



**Solar panel**

Energy comes to Earth from the Sun in two main forms that we can use directly, heat and light. We use heat energy for solar heating and we transform the light energy into electrical energy. Solar heating is used for water heating systems as one example. A panel with water pipes in it collects heat energy from the Sun and transfers that heat energy to the water in the pipes to provide hot water. Light energy can be transformed into electrical energy that is used immediately or stored in batteries. Photovoltaic (PV) panels are devices that are used to convert light energy into electrical energy.

Energy can only change from one form to another. It cannot be created or destroyed. This is the Law of Conservation of Energy.

Let's look at a solar vehicle as a simple example in the transformation of energy from one form to another.

Sunlight hits the PV panel and the panel transforms the light energy into electrical energy. The electrical energy (electricity) passes through the wire circuit to the motor. The motor transforms the electrical energy into mechanical energy and spins the drive shaft which spins the wheel. The front wheel rotates on

the ground to pull the car transforming mechanical energy into vehicle motion (kinetic energy).

Solar Vehicle Ideal Energy Chain:

Light Energy → Electrical Energy → Mechanical Energy → Kinetic Energy

The above case is ideal because not all systems are perfect and in reality there will be losses of energy from our system.

In a simplified view of this case some losses will be from:

- friction of electrons passing through the wires; this is released as heat energy although you may never notice it in the case of the solar explorer.
- friction of the wheel on the ground; this is released as either heat or sound energy.

Even with these losses the law of conservation of energy still holds. The amount of energy into a system will always equal the amount of energy out of a system. If energy cannot be created and can only be transformed from one form to another, how do we get heat and light energy from the Sun?

(Taken from <http://www.solarsam.com/about-solar-energy/energy.html>)

**EXERCISES**

**1 True or false?**

- a. A Solar Panel destroys energy. T F
- b. A PV converts light energy into electrical energy. T F
- c. Light energy cannot be transformed into electrical energy. T F
- d. Friction of electrons releases heat energy. T F

**2 Match the stages of the Solar Vehicle energy system with the form of energy involved.**

Sunlight hits the PV panel.	Mechanical Energy
The energy transformed by the PV panel passes through the wire circuit to the motor.	Kinetic Energy
The energy transformed by the motor spins the wheel.	Light Energy
The rotation of the front wheel transforms energy into vehicle motion.	Electrical Energy

**3 Match questions and answers.**

	QUESTIONS		ANSWERS
<b>A</b>	What happens to energy according to the law of Conservation of Energy?	<b>1</b>	Energy transforms three times in the solar vehicle example.
<b>B</b>	How many times is energy transformed in the solar vehicle example?	<b>2</b>	Energy cannot be created or destroyed, it can only change from one form to another.
<b>C</b>	How does a solar panel work?	<b>3</b>	It collects heat energy from the Sun and transfers it to the water providing hot water.
<b>A</b> .....		<b>B</b> .....	
<b>B</b> .....		<b>C</b> .....	