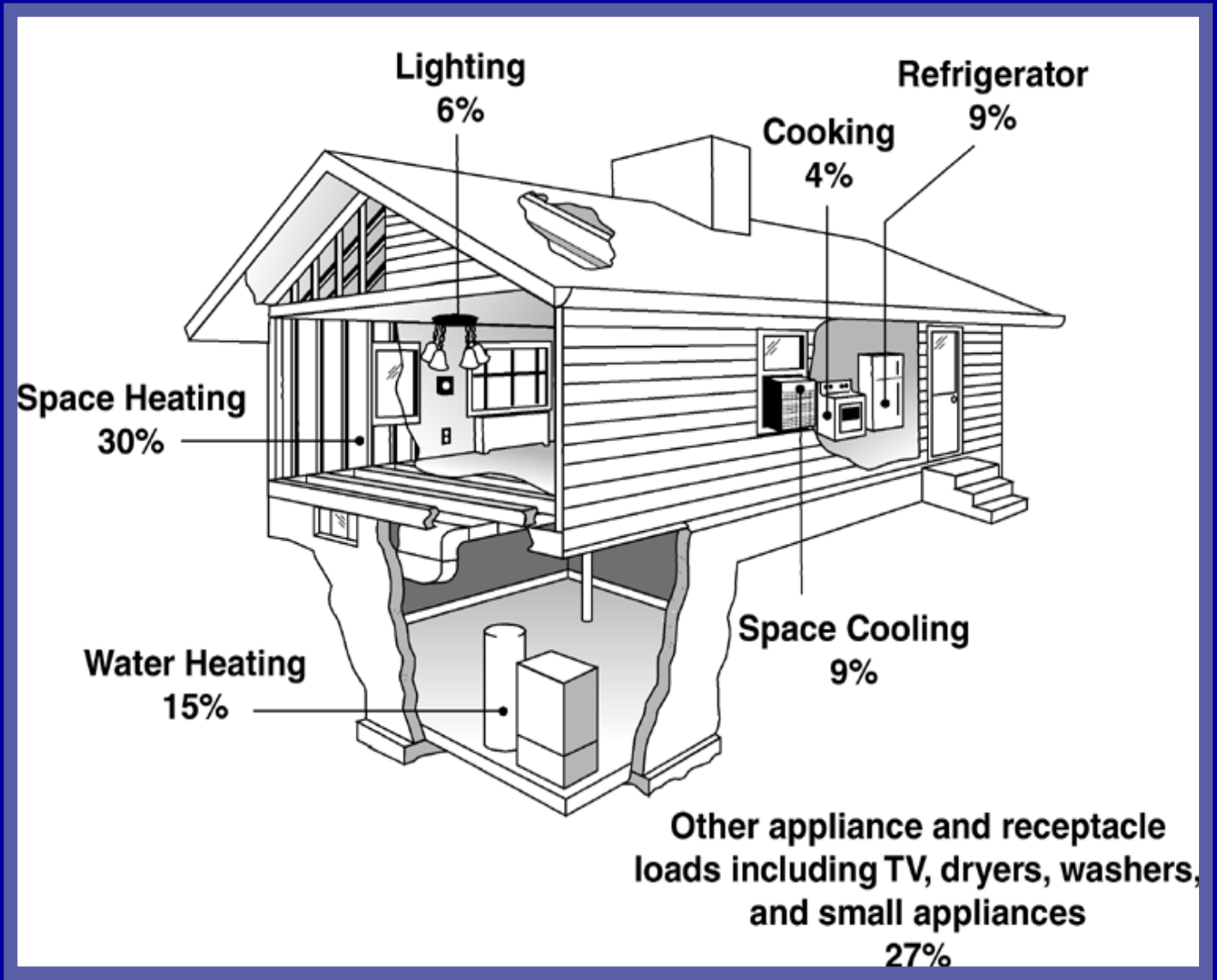
Energy-saving appliances, advanced energy controls and thermostats, efficient heating and cooling systems, photovoltaics, and solar water heating systems.

