General Solar Technical Information

North Carolina Solar Center

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Why Solar Heating?

- Saves Energy - The Su is Free.
- Saves Money $$$.
- Environmentally friendly.
- Self-sufficient.
- Attractive

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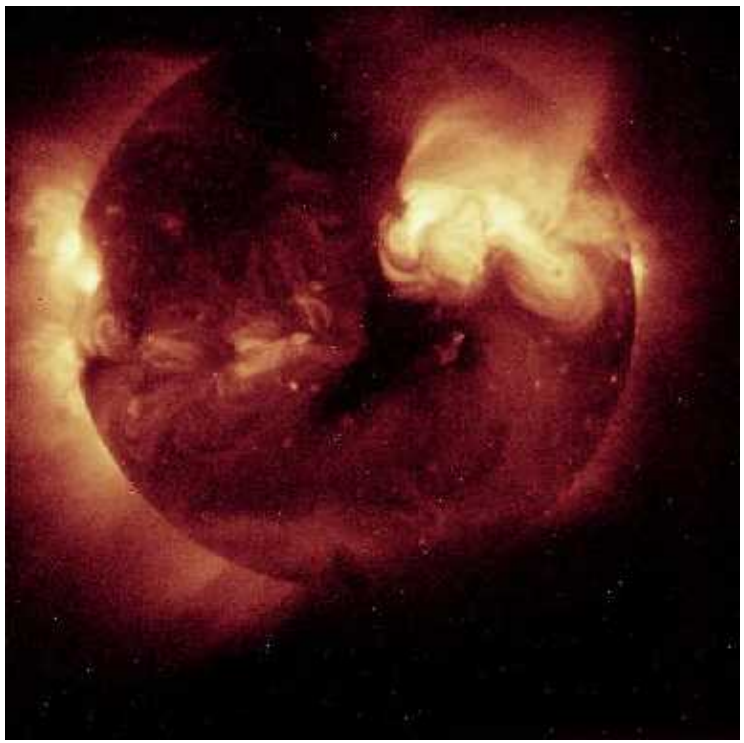
The Solar Facts

- Effective surface temperature of 10,400 °F.



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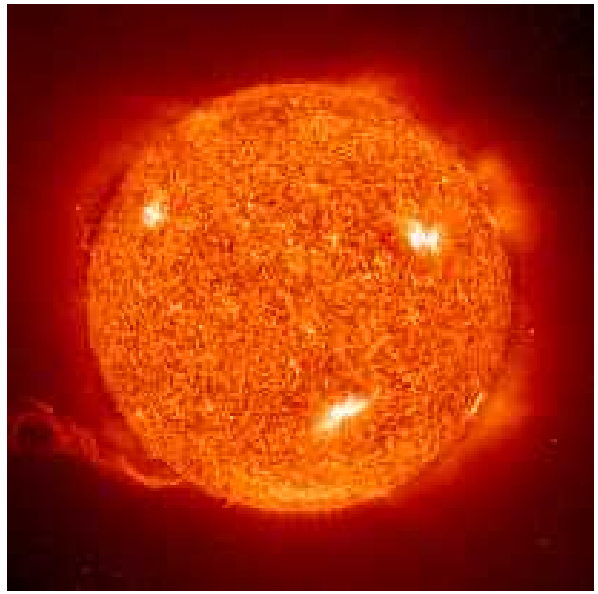
The Solar Facts



- The amount of sunlight that falls on North Carolina on a typical day is equal to the total amount of energy we will consumer this year.

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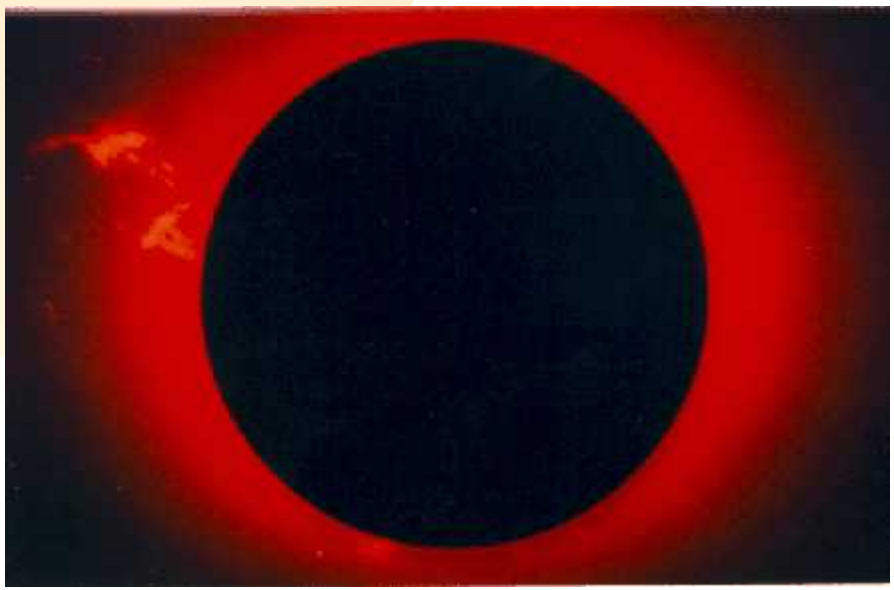
The Solar Facts

- The sun has been active for 4.6 billion years and has enough fuel for another 5 billion years, a sustainable energy source for many years to come.



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The Solar Facts

- For each typical solar hot water system installed, there is a reduction of over 4,500 lbs of CO_2 emitted into our North Carolina air each year.

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The Solar Facts

- For every 100 residential solar hot water systems installed in our state, approximately $25,000 will stay in the state each year and not leave for the purchase of electricity.

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What are the general components to a solar water heating system?

