



**RREAL**

**Rural Renewable Energy Alliance**

**Jason Edens**

**218-839-7732**

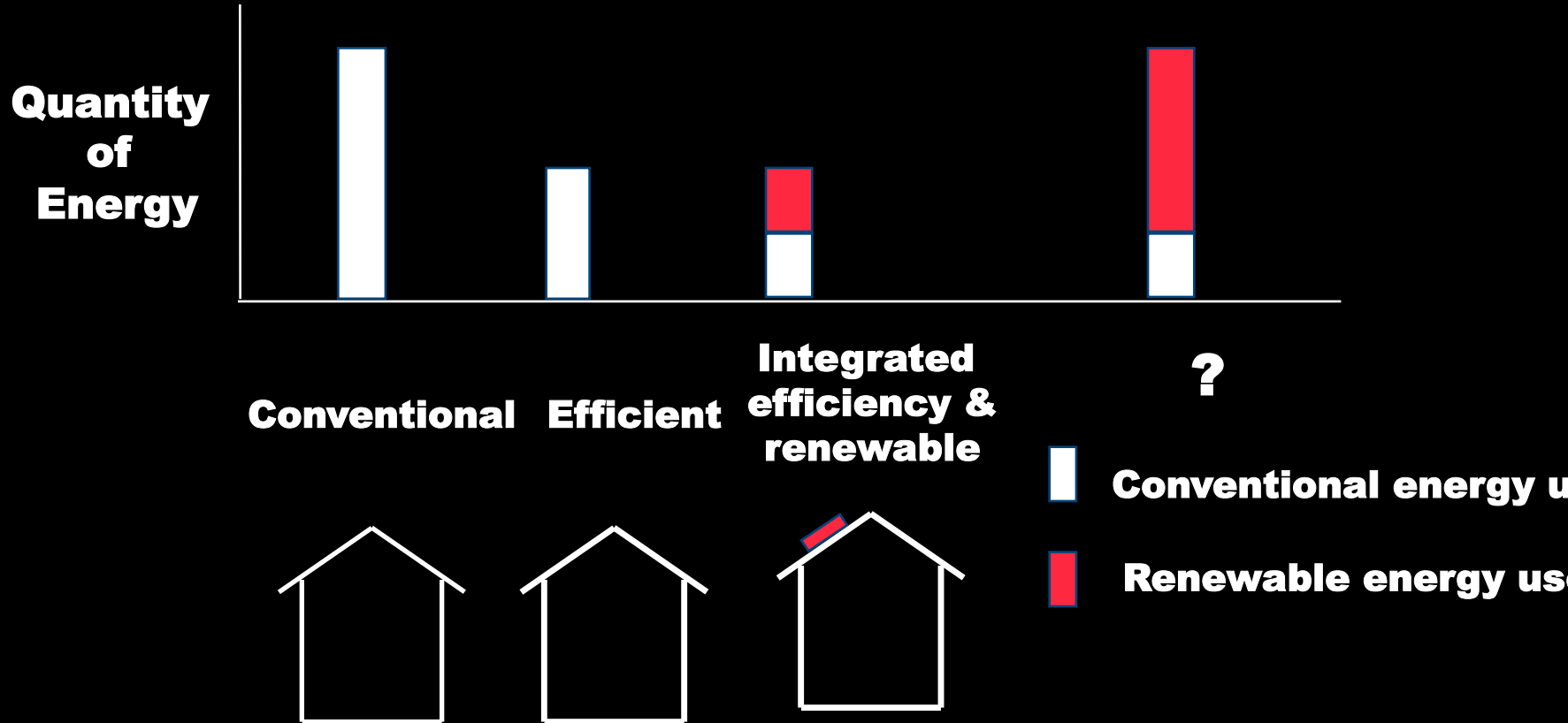
**[www.rreal.org](http://www.rreal.org)**