Energy-Efficient Materials

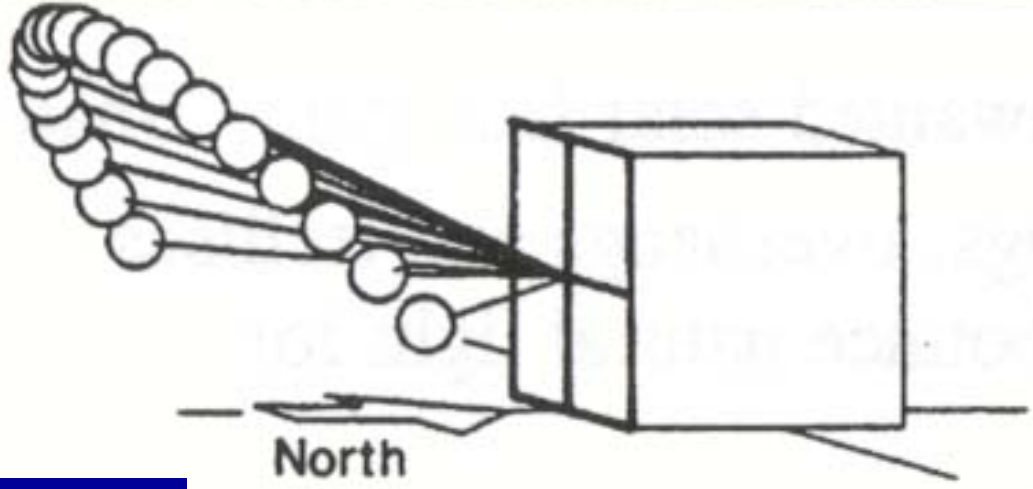
Superior building materials, including high-efficiency windows, insulation, brick, concrete masonry, and interior finish products.