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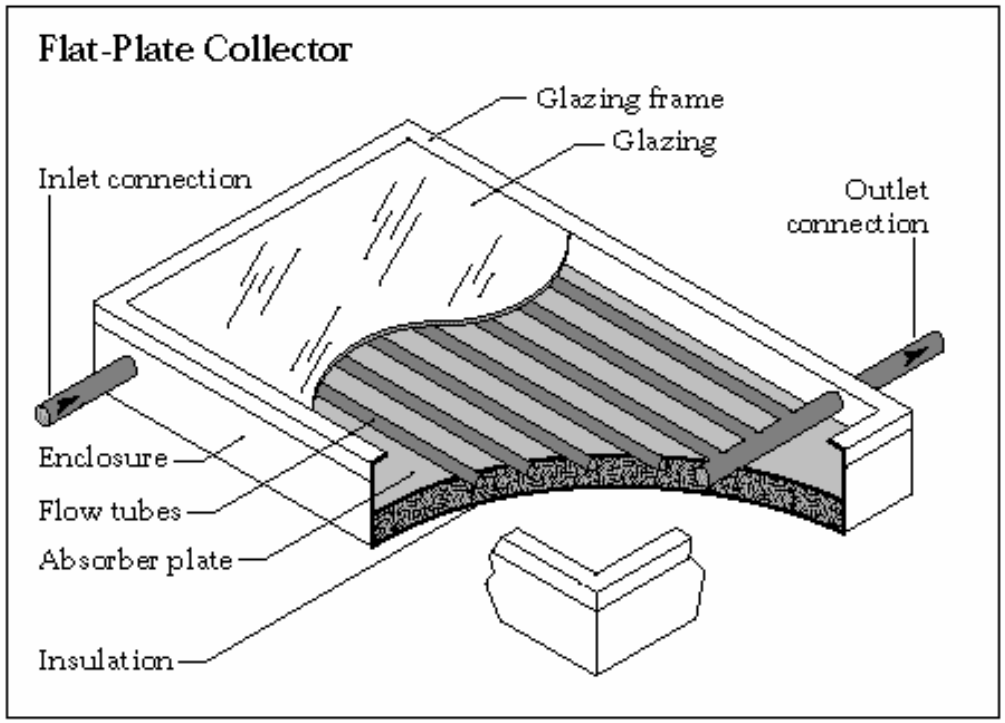
Solar Flat-Plate Collectors



- Absorber plate
- Glazing
- Housing
- Insulation

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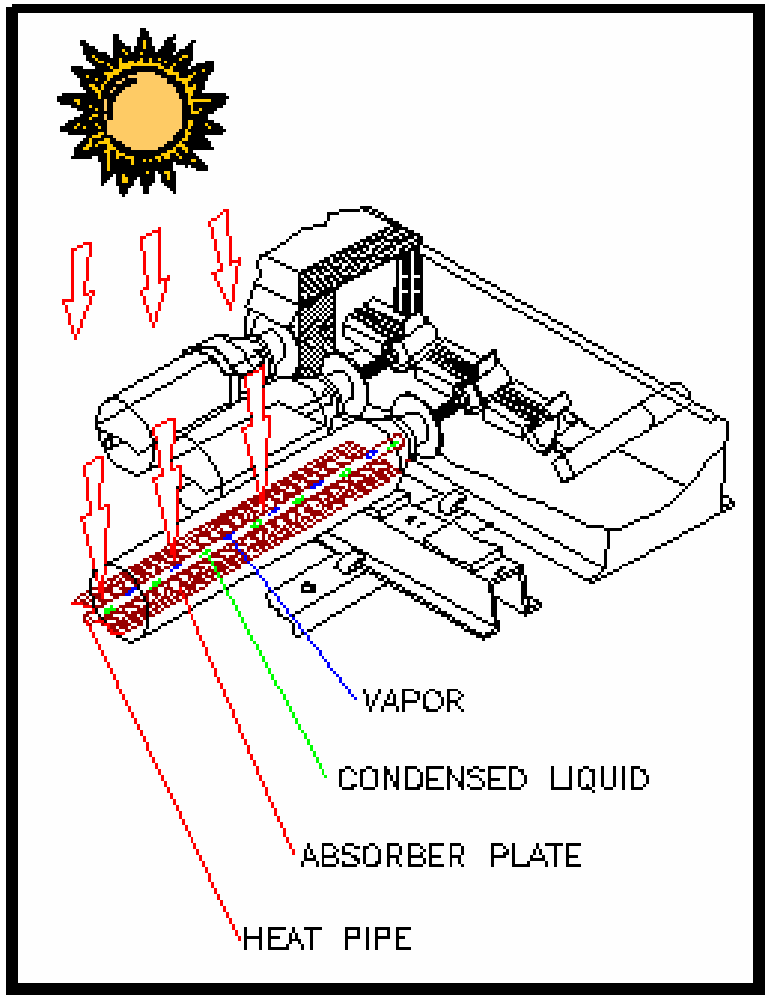
Evacuated Tube Collectors



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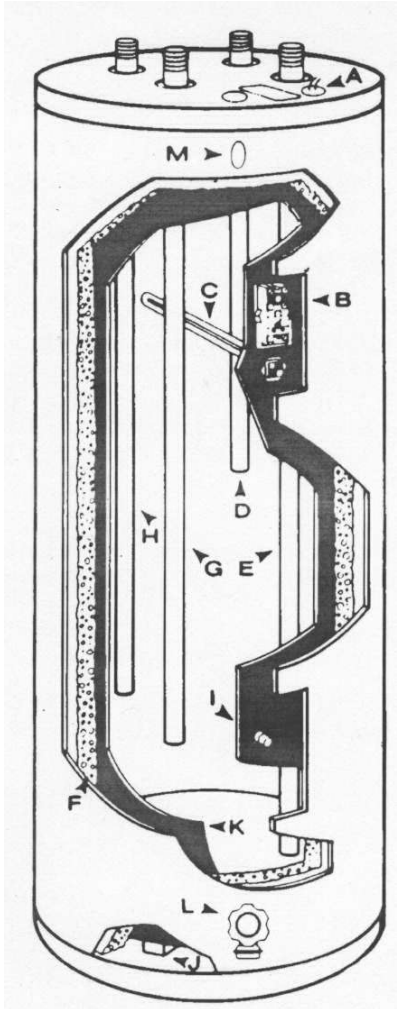
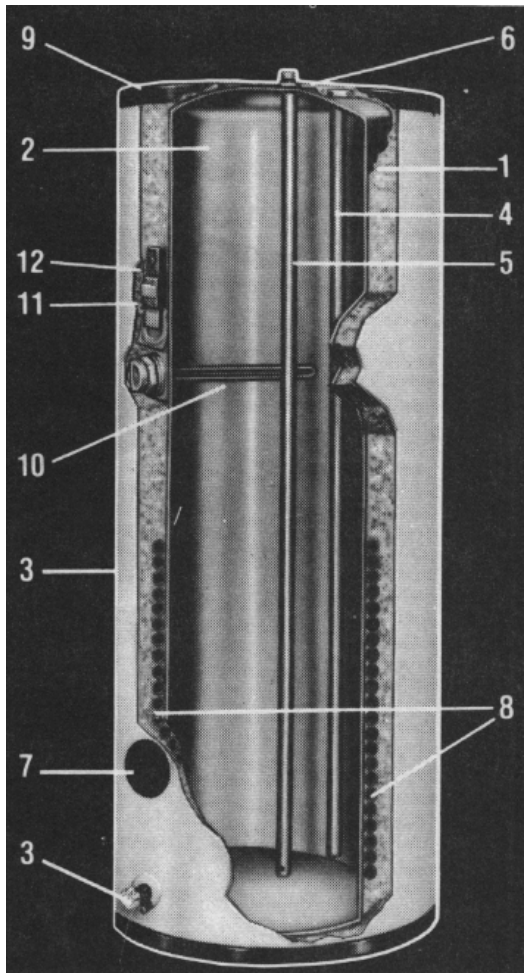
Heat Storage





