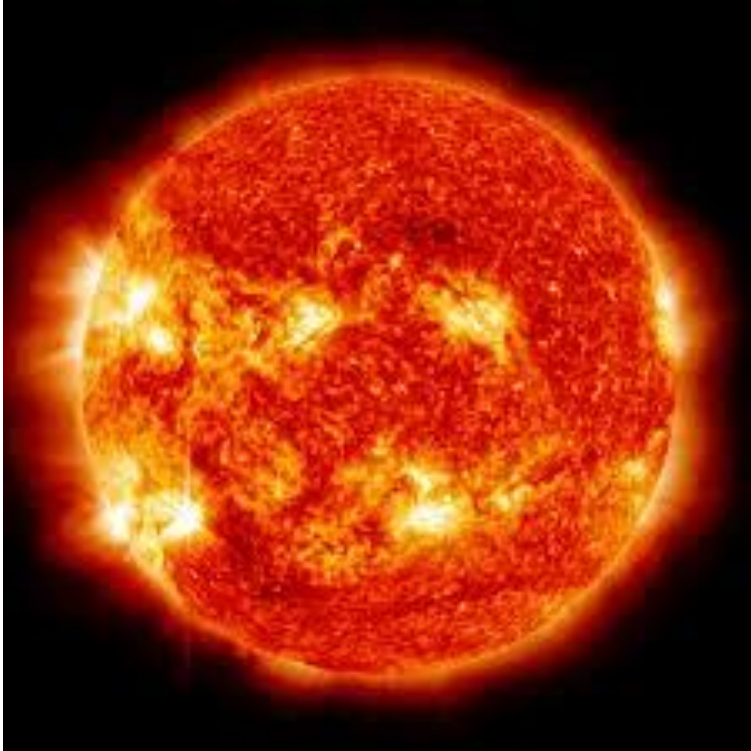


# Technical Review of Solar Equipment and Installations



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# Energy from the Sun

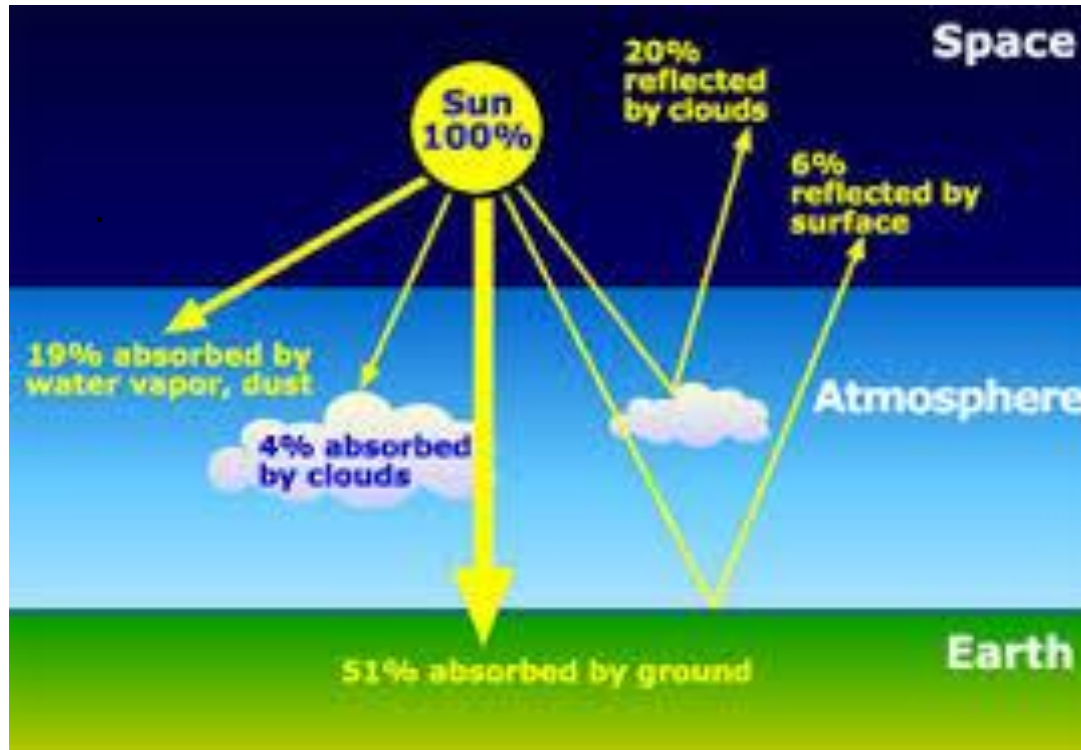


- Solar Irradiance  
Measured in  $\text{kW}/\text{m}^2$
- Solar Irradiation is power /  
area or time.  
 $\text{kWh}/\text{m}^2$ .



