

An overview of production of electricity using solar power plant

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ABSTRACT

Solar energy is the type of renewable energy and it is the energy which is produce by the sun in the form of heat and light. With the help of solar power plant acquired solar energy in the form of electricity. Solar power plant converts sunlight into electricity directly using photovoltaic (PV) or indirectly using concentrated solar power (CSP).

Keywords - Generation of electricity, Photovoltaic cell, Renewable energy, Solar energy, Solar power plan

I. INTRODUCTION

Solar energy is our primary source of renewable energy. It is a form of energy acquired by the sun including light, radio waves and X-rays. As oil prices increases and other energy sources remain limited we are searching safe reliable long term source of power. Electricity generation from solar energy at present is no more a new concept to the world. Solar electricity is pollution free, limitless, free will play a great role in the time to come in the present energy driven civilization [1]. In this paper, we are going to present basic information about solar power plant.

II. SOLAR POWER PLANT

Solar energy generates electricity using two ways first is photovoltaic cell (PV) and second is concentrated solar power (CSP).

2.1 PHOTOVOLTAIC CELL (PV)

A PV cell is semiconductor device that converts the sunlight energy into electricity without going through in any energy conversion steps. The actual working of PV cell is as shown in Fig. 1. This conversion takes place by PV effect. Hence they are called PV cells. The photovoltaic cells based on photoelectric effect.

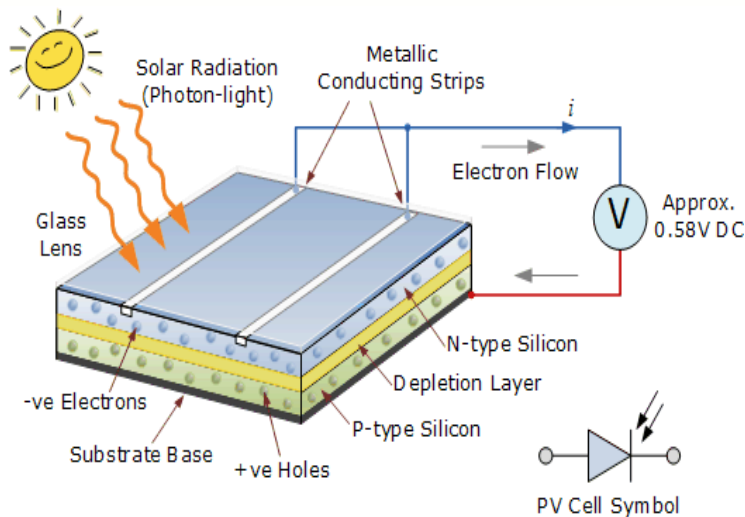


Figure 1 - Photovoltaic cell

2.1.1 PHOTOELECTRIC EFFECT

The Photoelectric effect is the scientific principle that makes solar power possible. The photoelectric effect is the principle referring to when electrons are released by photons making an electrical current, which is what makes it possible for the harvesting of electricity through the use of solar cells. The working of photoelectric effect is as shown in Fig. 2 [2].

The PV cell is light illuminated p-n junction diode which directly converts solar energy into electric energy via photovoltaic effect a typical silicon PV cell composed of thin wafer consisting of ultra thin layer of phosphorus doped silicon on top of thicker layer of boron doped silicon. When sunlight falls on surface of PV cell, photons with energy above the semiconductor band gap impart enough energy to create electron hole pair as shown in Fig. 1.

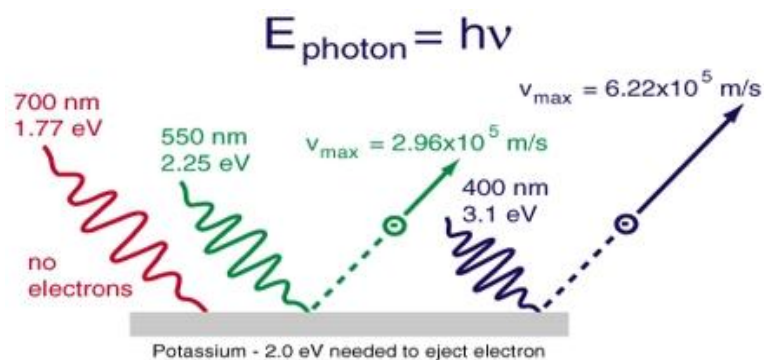


Figure 2 - Working of photoelectric effect.