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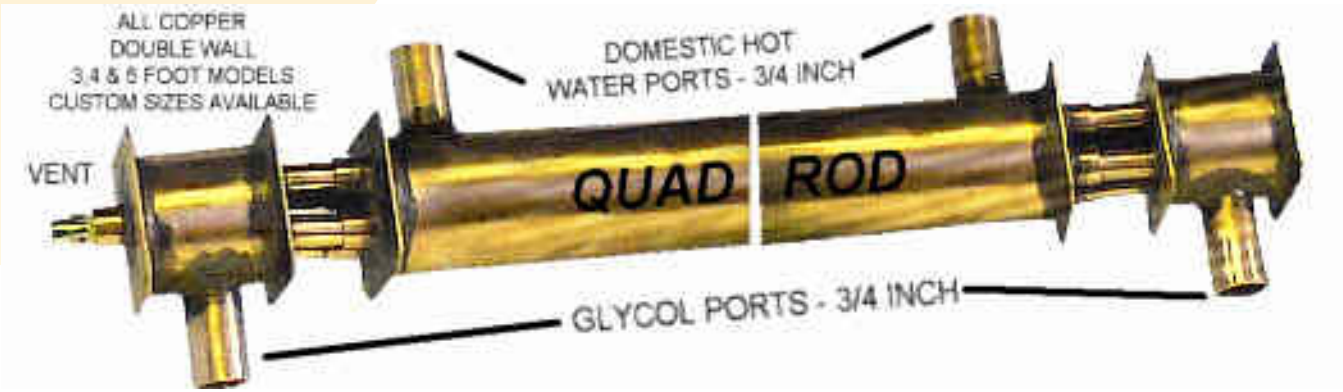
Means of Heat Transfer

- Fluid (Water or propylene glycol)
- Pumps (AC, DC or natural convection)
- Heat Exchanger (None, internal or external)



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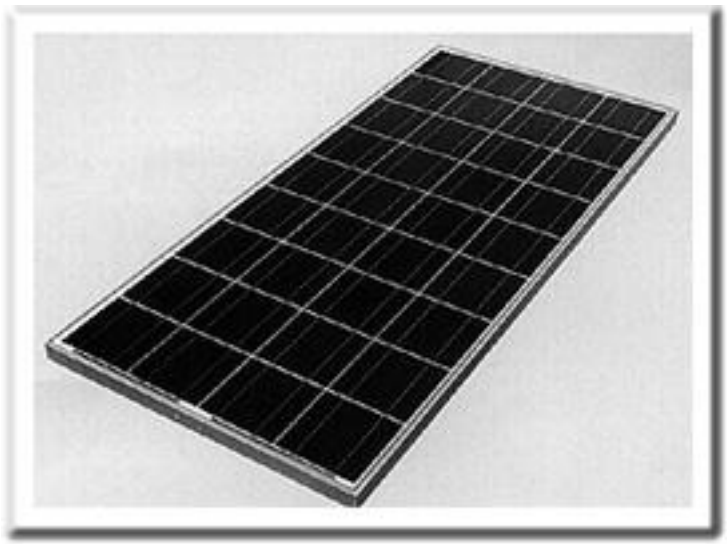
Controls

- Differential Controller
- PV module



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Solar Rating & Certification Corporation (SRCC)

- Independent third-party certification organization

- Collector certification (OG 100)
- Water Heating System Certification (OG 300)
- Solar Swimming Pool Heating (OG 400)

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SRCC OG300 Systems

- Indirect Glycol(Heliodyne and SunEarth)
- Drainback (Radco, Morley & Bobcat & sun Solar Heating Systems)
- Indirect Thermosyphon (Solahart)

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Orientation, Slope and Shading

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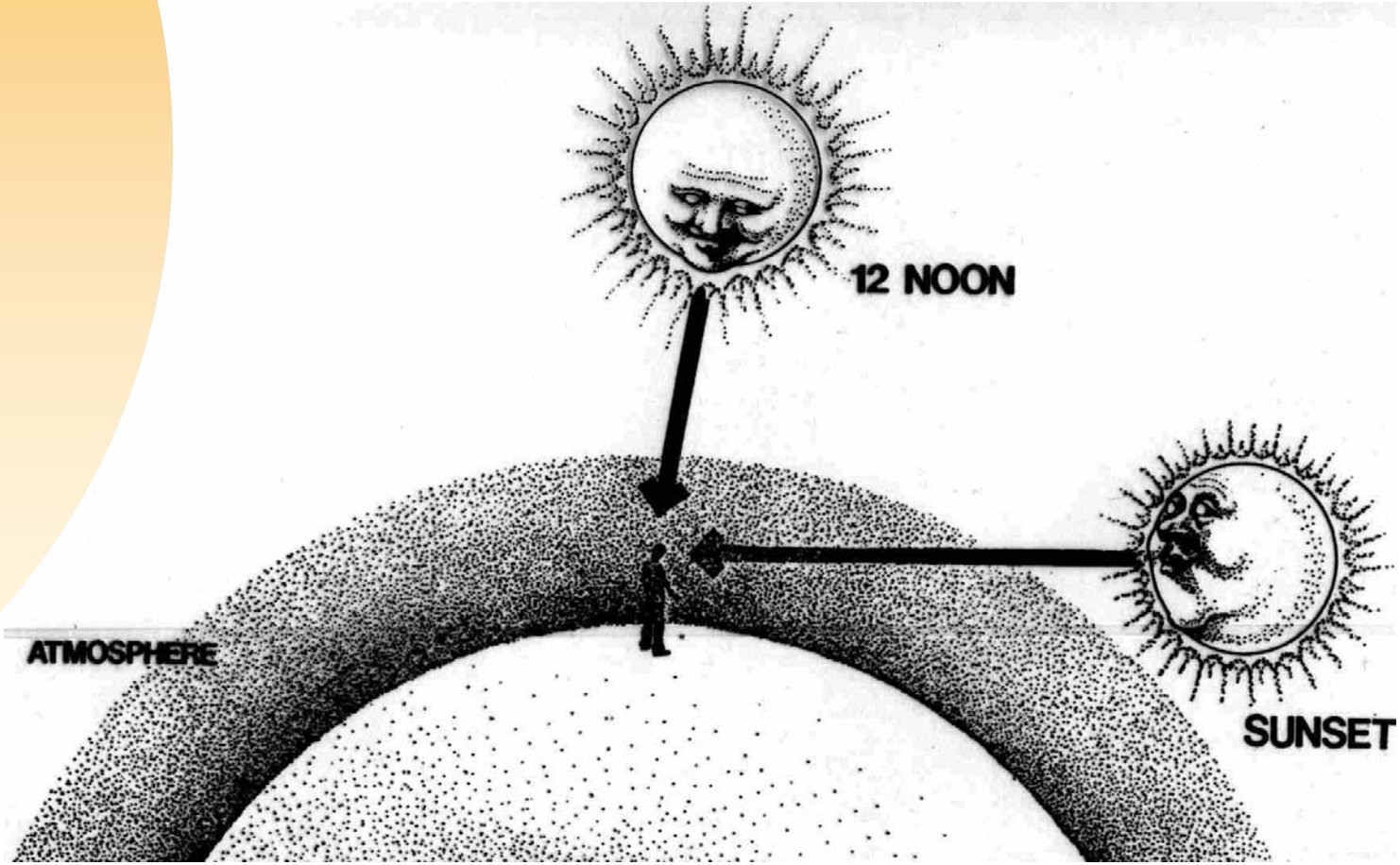
Solar Resource