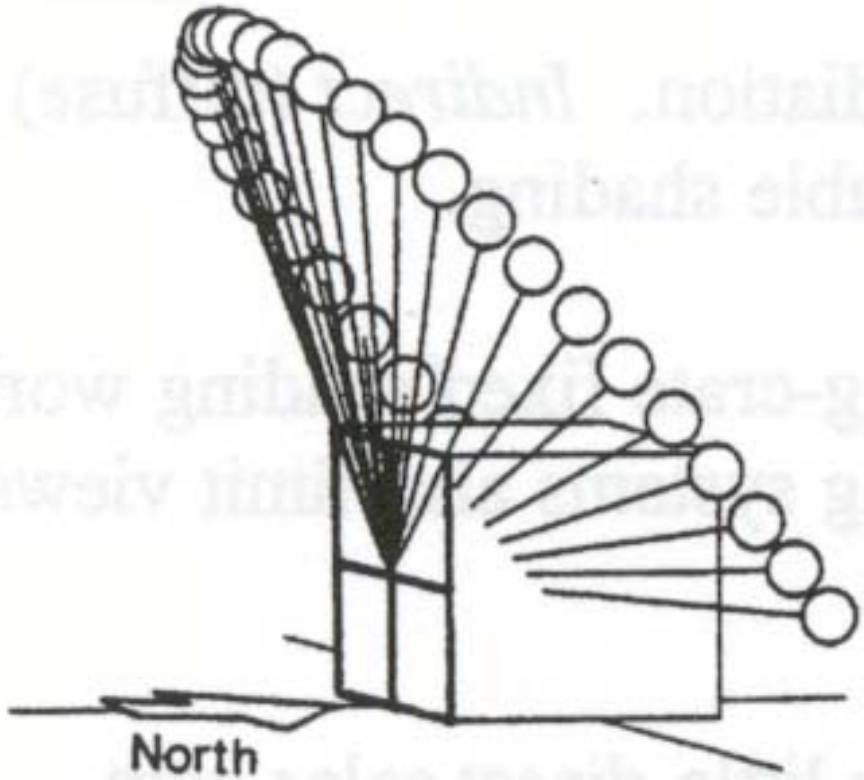
Typical Residential Energy Use Profile



Understanding The Sun



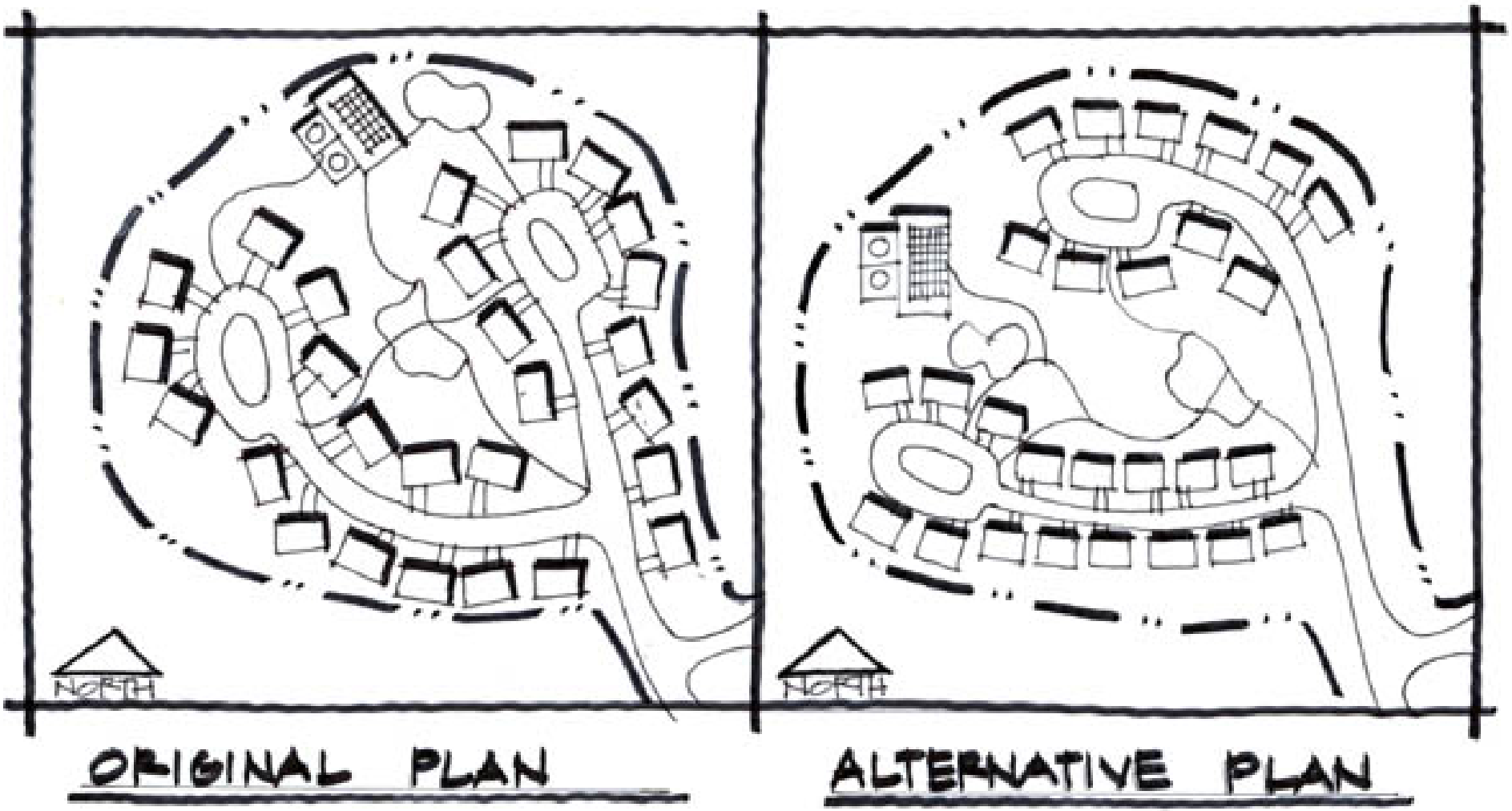
Winter sun angles on a facing vertical surface



