

Qur'an and Science Symposium

Science Kitchen

Solar Car Toy

"And He has pressed into service for you the night and the day, and the sun and the moon; and the stars too have been pressed into service by His command. Surely, in that are Signs for a people who make use of their reason."

(Qur'an 16:13)

Objective: To learn about how the sun can provide us with energy. Build a toy car and observe how the sun powers the motor.

Background:

The Sun is constantly emitting large amounts of energy. In the sun's core, hydrogen is being converted to helium through a process called **nuclear fusion**. As a result of this process, exorbitant amounts of energy are released. This energy is released across the solar system in the form of light and heat.

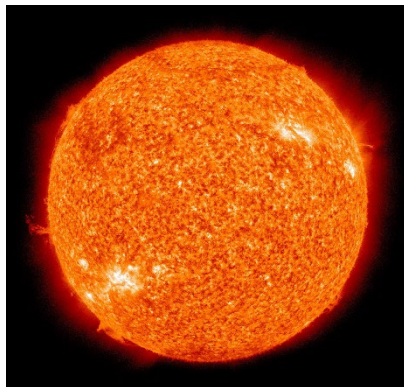


Figure: The sun is constantly releasing enormous amounts of energy

Almost all of the energy to power our planet comes from the sun. Plants use the power from the sun to generate energy through photosynthesis. Moreover, the heat from the sun warms our planet, and contributes to the processes that generate wind, ocean currents, and rain, all of which are important to sustain life.

As such, mankind has always benefited from the sun. Since there is so much energy coming from the sun, it would be incredibly useful if we could harness that energy.

This is accomplished through the use of solar cells. Solar cells, or **photovoltaic cells**, convert the light energy from the sun into electricity. When multiple solar cells are put together in a series, they create a solar panel. The solar panels do not absorb all of the energy from the sun, however. Currently, most solar panels absorb about 20% of the energy from sunlight. Since there is so much energy available from the sun, that 20% is still a significant amount of energy - roughly enough to power an average-sized home throughout the day.



Figure: Solar Panel

How do solar panels work?

1. The sun shines on the solar panels. This light from the sun is a source of **photon energy**. Hence, the name photovoltaic (PV) solar panels. “Photo” meaning light, and “volt” meaning the electricity.
2. The most common component of solar panels is silicon, which is a semiconductor.
3. When the light energy reaches the solar cells, it generates a direct current (or DC) through the flow of electrons.
4. This current is then fed into an inverter, which converts the DC current to AC electricity.
5. The AC current is used to power your home, car, or other devices.

Inside a photovoltaic cell

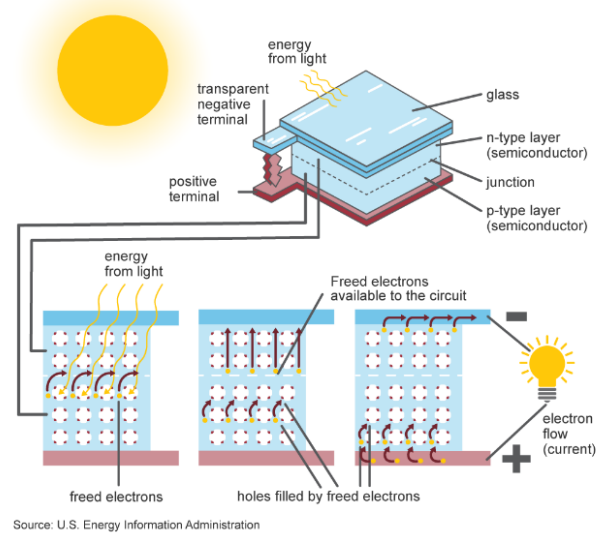


Figure: How a solar panel works

Fun Facts:

- The Earth receives more energy from the sun in one hour than the entire planet use in one year!
- For solar panels to supply the world’s electrical needs, less than 1% of the land on Earth would need to be covered in solar panels.
- Wind is a form of solar power because wind itself is created by the heating of the Earth’s surface by the sun.
- The solar cell was invented by Russell Ohl in 1941
- The photovoltaic effect, which explains how electricity can be generated from sunlight, was discovered by Alexandre Edmond Becquerel in 1839.
- The amount of energy that is used to create solar panels is actually paid back through clean electricity production within one or two years, making it much cleaner than people think.



Figure: Solar panels on top of Bait-ul-Futuh Mosque

To learn more about Solar panels, visit the following websites:

<https://www.energy.gov/solar>

<https://renewableenergyhub.co.uk/main/solar-panels/how-do-solar-panels-work-for-kids/>