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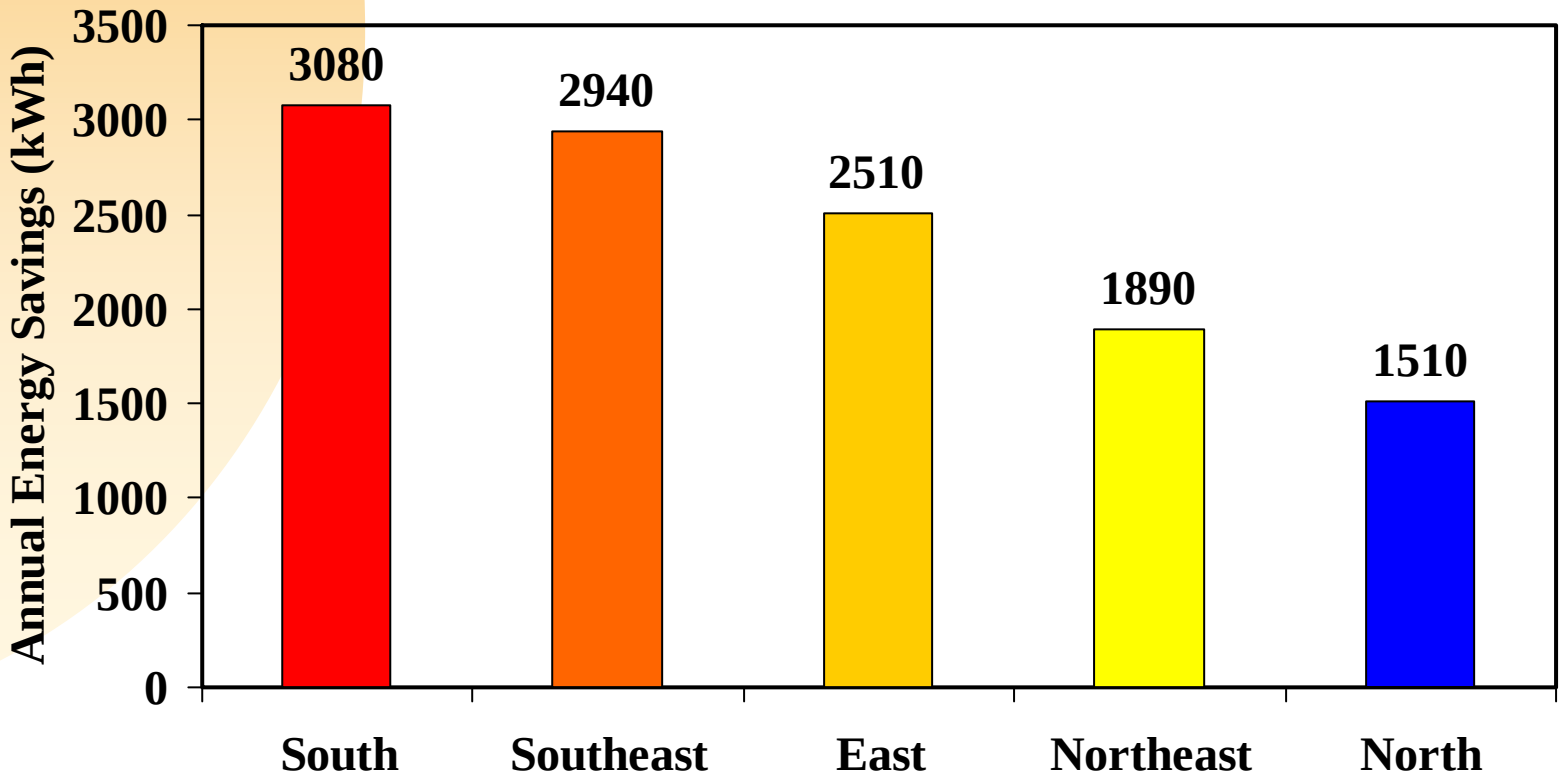
Do We Have to Face South?



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Which Way is True South

- Must take magnetic declination into account (In NC declination if 5-10 degrees W of South).
- For Raleigh, true south is 7 degrees west of magnetic south.

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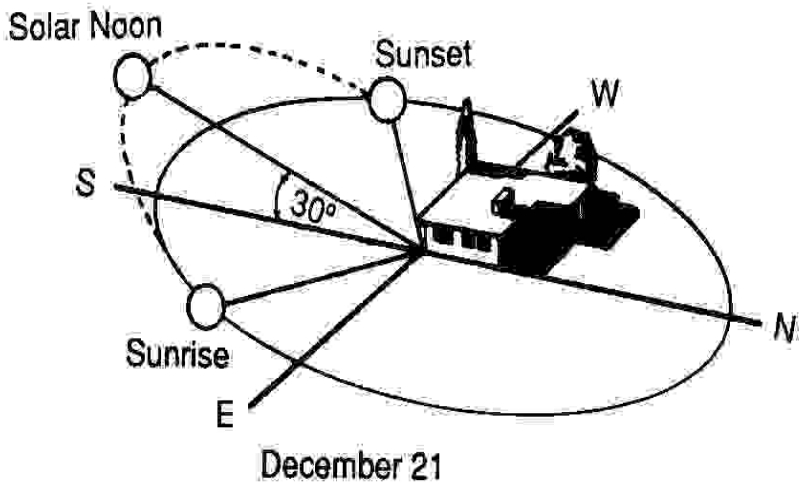
What About Seasonal Changes?



