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Inexhaustible Resource: Solar Power

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The main source of energy that powers the earth is the sun. On a clear day, about 150 J of direct light energy hit one square meter of earth each second [1].

Solar energy is changed into heat energy when sunlight hits the molecules in a material. The light energy is changed into the increased kinetic energy of the molecules in the material. The sun's energy also heats the atmosphere. It causes large movements of warm air masses. The sun's energy is part of a complex system in the atmosphere that creates winds and weather. The sun's light energy can evaporate large amounts of water from the oceans. This evaporated water eventually falls back to earth as rain. The rain collects in lakes high above sea level. The solar energy ends up as the stored potential energy in the lake's water. As the water flows back down, electric energy can be generated in a hydroelectric power station. Sunlight can also be changed directly into electric energy with a solar cell.

The energy on the earth comes from the sun. Energy is not created or destroyed. It just changes from one kind into another. Energy is always conserved! Sometimes the sun's energy is stored for millions of years before it is released. Gasoline, natural gas, oil and coal are called fossil fuels. Fossil fuels are plants that have been compressed for millions of years. Ancient light energy is stored in fossil fuels. The stored energy is changed into heat energy as the fuels are burned in a car engine or home furnace.

Energy consumption has increased immensely in the last decades. We have been burning up our supply of fossil fuels at an alarming rate. Industries and new technologies have grown rapidly. As they grow and expand, so does the demand for energy to run them.

There is a problem with large amounts of energy we use. The energy that is used does not disappear. It ends up as useless heat energy. Thermal pollution is a new problem on the earth. As our atmosphere, lakes, and rivers become hotter, changes in weather patterns will occur. Because of these changes, our way of life will also change.

Other sources of energy are being developed to replace the dwindling fossil-fuel supply. The sun is a huge and largely untapped source of energy. Science and technology are working together to find new and better ways to use energy from the sun. Solar energy is being used for heating and cooling homes. Use of solar energy can conserve fossil fuels and reduce air pollution.

The solar-heated house absorbs heat from the sun by using collector panels. These panels have black energy-absorbing surfaces covered with glass or clear plastic. They are attached to pipes that circulate air or water throughout the house. The dark surfaces of the panels absorb solar energy and heat the air or water in the pipes. The heated materials transfer energy throughout the building. Solar energy must be stored for use at times when it cannot be collected. Tanks of water and beds of large pebbles are two common methods of storage [2].

Energy is required to run air conditioners. Most air conditioners get this energy from electricity. The energy runs the refrigeration generator. The latter cools air by evaporating and then condensing a circulating liquid refrigerant.

A solar cell converts solar energy directly into electricity. The conversation of sunlight into electricity is called the photovoltaic effect.

A major advantage of using solar energy is that it is clean. Solar energy produces little or no waste material. So it does not cause air pollution or waste disposal problem. Another advantage: energy from the sun is not going to run out for many years to come.

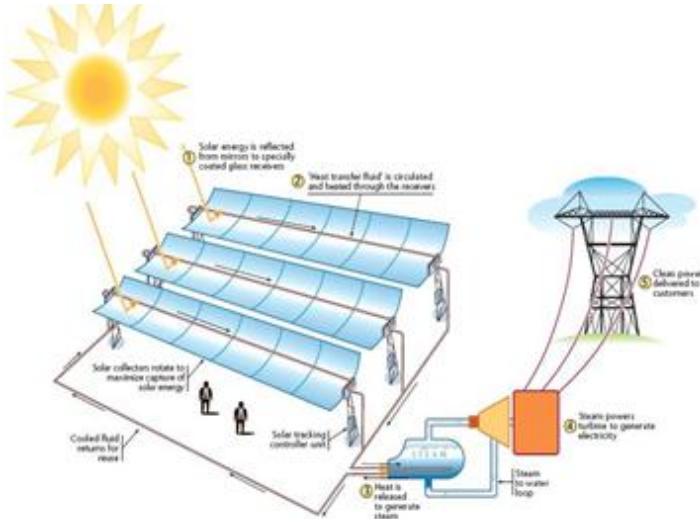


Figure 1: Solar Thermal Parabolic Technology

The solar energy plant uses a giant curved mirror to focus the sun's rays. The focused rays are used to heat water in a boiler. The energy produces steam. The steam, in turn, drives a turbine in a generator. The spinning turbine enables the generator to produce electricity.

A solar cell is two layers made largely from the element silicon. When the sun shines on the cell, electrons are released from the lower layer. These electrons are collected by one surface of the cell. The electrons can then travel through a path, a circuit, made of metal grids. This flow of electrons through a circuit is an electric circuit. By connecting many solar cells,

one can increase the amount of current produced. Groups of solar cells have been used for communication and transportation [2].

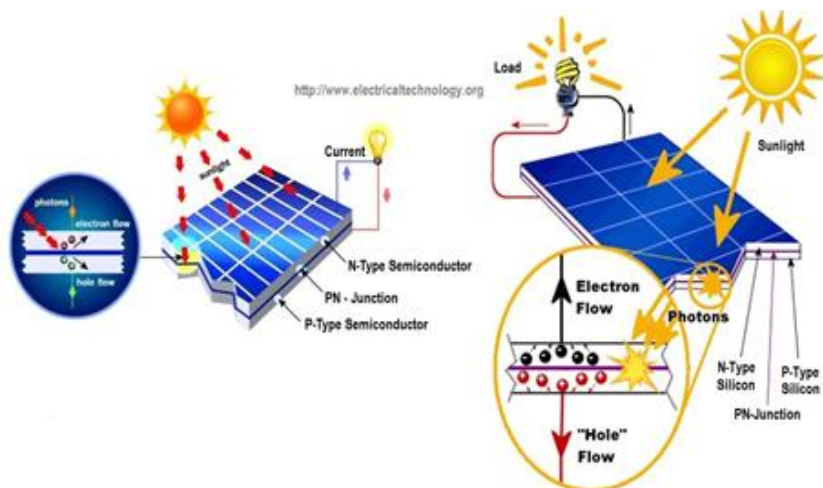


Figure 2: Basic Operating Principle of a Solar Cell

However, using solar energy does have some disadvantages. It can be collected only when the sun is shining. The cost of installing solar heating and cooling systems is high. But once the systems are in operation, they save on fuel. Solar cells are also expensive at present. Scientists are searching for less expensive ways to produce solar cells.

References:

1. The Sun's Energy [Electronic Resource]. – Mode of access: <http://ag.tennessee.edu>. – Date of access: 22.02.2019.
2. About Solar Energy [Electronic Resource]. – Mode of access: <http://www.seia.org>. – Date of access: 13.03.2019.