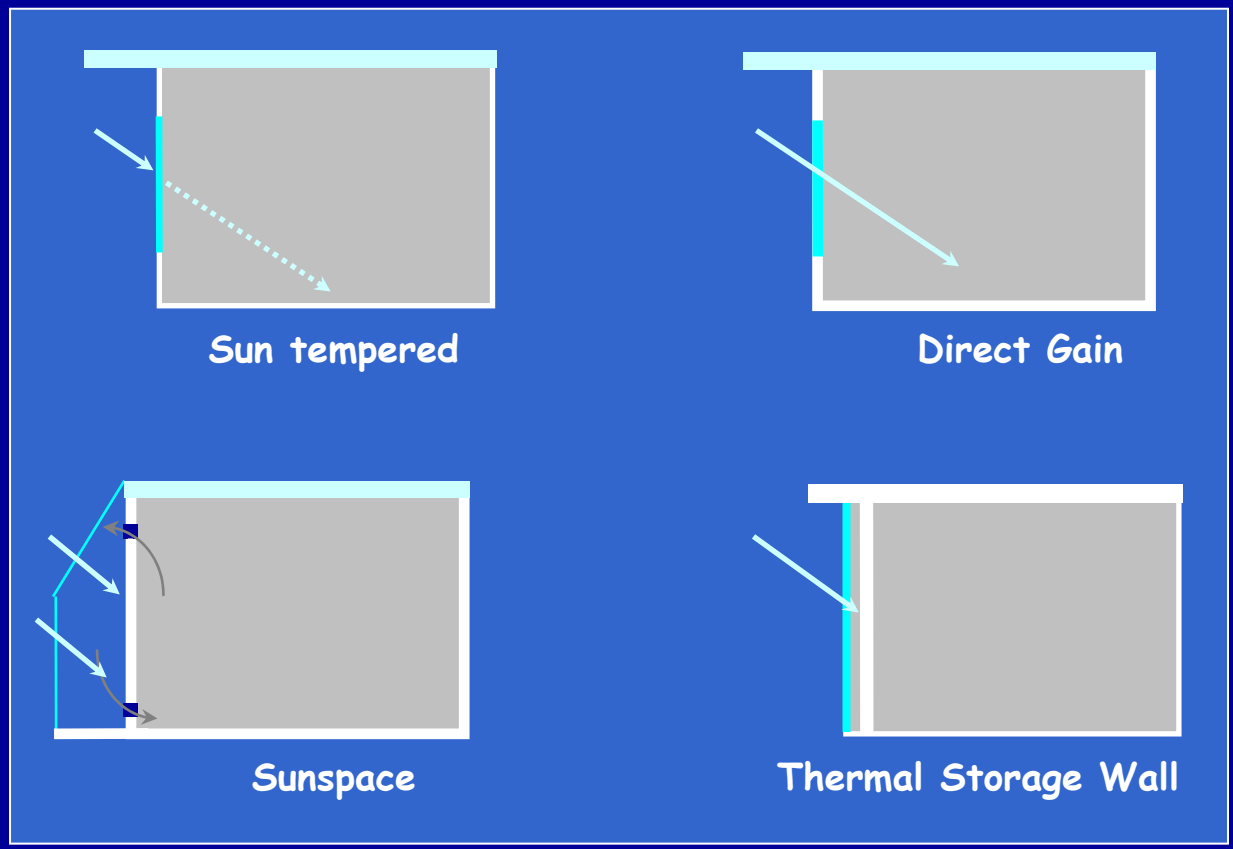
Summer sun angles on a south-facing vertical surface

Building Siting and Orientation

- Integrate landscape architecture & planning
- Orient building to optimize solar and breezes