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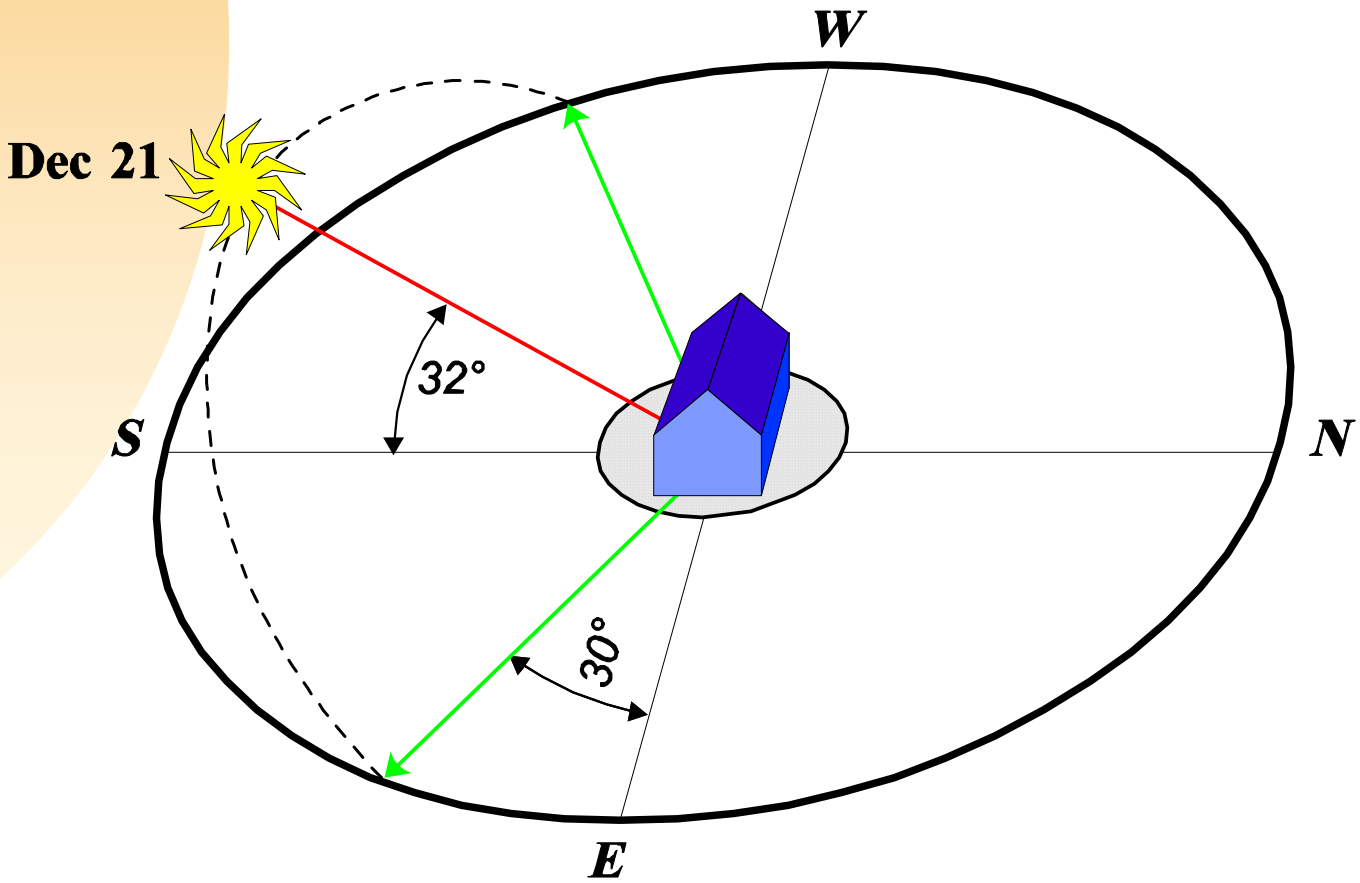
Sun Position



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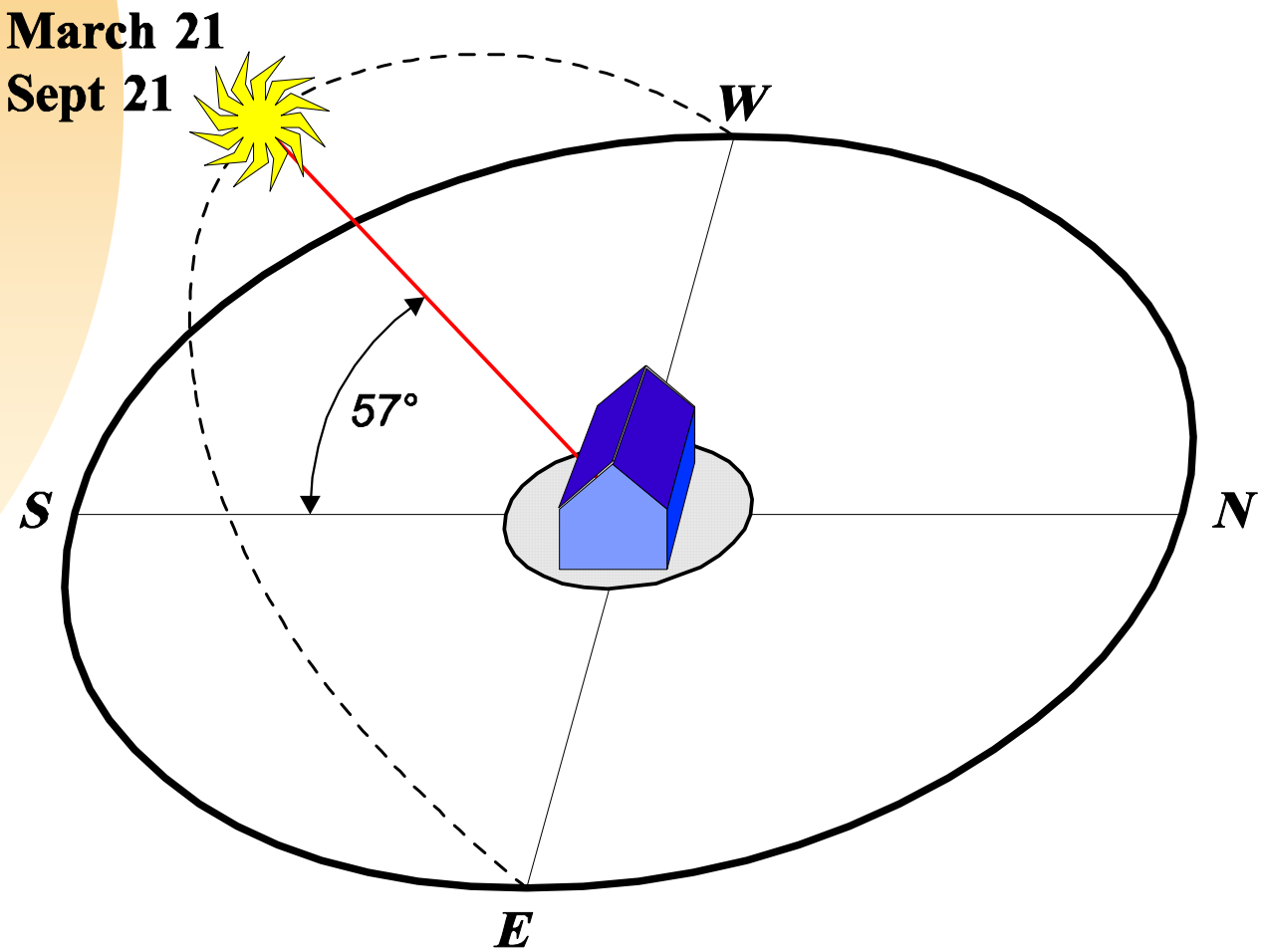
Sun Position