**[jason@rreal.org](mailto:jason@rreal.org)**



**The Answer is NOT Solar...**

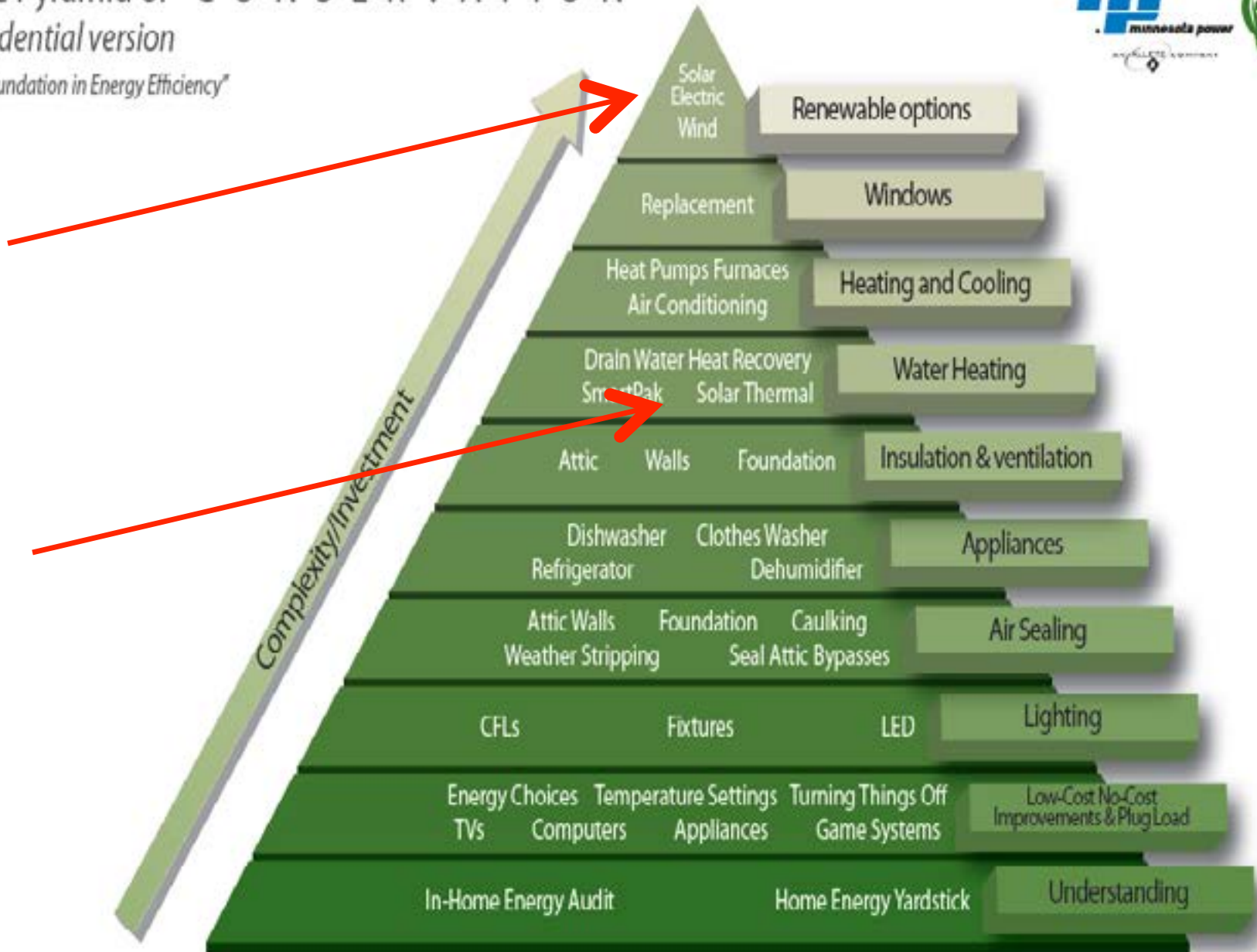
# “Efficiency Before Renewables!”