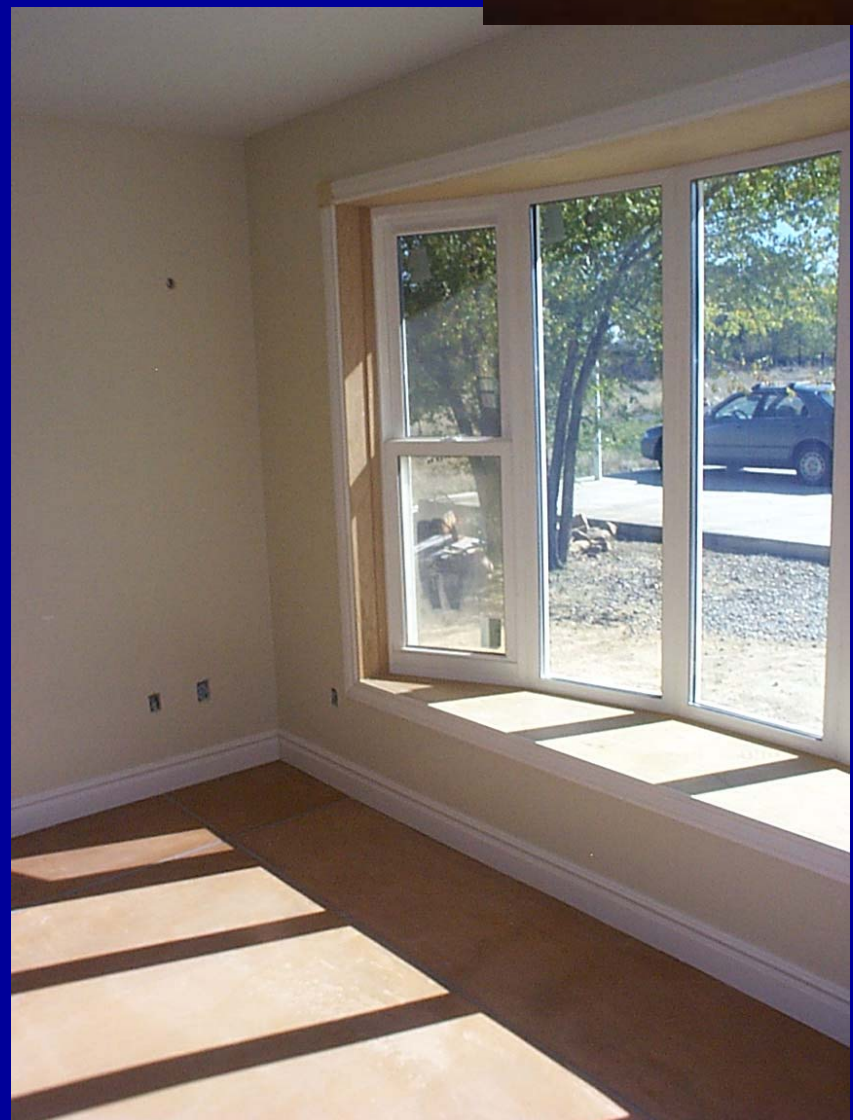
Passive Solar Strategies



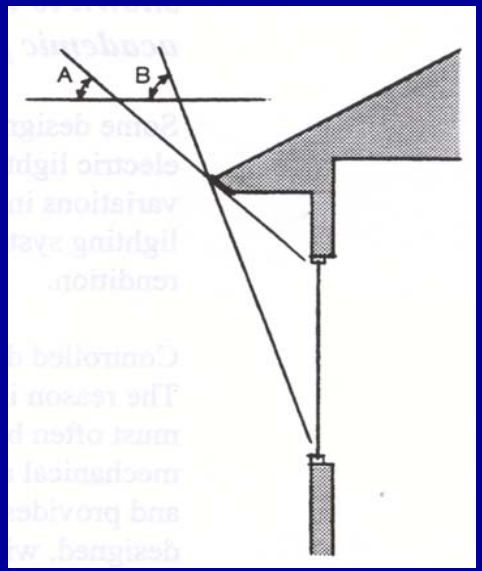
Passive Solar Heating
Sunspace

Sunshine & Glass

- Reflected
- Absorbed
- Transmitted



Optimum Roof Overhangs



Winter

Spring/Fall

Passive Solar Design

Carlisle\Prythero residence,
Lakewood,CO

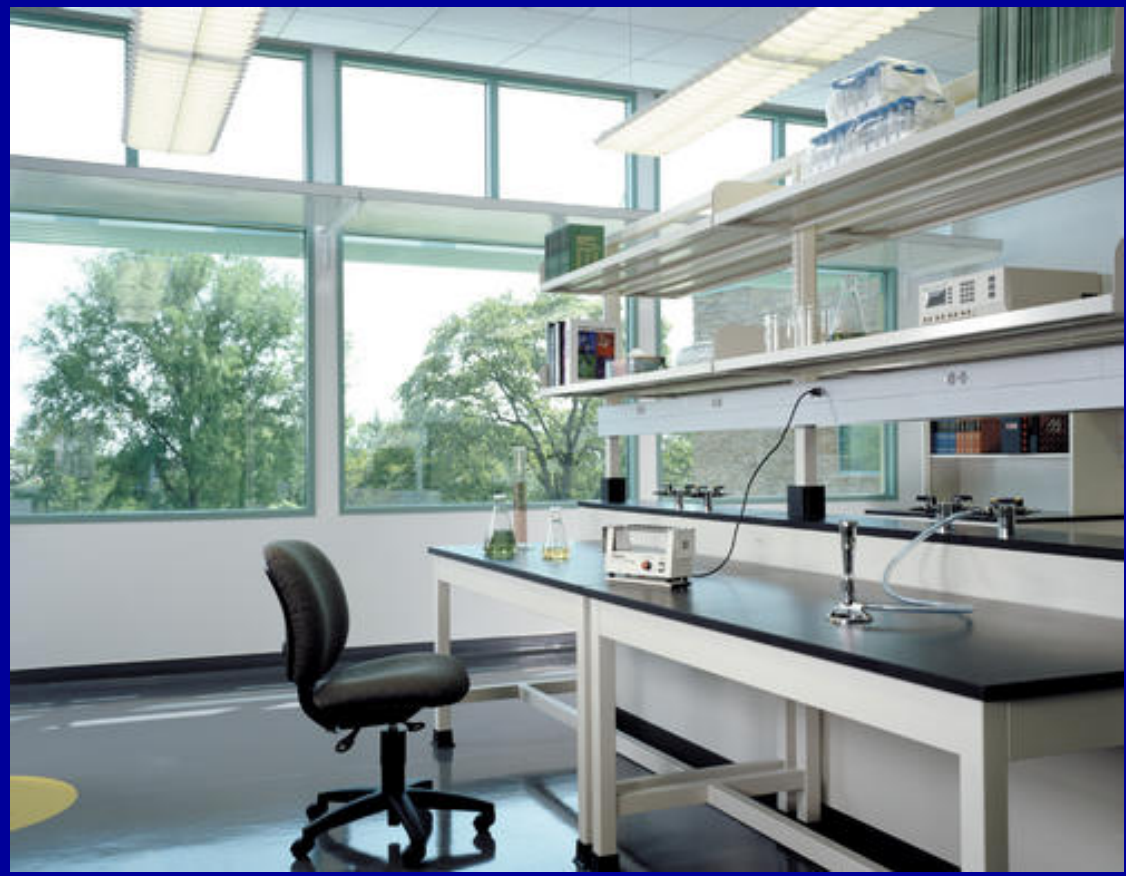
Passive Solar Heating & Cooling

1. Elongate east-west
2. Organize floor plan
3. Use high performance glazing
4. Locate solar glazing for winter sun angles
5. Incorporate sun control
6. Open floor plan