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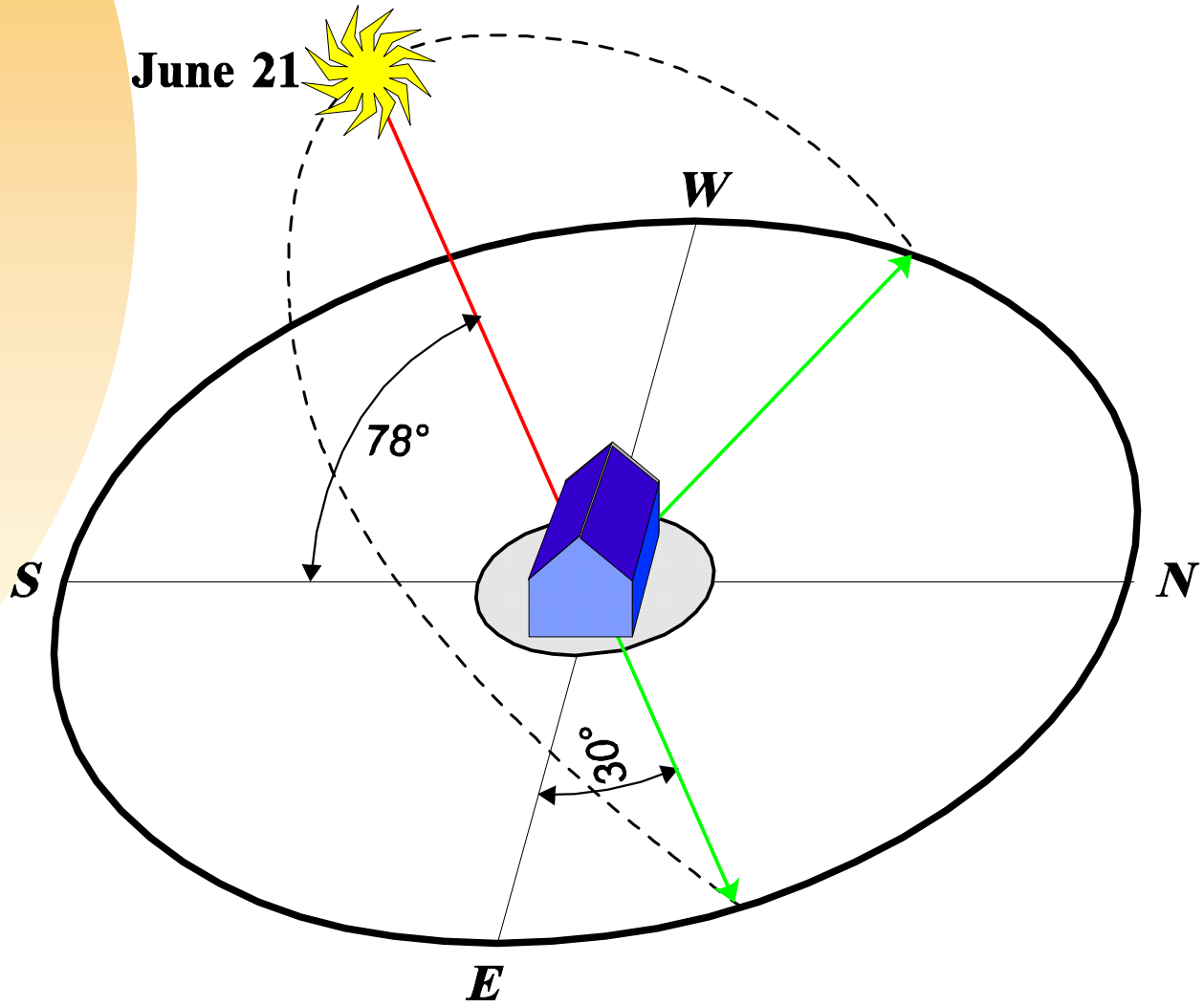
Sun Position



