

Solar Too!

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Investigation Question

- Is it feasible to utilize solar power in average Indiana homes?
- What we addressed in this question
 - Indiana's potential success
 - Adding solar power to already built homes
 - Equipment needed
 - Cost of equipment
 - Pros and Cons

How Solar Panels Work

- [Video to solar panels](#)



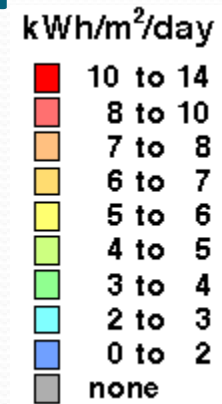
Sunshine In Indiana vs. Arizona

City	Sunny	Partly Sunny	Total Days with Sun
Evansville	102	100	202
Fort Wayne	78	102	180
Indianapolis	88	99	187
South Bend	73	100	173

City	Sunny	Partly Sunny	Total Days With Sun
Flagstaff	162	102	264
Phoenix	211	85	296
Tucson	193	91	284
Winslow	177	99	276
Yuma	242	71	313

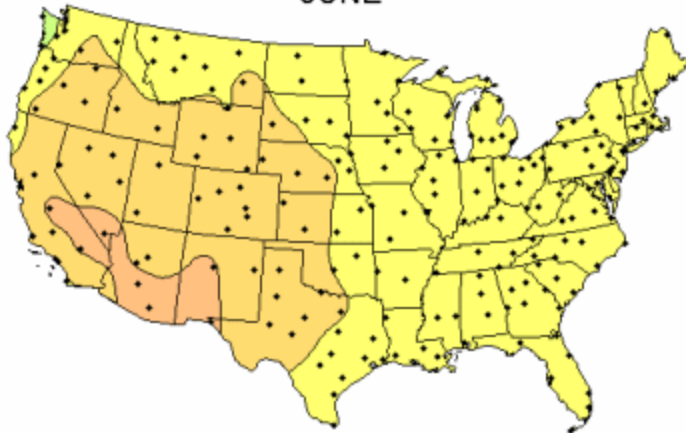
Solar Radiation in Indiana

- These maps are based on flat solar panels tilted toward the south
- The legend gives the amount of KWH you expect to get per day for each square meter of solar panel surface area



Average Daily Solar Radiation Per Month

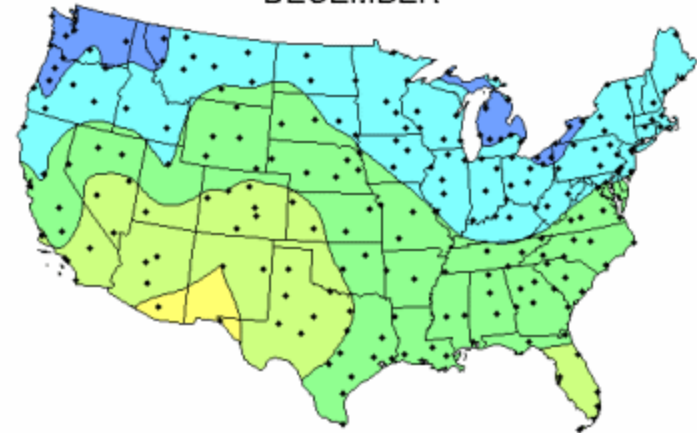
JUNE



Flat Plate Tilted South at Latitude

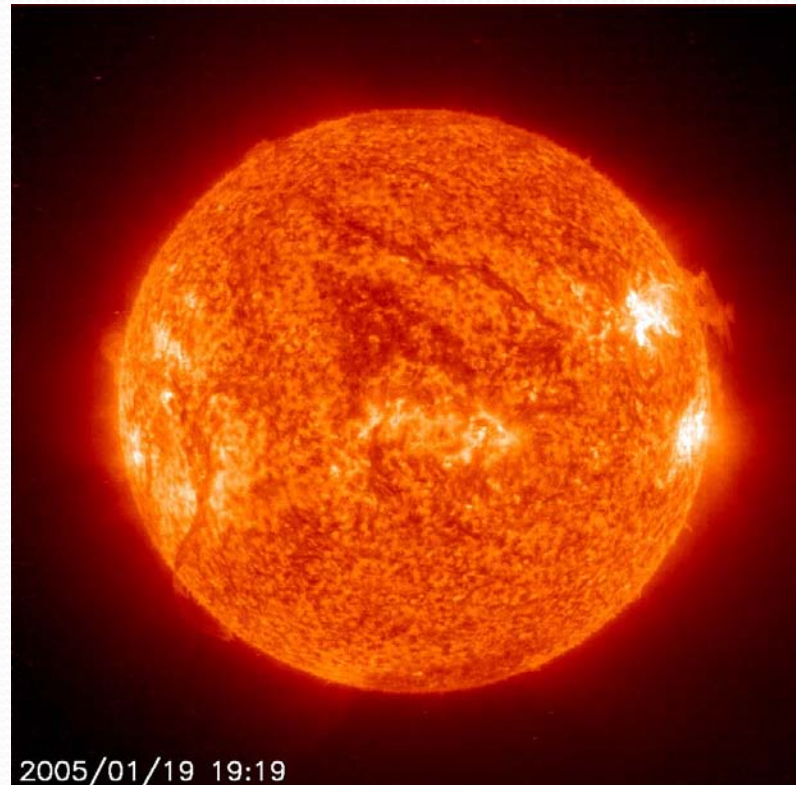
Average Daily Solar Radiation Per Month

DECEMBER



Flat Plate Tilted South at Latitude

Equipment: What the average house needs to “go” solar



Photovoltaic Solar cells (Panels)

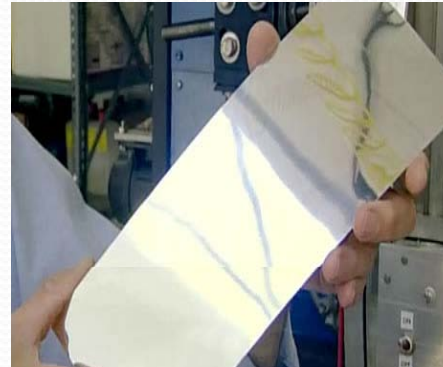


Solar Panels uses semiconducting materials to turn sunlight into DC electric current.