# The Pyramid of CONSERVATION

*residential version*

"A Foundation in Energy Efficiency"



# ***An Introduction to Solar Energy for your Home or Business***

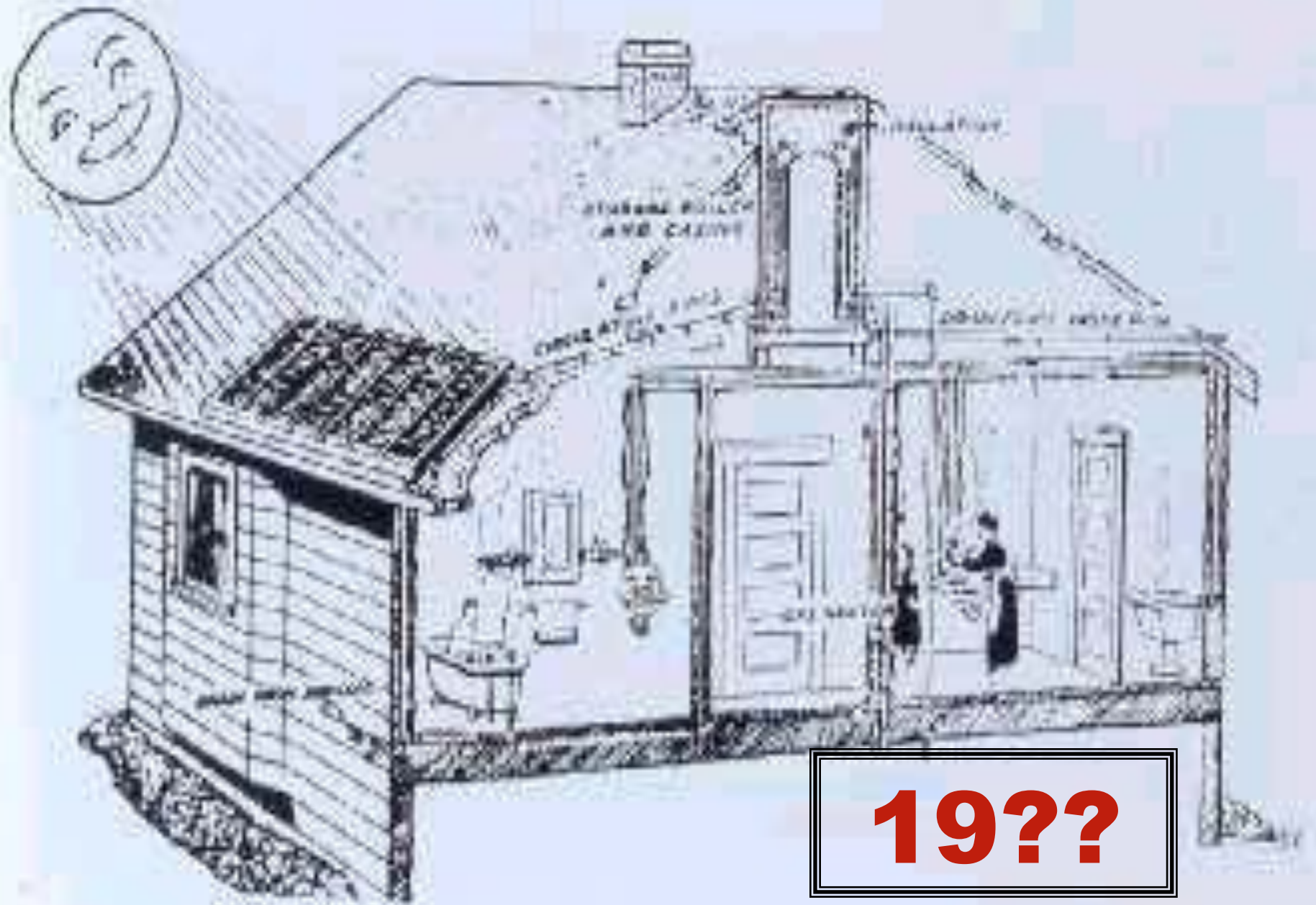




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**Nothing New...**





