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Electricity generation from solar energy and its Applications

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ABSTRACT - The Solar Energy is produced by the Sunlight is a non-vanishing renewable source of energy which is free from eco friendly. Every hour enough sunlight energy reaches the earth to meet the world's energy demand for a whole year. In today's generation we needed Electricity every hour. This Solar Energy is generated by as per applications like industrial, commercial, and residential. It cans easily energy drawn from direct sunlight. So it is very efficiency & free environment pollution for surrounding. In this paper the Solar Energy from Sunlight and discussed about their future trends and aspects. The paper also tries to discussed working, solar panel types; emphasize the various applications and methods to promote the benefits of solar energy.

KEYWORDS: Renewable energy, Solar panel, Photovoltaic cell, Modeling of PV Panel, Solar Concrete Collector

I. INTRODUCTION:-

Nowadays, due to the decreasing amount of renewable energy resources, the last ten years become more important for per watt cost of solar energy device. It is definitely set to become economical in the coming years and growing as better technology in terms of both cost and applications. Everyday earth receives sunlight above (1366W approx.) This is an unlimited source of energy which is available at no cost. The major benefit of solar energy over other conventional power generators is that the sunlight can be directly converted into solar energy with the use of smallest photovoltaic (PV) solar cells. There have been a large amount of research activities to combine the Sun's energy process by developing solar cells/panels/module with high converting form. The most advantages of solar energy is that it is free reachable to common people and available in large quantities of supply compared to that of the price of various fossil fuels and oils in the past ten years. Moreover, solar energy requires considerably lower man power expenses over conventional energy production technology.

II. SOLAR ENERGY:-

Amount of energy in the form of heat and radiations called solar energy. Shown in Fig.1. It is radiant light and heat from sun that is natural source of energy using a range of ever changing and developing of technology such as solar thermal energy, solar architecture, solar heating, molten salt power plant and artificial photosynthesis. The large magnitude of solar power available makes highly appealing source of electricity. 30% (approx.) solar radiation is back to space while the rest is absorbed by ocean, clouds and land masses.