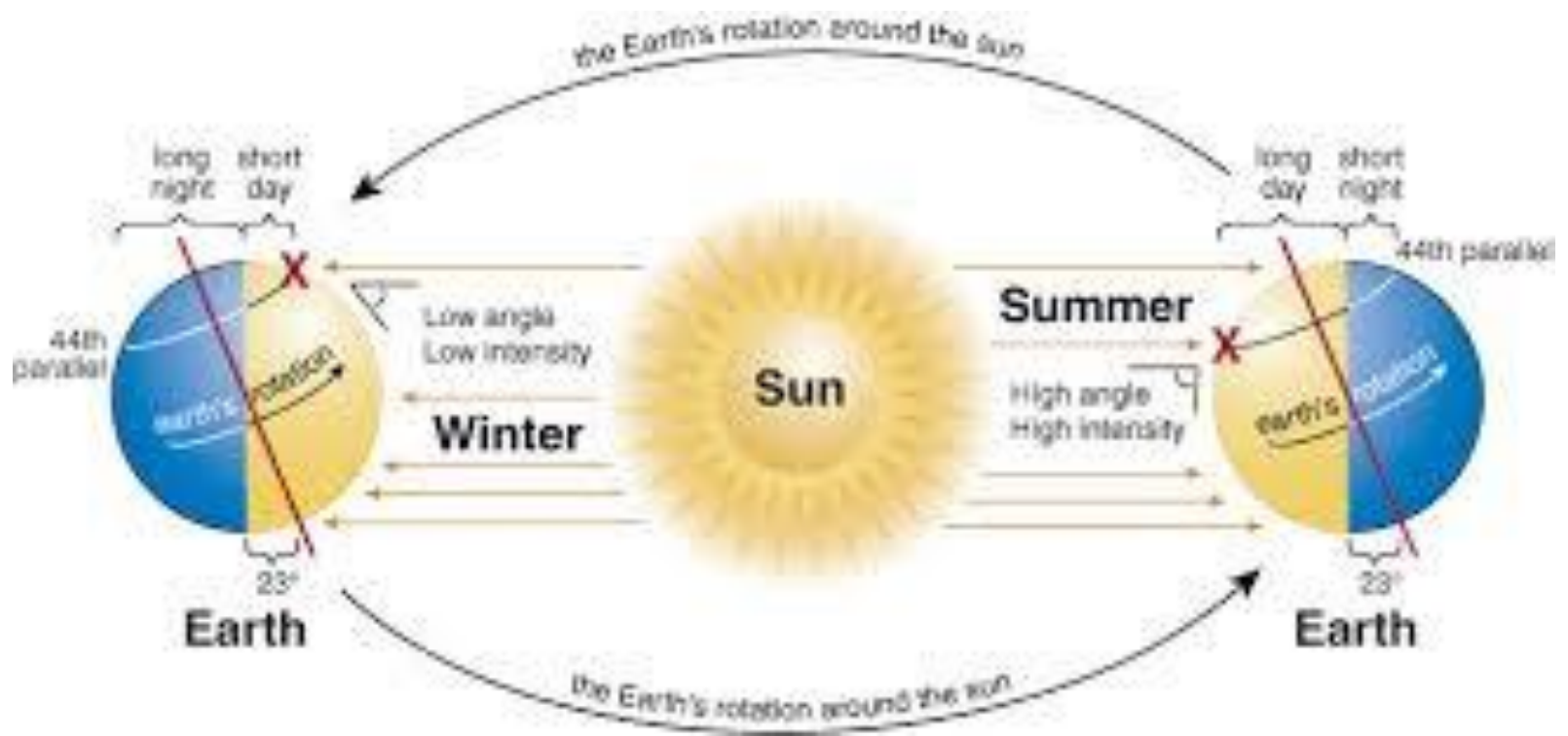
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# Energy that reaches the Earth