Residential daylighting is often overlooked.

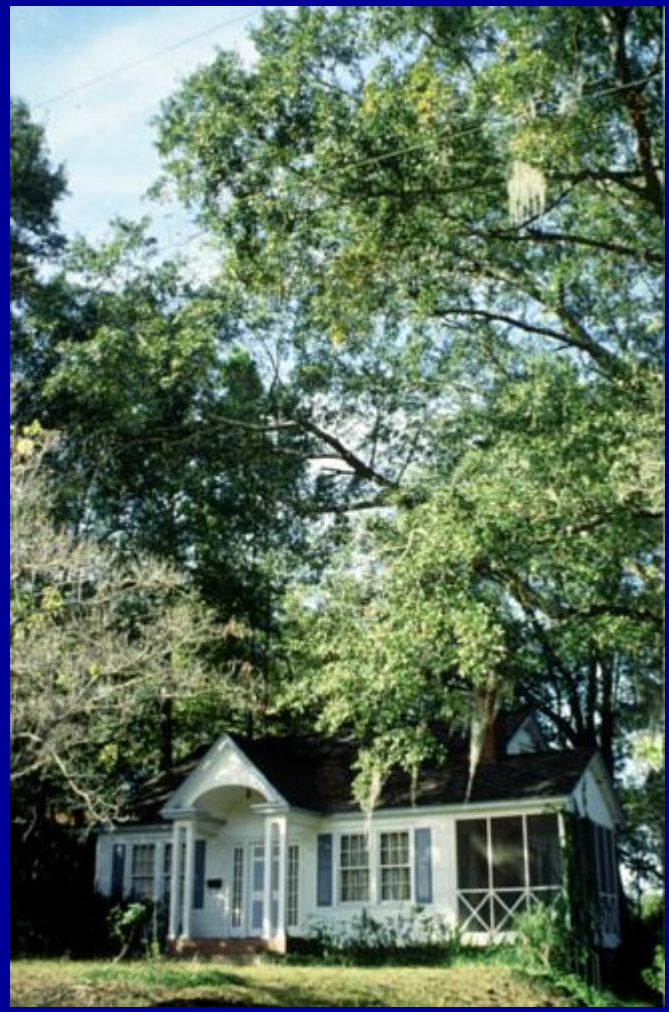
Glare control with baffles to diffuse natural light in buildings

Good daylighting …



Tubular Skylights

Cooling Load Avoidance
Vegetation



Cooling Load Avoidance
Reflective Roof

Energy Efficiency 1ST Then Renewables

- Every $ spent on efficiency saves at least as much as $2 spent on renewables
- Climate sensitive design (passive solar)
- Long axis of building faces south, south glass with overhangs, 7 – 12% glass area of building floor area
- Limit east, west and north glass

What to look for...