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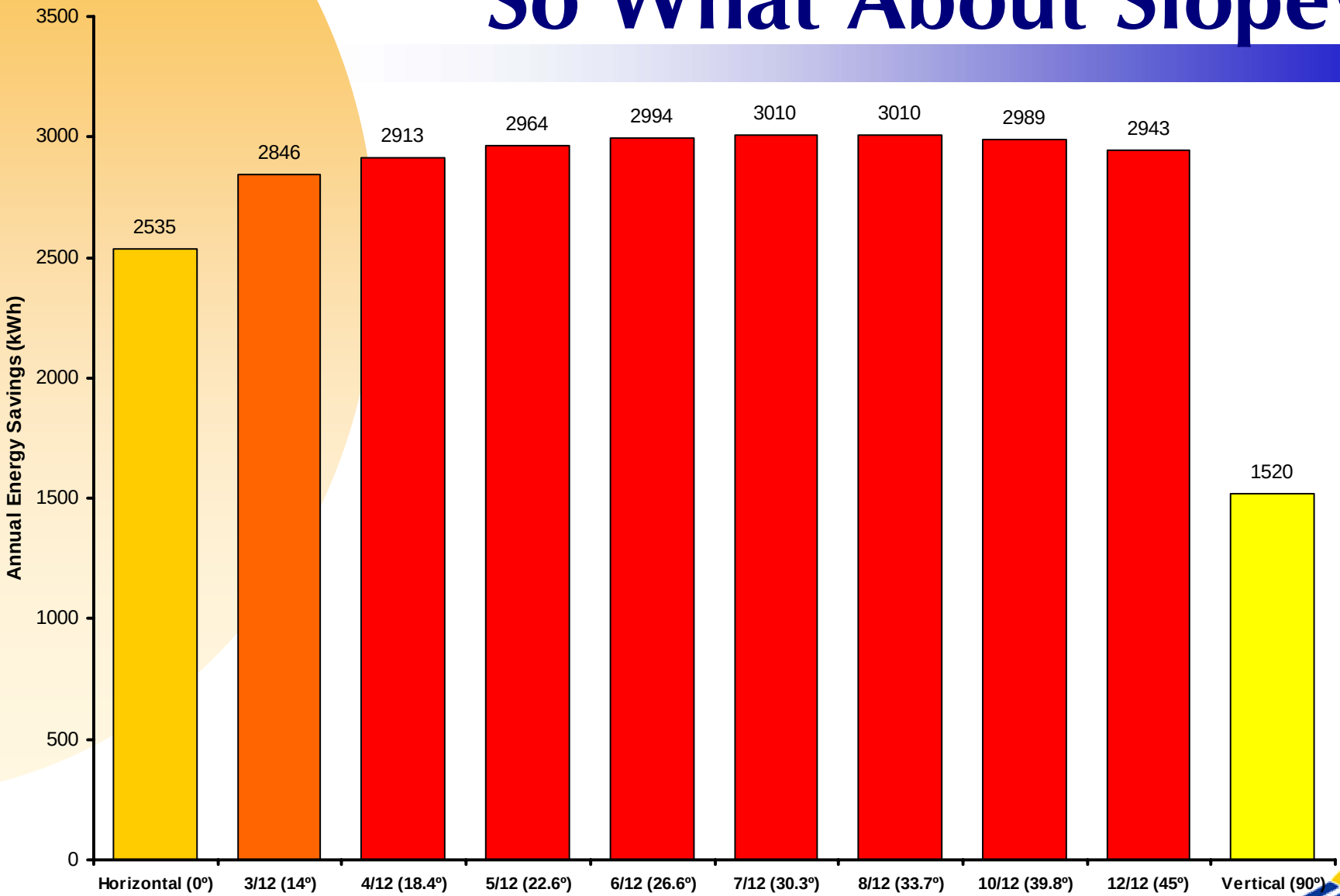
So What About Slope?



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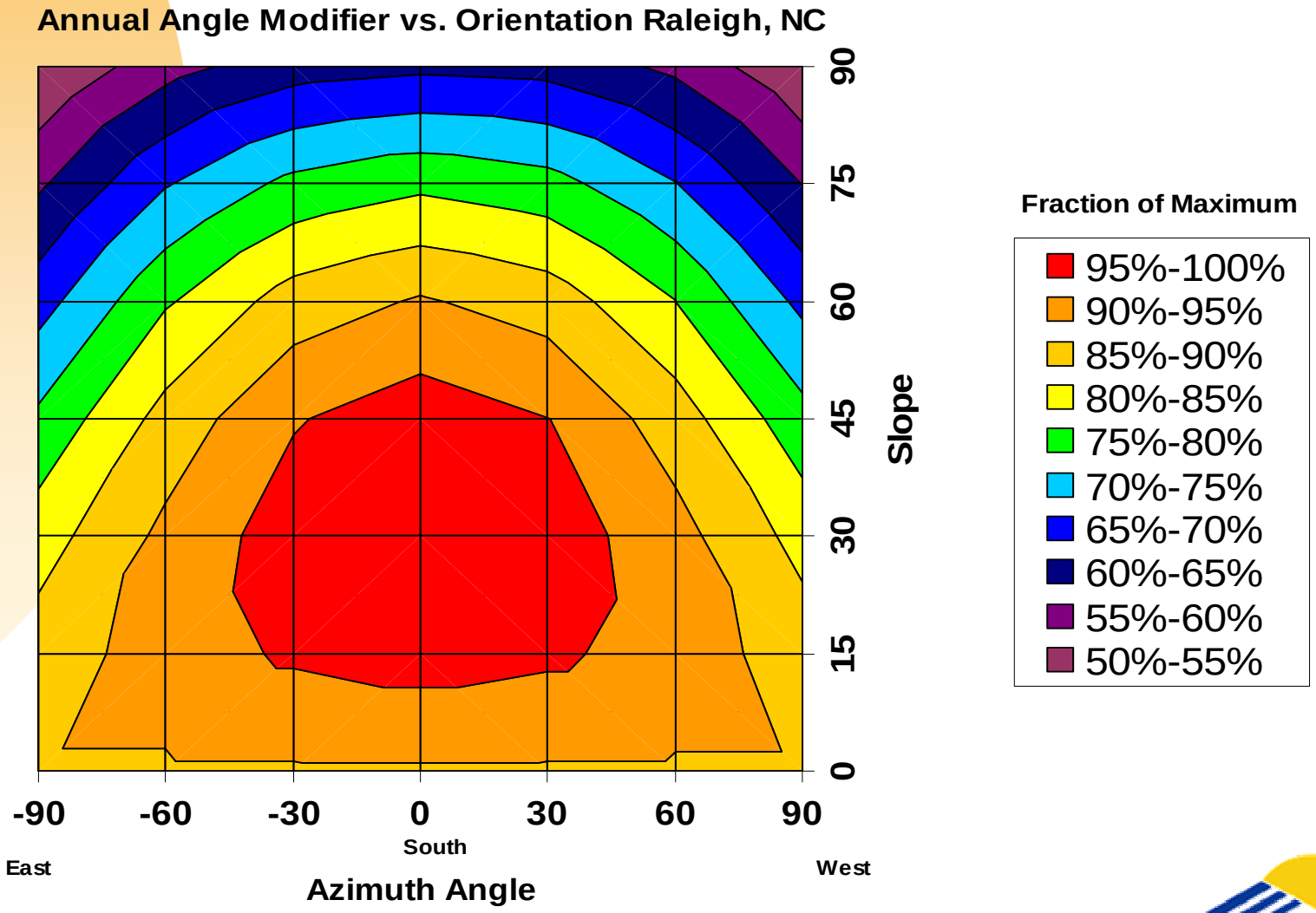
Orientation Effect on Annual Output



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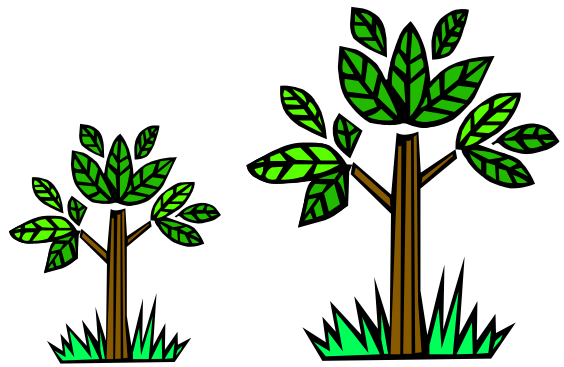
Shading Can Be Critical

- Shading can significantly reduce performance regardless of orientation.
- Good to conduct a site analysis.
- Important to consider future growth of surrounding trees.