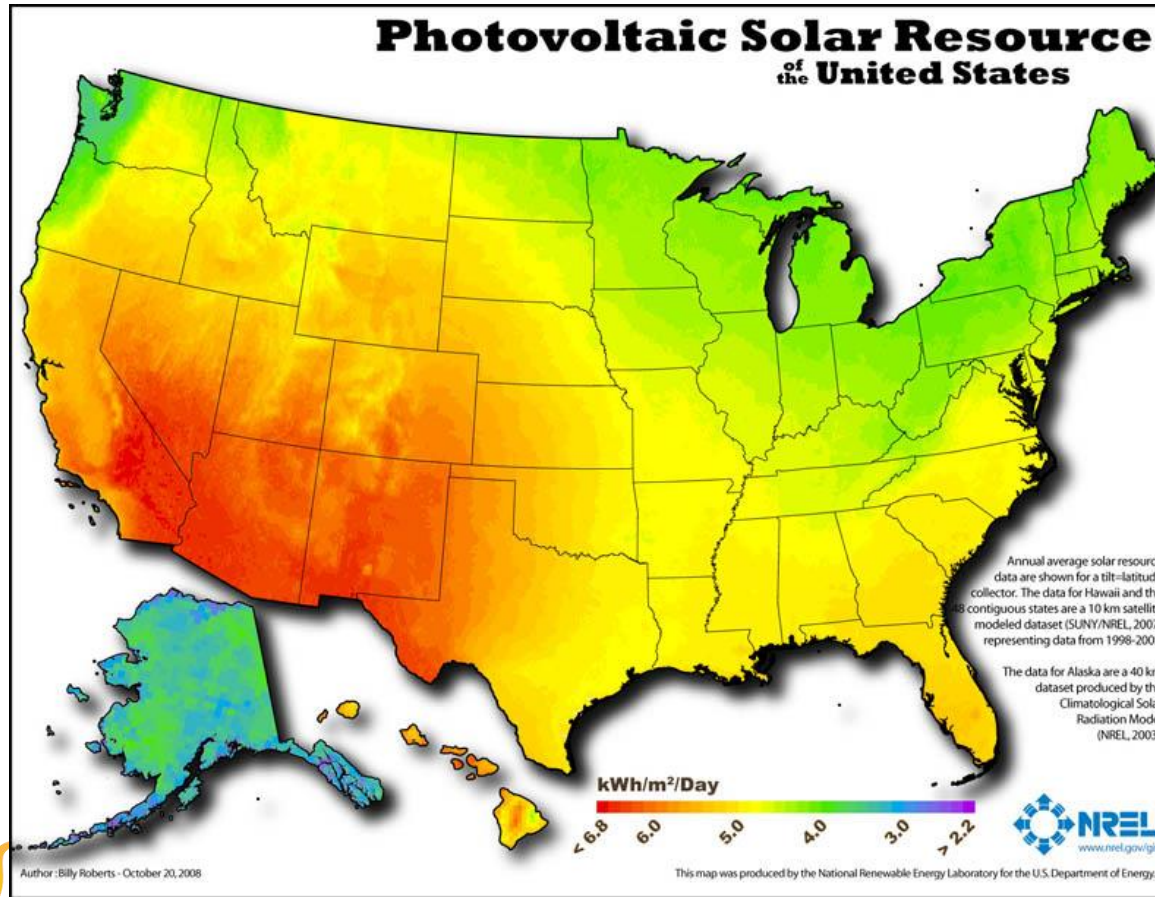
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# Energy influenced by distance



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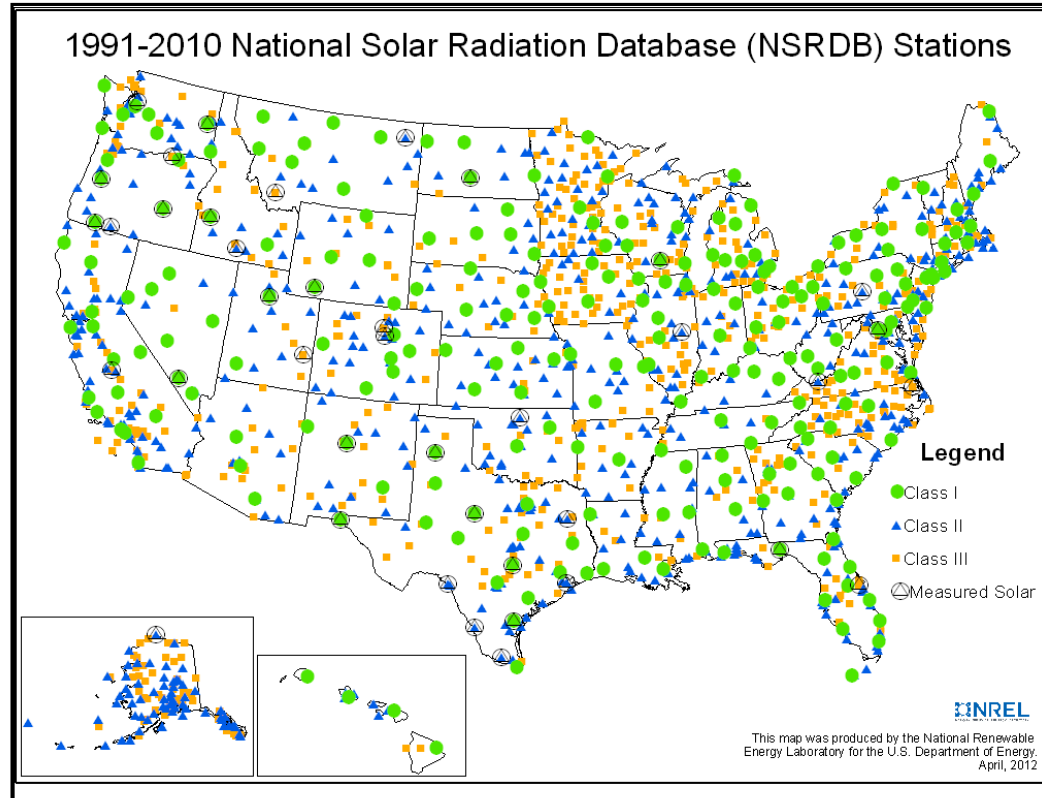
# Your solar resource.