- General Rules for Buildings
- Long axis of building faces south
- Minimal **East and West** Windows
  - Should have low SHGC (<0.40)
- Maximize **South** Glazing with high glass for daylighting
  - Design overhangs to shade surfaces in summer
  - Use high SHGC (>0.60)
- Use **North** glass for daylighting and view glass
  - SHGC does not have big energy impact
- Motion and Daylight Sensors to harvest daylighting

What to look for… part II

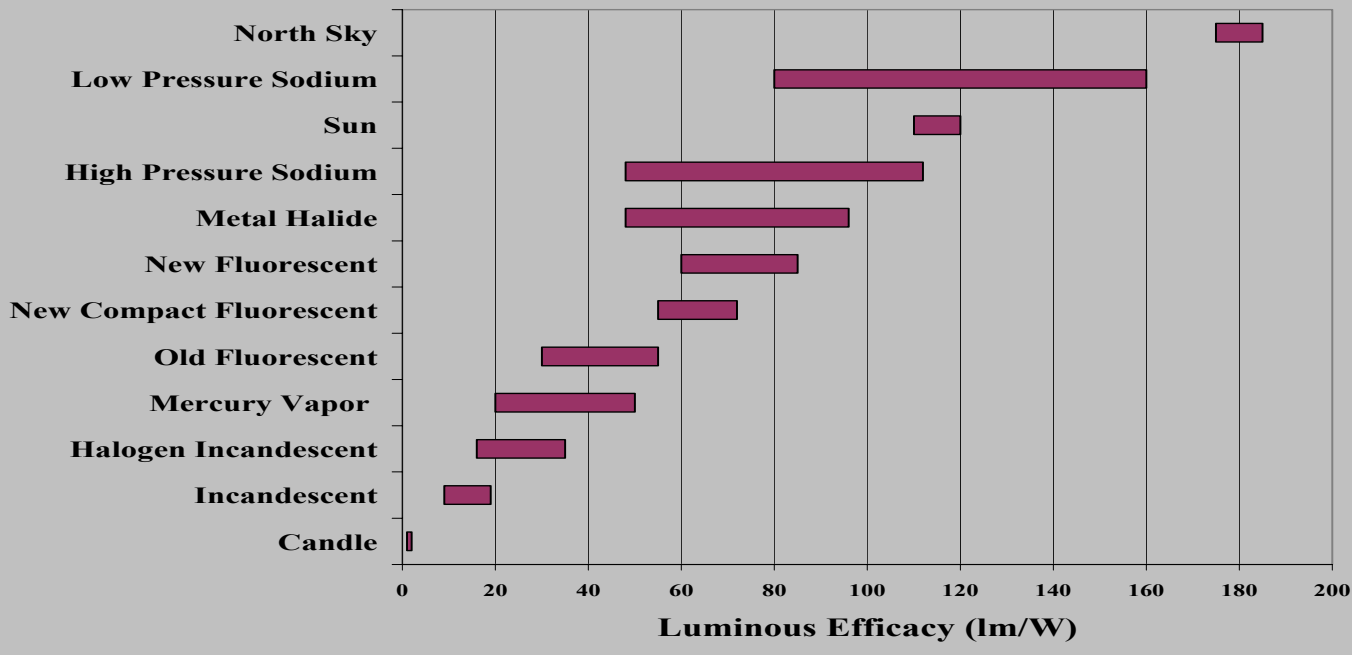
- Good Insulation Packages
- Energy Star Appliances
- No incandescent lights
- Effective Energy Design
- HVAC sized for the building, type appropriate for climate (Evap cooling in SW, etc)
- Low-Energy is in the Building, not the HVAC system.
- Pay for added building costs with reduced HVAC.
- Use simulations to design building.

What to look for… and how to accomplish

- Low Maintenance design (Stucco, Masonry, clad windows, metal roof, etc.)
- Low water use design
- WHO ELSE IN YOUR TRIBE OR COMMUNITY CAN HELP?
- Who can provide required goods and services?
- How will project be funded?
- Sketch a project time line.

Efficient Lighting

If every American changed out 5 lights, we'd save $6 billion/year and the equivalent of 21 power plants.



Refrigerators

Room & Central
Air Conditioners

ENERGY STAR

Clothes Washers

Lighting

Oil and Gas Boilers
& Water Heaters

Programmable
Thermostats

Dishwashers

Dehumidifiers

EPA – Approved Wood & Pellet Stoves