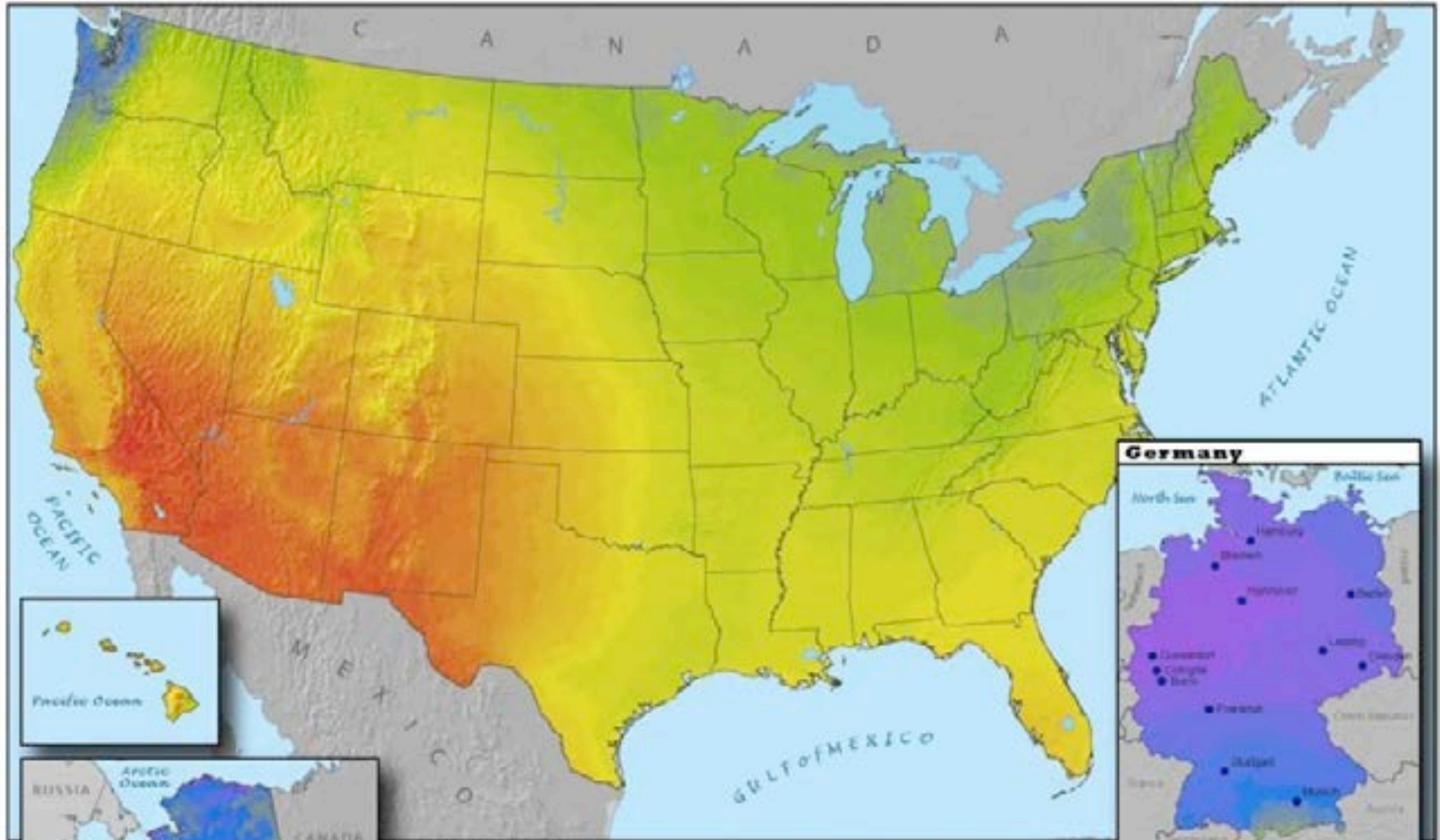


# Is Solar Energy an Appropriate Technology?

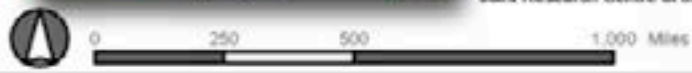
**MAYBE!**

- 1. Regional Solar Resource*
- 2. Site-based Solar Resource*
- 3. Site-based needs,  
opportunities and limitations*