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# Specific Location Data collect by NREL

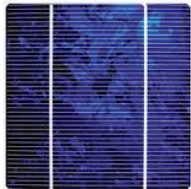


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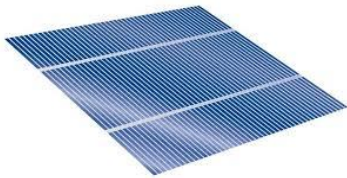
# Solar Cells



Monocrystalline Silicon



Polycrystalline Silicon



Ribbon Silicon



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# Monocrystalline Silicon



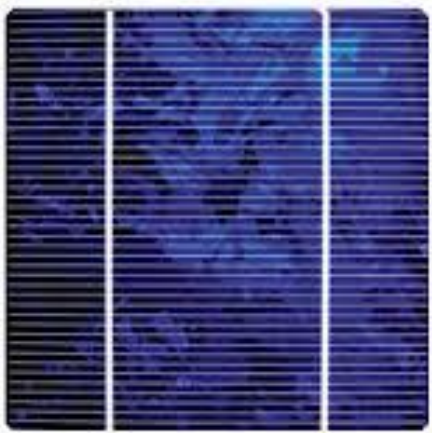
- Grown as a crystal
- Most expensive
- Highest efficiency
- Lots of waste from cutting



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# Polycrystalline Silicon



- Formed in a mold
- Less expensive
- Moderate Efficiency
- Less waste than Mono



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# Ribbon Silicon

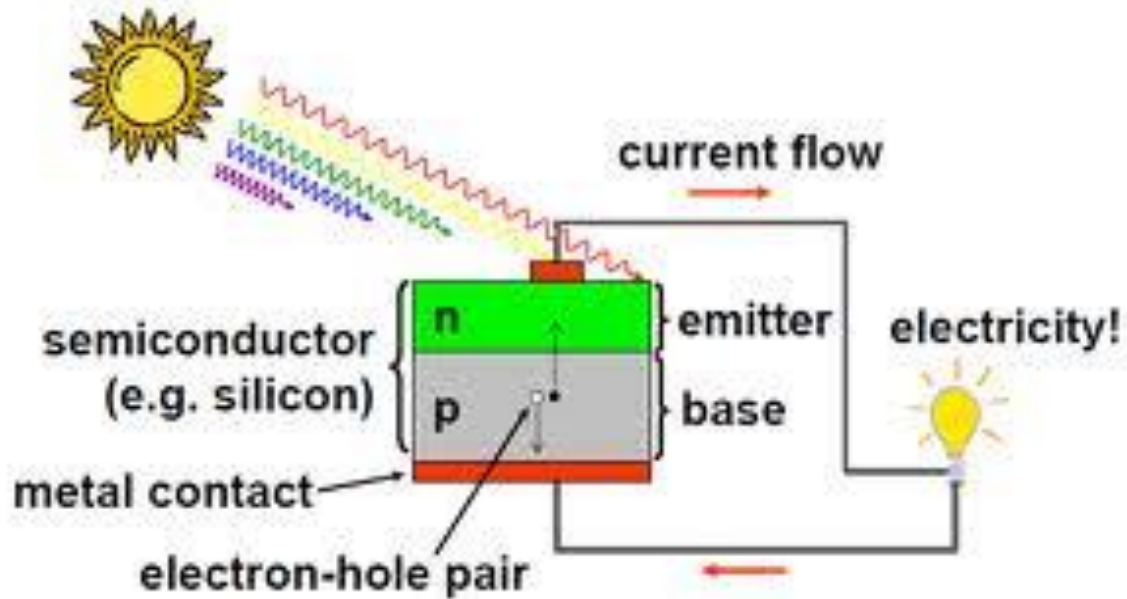


- Melted and pressed through rollers
- Becoming less expensive
- Moderate efficiency
- Very little waste