2.2 CONCENTRATED SOLAR POWER

Concentrated solar power systems generates solar power by using mirrors or lenses to concentrate a large area of sunlight, or solar thermal energy, onto a small area. Fig. 3 shows the concentrated solar power plant using solar panel. In CSP, electricity generated when light is converted to heat. The heat drives a steam turbine connected to electrical power plants to continue to generate after sunset and adds value to such systems when compared to photovoltaic cell. Fig. 4 shows the schematic representation of production of electricity using solar power plant [3].

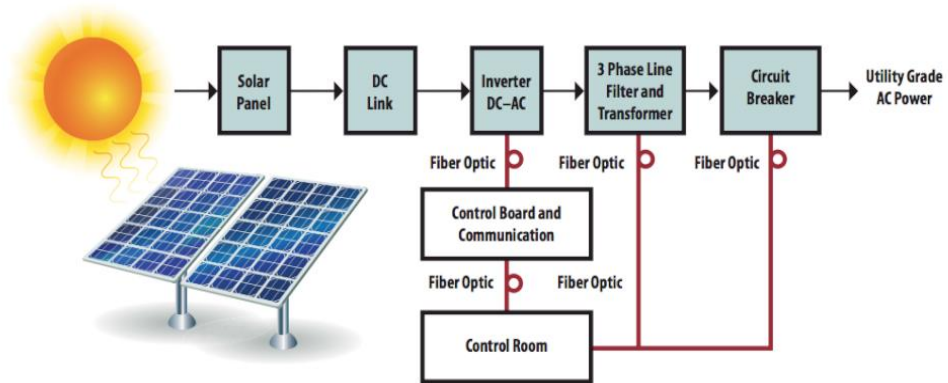


Figure 3 - Concentrated solar power

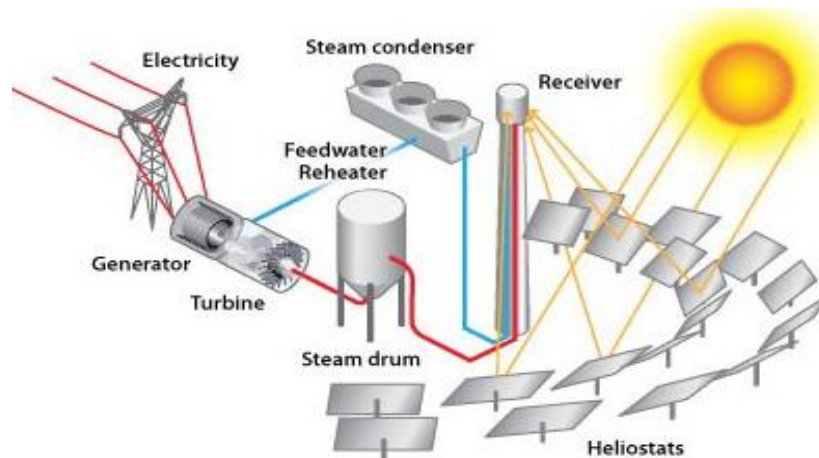


Figure 4 - Production of electricity by CSP

2.3 CURRENT SCENARIO IN MAHARASHTRA

Among the renewable sources of energy, solar energy has a huge potential for power generation in Maharashtra. There are 250-300 days of clear sun with an available average radiation of 4 - 6 kWh/m² over a day. There is a

capacity to generate 1.5 million units/MW/year through solar photovoltaic systems & up to 2.5 million units/MW/ year through solar thermal systems. Maharashtra is already in process to boost this enormous source and interested solar project developers can submit their proposals to MEDA [4].

III. CONCLUSION

Using different types of solar power plants, electricity is produced. In Maharashtra, per year 1.5 million unit/MW and 2.5 million unit/MW energy is produced using photovoltaic system and solar thermal system respectively. Solar power generation has long been seen as a clean energy technology which dawns upon the planets plentiful and widely distributed energy source.

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