# Solar Resource : United States and Germany



Annual average solar resource data are for a solar collector oriented toward the south at a tilt = local latitude. The data for Hawaii and the 48 contiguous states are derived from a model developed at SUNY/Albany using geostationary weather satellite data for the period 1995-2005. The data for Alaska are derived from a 40-km satellite and surface cloud cover database for the period 1985-1991 (NREL, 2003). The data for Germany were acquired from the Joint Research Centre of the European Commission and is the yearly sum of global irradiation on an optimally-inclined surface for the period 1981-1990.



# Is your place solar compatible?

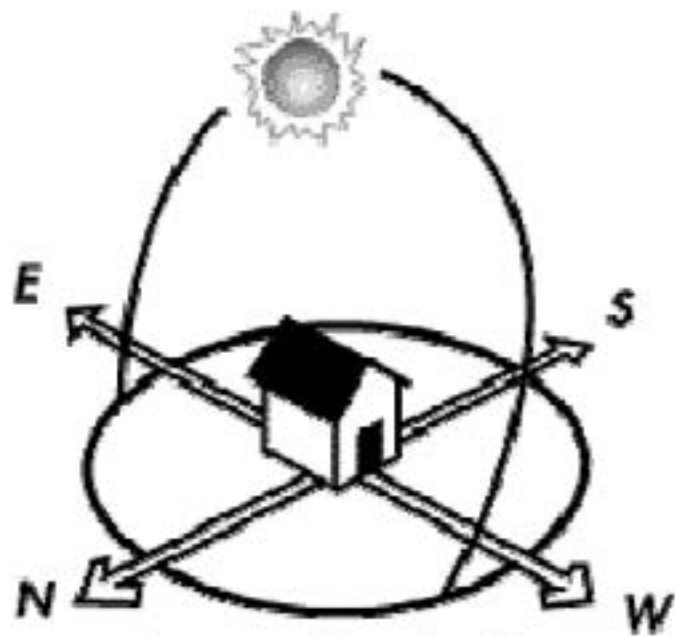


**A**



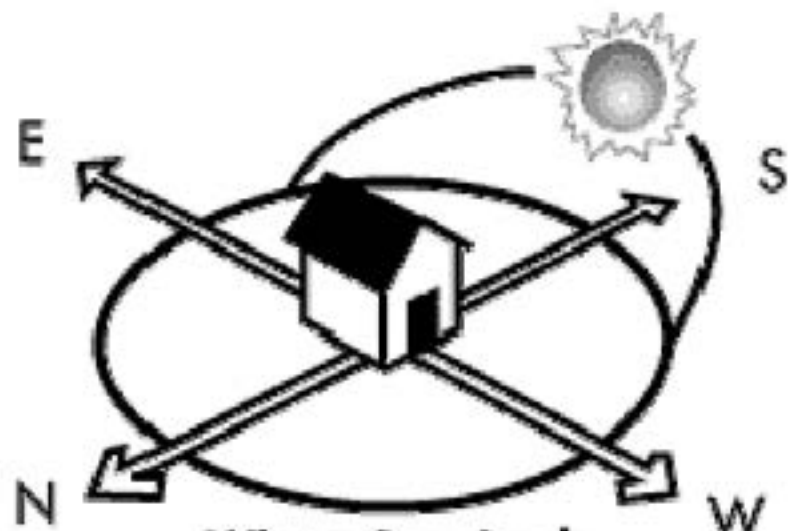
**B**

## Sun Path



Summer Sun Angles

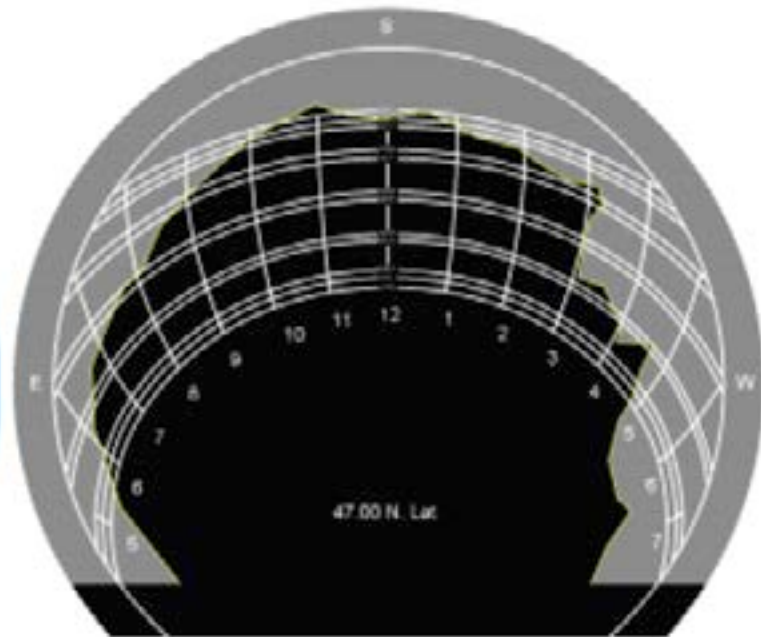
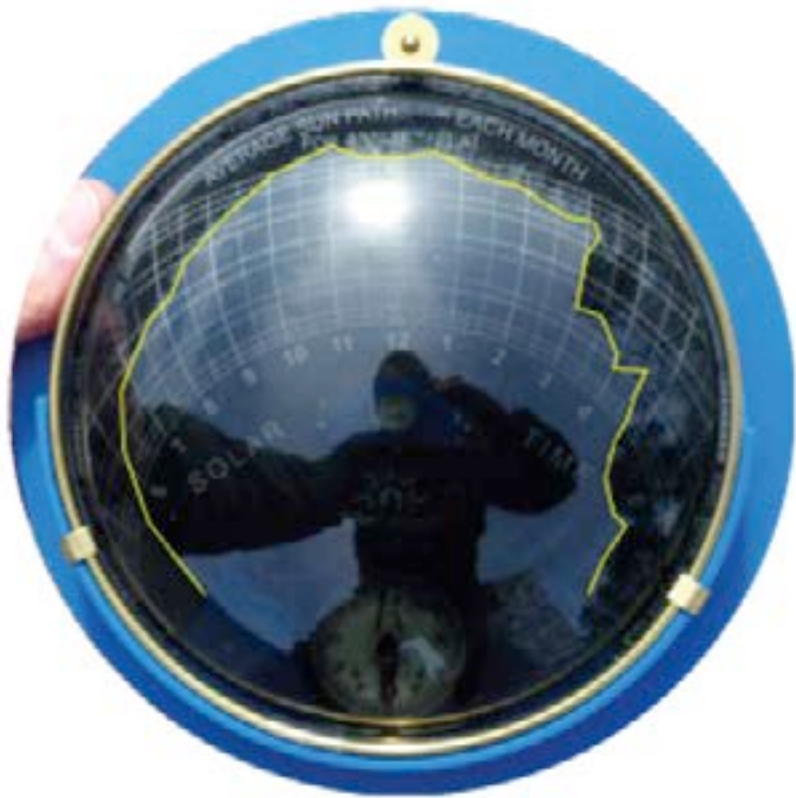
June 21st



Winter Sun Angle

December 21st

# The Site Visit





**Solar Power**

**Solar Thermal**

**Solar Electric**



## Solar Thermal

- Passive Solar
- Solar Air Heat
- Solar Water Heat

## Solar Electric

- Direct drive
- Battery-based, off grid
- Grid-tied
- Grid-tied, battery back-up