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# Making electricity at the cell level



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# Combine cells together to make a module



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# Combine modules together to make an array



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# Convert power from DC to AC



**Inverter**



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# Connect to panel



**Existing Electric Panel**



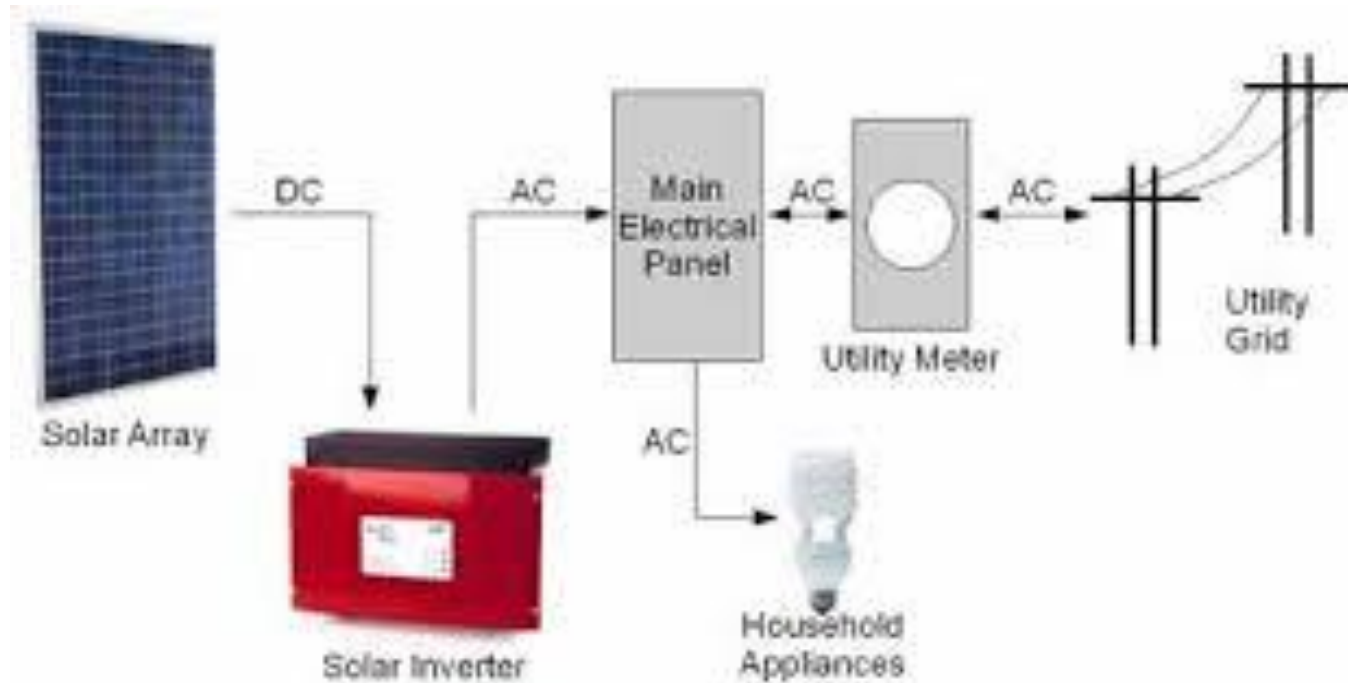
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# Connect to panel



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# Wire it together



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# The Inverter

## Primary Purpose of the Inverter



- Convert DC to AC Power.
- Match voltage and frequency with the grid.
- Shut down when there's a grid power outage.
- Adjust voltage and amperage to achieve maximum power. Maximum Power Point Tracking (MPPT)



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# Types of Inverters



## Central Inverter

Usually mounted inside near panel.



## Micro Inverter

Mounted on panel or racking



## Power Maximizers

- Maximizer on panel/racking
- Inverter inside



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# Types of tie-ins



**Load Side**



**Supply Side**



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# 2 Meters



**Utility's Meter.**  
Runs forward and backwards



**Your solar  
production meter.**  
Runs forward only



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# Array locations



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# Ground mounts



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# Not your average solar arrays



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# Not your average solar arrays



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# Not your average solar arrays



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