Solar Shingles

[httpwww.technologyreview.com
business24383](http://www.technologyreview.com/business24383)

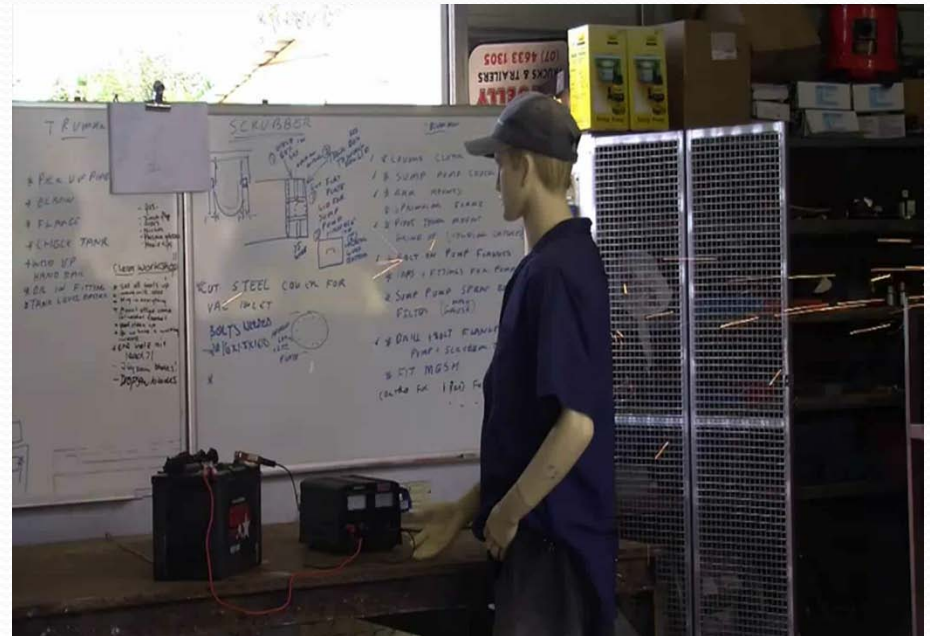


CIGS Solar Film

Batteries



Sealed solar gel batteries located in an open basement rack



<http://www.youtube.com/watch?v=ZgfwH6zRmRA>

Manipulating the electric current.

- Charge Controller



Keeps batteries at optimal charge at all times

Increases the life of the batteries

- Power Inverter



Tying into the power Grid

- **Benefit to you:**
 1. **Net-metering**
 - Power company will sell you power when your
 - Solar system cannot meet your home's demand.
 - Will buy your excess power and sell it to your neighbor.
 - **Benefit to your power company:**
 - They don't have to build another power plant to
 - Have enough electricity to meet demand.
- **Downsides**



Grid Tie Inverter



Costs

- Average American home uses ~940 kWh/month
- At 10¢/kWh it cost about \$94/month for electricity
- 100 sq ft of solar panel can produce 1 kWh of energy
- An average home, depending on location would need between 400-800 sq ft.
 - More sunshine annually = less panels and less sunshine annually = more panels
- Installed cost: \$7-\$9 per watt
 - For a 5 kW system it would cost \$35,000-\$45,000
 - For an 8 kW system it would cost \$56,000-\$72,000

Cost of Solar Panels

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Costs of Panels Continued

- To install solar power to offset 50% of my electric bill
 - Solar Radiance: 4.53 kWh/m²/day
 - Average Monthly Usage: 1,738 kWh
 - System Size: 7.953 kW
 - Roof Size: 795 ft²
 - Estimated Cost: \$55,669.30
 - Post Incentive Cost: \$38,968.51
 - Average Monthly Savings: \$80.00
 - 25 Year Savings: \$39,980.07
 - Tax Credit: 30%
 - Electricity Used Now: 31,280 lbs of Carbon / Year
 - To Offset Carbon Used: Need to plant 78 trees per year
- <http://solarpowerauthority.com/calculator>

Leasing Options

- Solar Leasing Steps
 - Contact Provider
 - They come to home and determine variables.
 - Collect deposit and sign 10-20 year agreement
 - Provider hires installer, oversees installation, as well as manage maintenance and warranty issues



Pros and Cons

- Pros:

- Leaser gets lower monthly electric bills
- Utility rates are locked down in agreement
- Can help the planet

- Cons:

- Provider gets utility incentives and tax breaks
 - Incentives only offered currently in Arizona, California, Colorado, Massachusetts, New Jersey, and Pennsylvania. Soon to be offered in Texas and Florida.
- Typically these are only serviced by a major utility with a solar incentive in place. It is not often seen in local or municipal power cooperatives.
- Need a large roof free of obstructions and faces south.

References

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