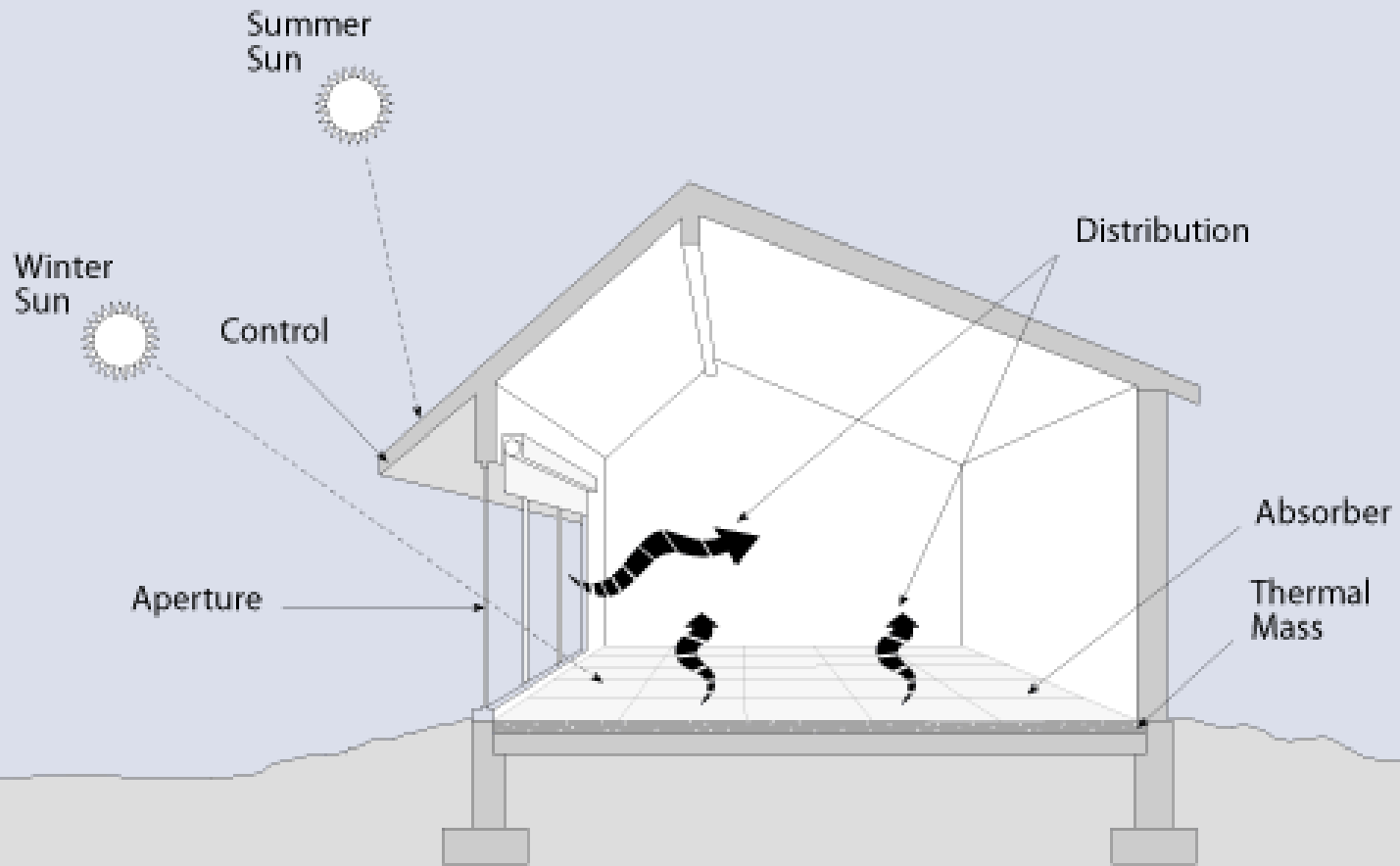
# Passive Solar





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# Passive Solar Design Principles



**Solar Air Heat**

**Reconsidered**





# Appropriate Solar Thermal Technologies



**Transpired Air**



**Recirculation Solar Air**

# Transpired Air



# Transpired Air at Bemidji State



# Ventilation Make-up Air