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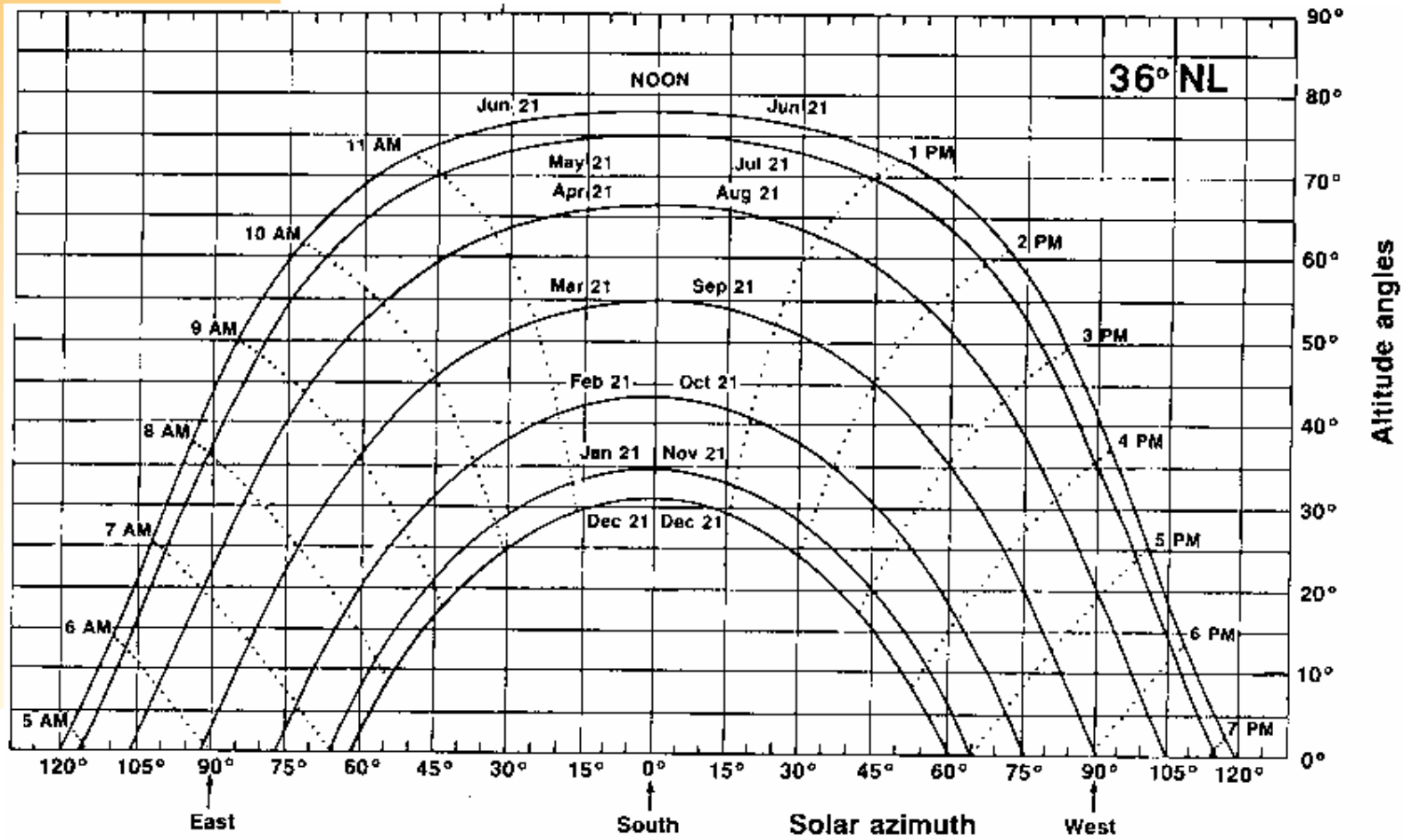
Sun Chart



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Orientation, Slope & Shading

- South facing, but OK +/- 45°
- Best year round performance slope is around latitude but most roof pitches will work.
- Space heating will often require a steeper slope.
- A site with no shading is key. Make sure the solar window is open.

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What Size System Do I Need?

- Collector rule of thumb:
  - 10 - 18 ft^2 per person
- Storage tanks rule of thumb:
  - 1.5 - 2.0 gallons per ft^2 of collector area
- Single tank vs. preheat tank.
  - Single more efficient, while preheat is generally more comfortable.

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Tax Credit Summary

Renewable Technology	Residential	Non-residential
Biomass	35% $10,500 Per Installation	35% $2,500,000 Per Installation
Hydroelectric	35% $10,500 Per Installation	35% $2,500,000 Per Installation
Solar Energy Equipment for Domestic Water Heating	35% $1,400 Per Dwelling Unit	35% $2,500,000 Per Installation
Solar Energy Equipment for Active Space Heating	35% $3,500 Per Dwelling Unit	35% $2,500,000 Per Installation
Solar Energy Equipment for Combined Active Space and Domestic Hot Water Systems	35% $3,500 Per Dwelling Unit	35% $2,500,000 Per Installation
Solar Energy Equipment for Passive Space Heating	35% $3,500 Per Dwelling Unit	
Solar Energy Equipment for Daylighting		35% $2,500,000 Per Installation
Solar Energy Equipment for Solar Electric or Other Solar Thermal Applications	35% $10,500 Per Installation	35% $2,500,000 Per Installation
Wind	35% $10,500 Per Installation	35% $2,500,000 Per Installation

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Hot Water and Active Space Heating

- System must be installed by an appropriately licensed in NC contractor or, in the case of a residential installation by homeowner, in accordance with the North Carolina State building code and be inspected by a local code official.
- System shall provide adequate freeze protection, which does not rely on electrical power.

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Hot Water and Active Space Heating

- Space heating systems shall also provide adequate overheating protection during the non-heating season.
- The system must include an easy to understand way for the owner to determine if the system is operating properly.
- It is highly recommended that installed solar collectors be OG-100 certified by the Solar Rating and Certification Corporation (SRCC).
- Recommend OG-300 for water heating.

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For More Information...

Contact:

Personal Taxes Division at

(919) 733-8510

or Corporate Excise & Insurance Tax Division at (919) 733-8510

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For More Information...

Contact the NC Solar Center at

www.ncsc.ncsu.edu

1-800-33-NCSUN

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