



Solar Power Workbook



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Solar Power

Shining New Ways of Sustainable Power

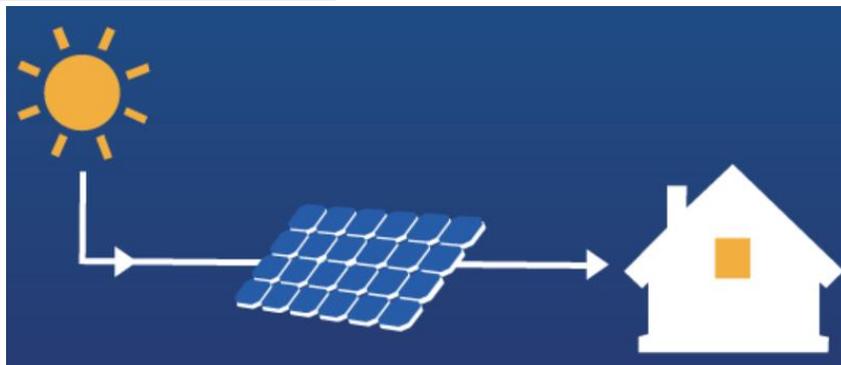
Introduction

The Basics of Solar Power

- Solar Power is an inexhaustible energy source that is also practically pollution free.
- This energy source harnesses light energy and transfers it to electrical energy to power anything from home appliances to entire cities!
- China is the world leader in solar energy, and California leads the U.S.
- With just one hour of direct sunlight, you could collect enough energy to generate a year's worth of power for the entire Earth



How does Solar Power Work?



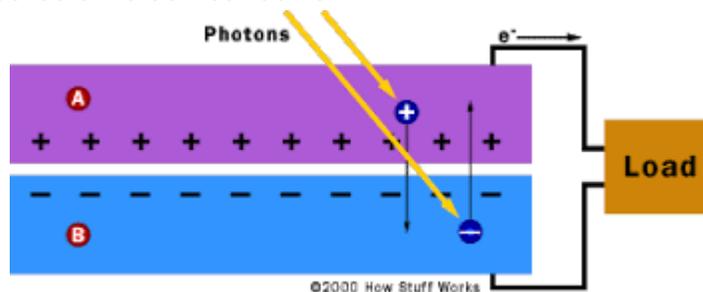
Step 1: Sunlight activates the solar panels

The solar cells, which are also referred to as *photovoltaic cells*, absorb sunlight during daylight hours. Each individual panel is constructed of a layer of silicon cells, a metal frame, a glass casing surrounded by a special film, and wiring. These panels are grouped together and typically placed on roofs of buildings or wide open spaces.

Step 2: The cells produce electrical current

Within each solar cell is a thin semiconductor wafer made from two layers of silicon. One layer is positively charged, and the other negatively charged, forming an electric field. When light energy from the sun strikes a photovoltaic solar cell, it energizes the

cell and causes electrons to 'come loose' from atoms within the semiconductor wafer. Those loose electrons are set into motion by the electric field surrounding the wafer, and this motion creates an electrical current.



Step 3: The electrical energy is converted

You now have solar panels working efficiently to transform sunlight into electricity, but the electricity generated is called direct current (or DC) electricity, which is not the type of electricity that powers most homes, which is alternating current (or AC) electricity. Fortunately, DC electricity can easily be changed into AC electricity by a gadget called an inverter. In modern solar systems, these inverters can be configured as one inverter for the entire system or as individual microinverters attached behind the panels. The picture to the right shows a solar inverter.



Step 4: The converted energy powers your home

Once the solar energy has been converted from DC to AC electricity, it runs through your electrical panel and is distributed within the home to power your appliances. It works exactly the same way as the electrical power generated through the grid by your electric utility company, so nothing within the home needs to change. Since you still remain connected to your traditional power company, you can automatically draw additional electricity to supplement any solar shortages from the grid.

Check out [this video](#) to watch how solar panels work in action!

Next are the instructions to working with a solar panel including links of where you can buy the materials.

Activity

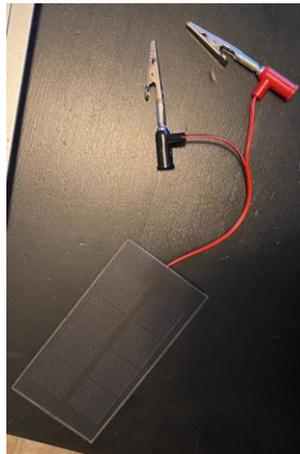
Materials Needed

1. [2 LED diode lights](#)
2. [1 Solar Panel](#)
3. Arts and crafts supplied

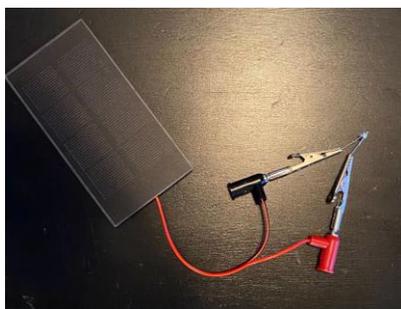
Once the materials are accounted for, you will begin your Modeling Your Solar Paradise

Modeling Your Solar Paradise Instructions

1. Design a location you think you can incorporate solar panels to and that is under some form of light like the sun if you can or under some powerful light bulb. Make sure that your design has room for both the lights and the solar panel and room for the wires to connect.
2. After designing your location then place your solar panel and your lights in the locations you want them.
3. On the light bulb, bend the prongs into L shapes facing away from each other
4. Clip the red clamp onto one side and the black clamp onto the other (make sure the clamps are not touching)



5. Once you place your solar panel in sunlight or under a bright lamp/lightbulb your lightbulb should start shining! If it doesn't, try switching which color clamp is on each lightbulb prong.



6. After you get the light bulb working, try experimenting with the solar panel and modelling a cloudy day. To do this, slightly cover part of the solar panel with your hand so the light only partially covers it and see the effect on your light bulb!
7. Here's the light house we made



Discussion Questions

1. Why is Solar Power energy so important?
2. What limitations does solar power have here in West Michigan?
3. What are some advantages to solar power when compared to other sources of renewable energy?
4. What lingering questions do you still have about solar power?



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