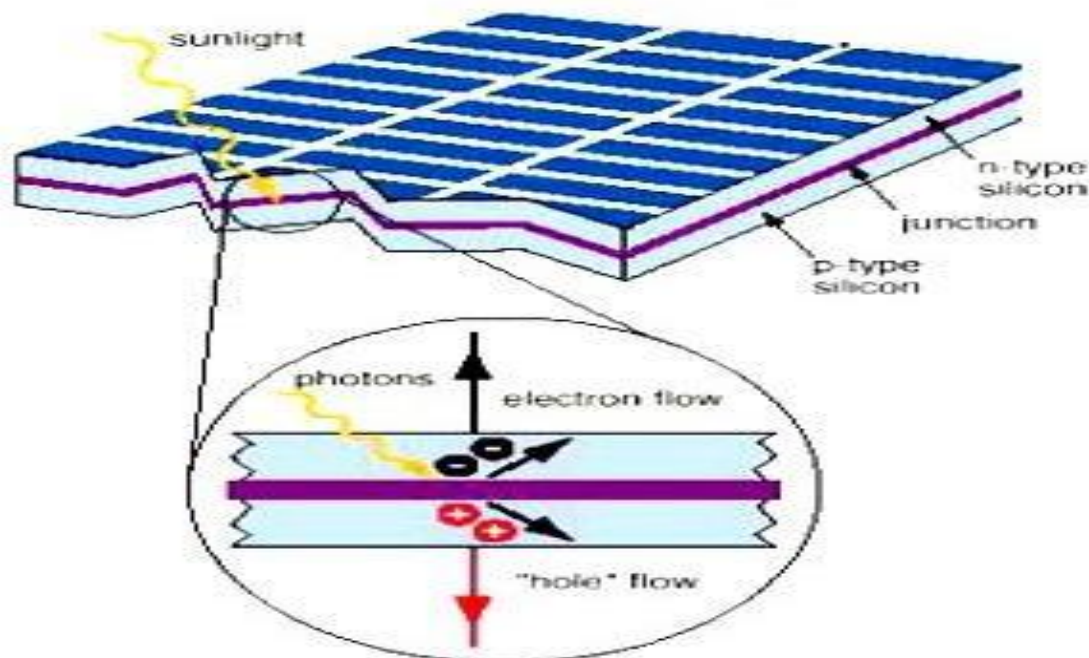


Fig.1 Internal of Reaction of Solar energy

III. WORKING OF SOLAR ENERGY

PV cells Convert Sunlight to Direct Current (DC) electricity. Charge Controller work as control the power from solar panel which reverses back to solar panel get cause of panel damage. Battery System act as storage of electric power is used when sunlight not available (i.e. night).From this system connected to inverter for convert Direct Current (DC) into Alternating Current (AC).

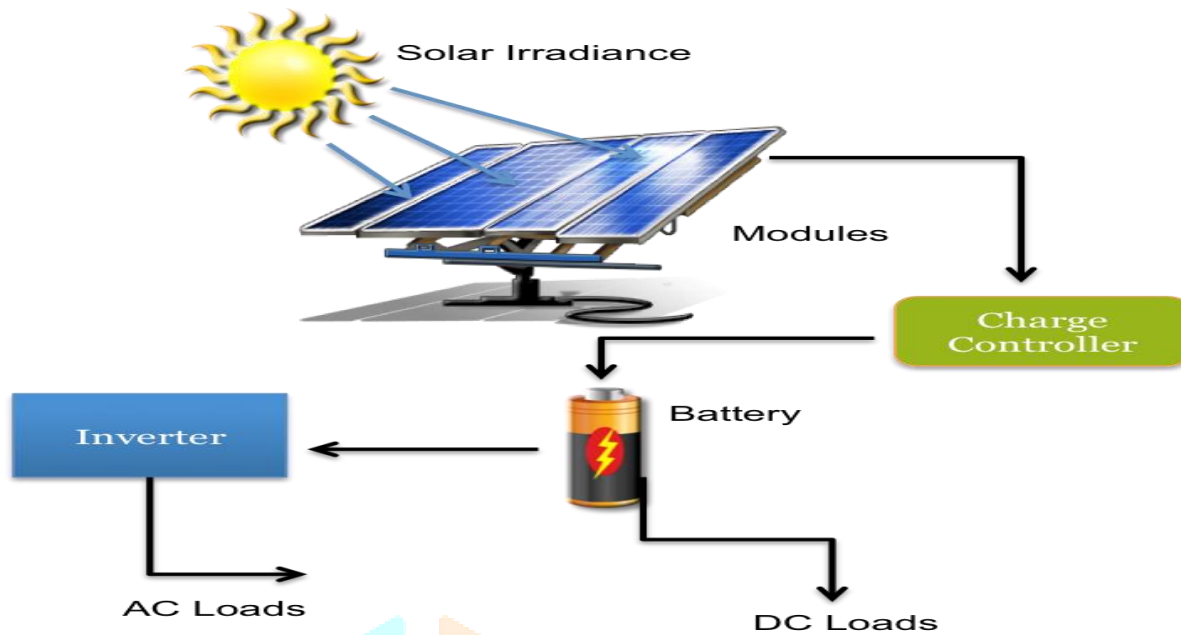


Fig. 2 Working of Solar Energy

IV. SOLAR CONCRETE COLLECTOR:-

Concentrating collector is a device to collect solar energy with high light intensity of solar radiation on the energy absorbing surface. This is focusing type collector. A focusing is a special form of flat plate collector modified by introducing a reflecting surface between the solar radiation and the absorber.

A. Parabolic Dish:-

It similar in appearance to a large satellite dishes, but has mirror like reflectors and absorber the focal point. It used a dual axial sun tracking. It is efficiency of 30% achieved. By this dish it produces in MW level in solar plant. This is highest conversion performance of the concentrating solar power technology. A parabolic dish collector brings solar radiation to a focus at a point actually a small central volume.



Fig. 3 A Parabolic Dish Collectors

B. PARABOLIC TROUGH COLLECTOR:-

It contains a linear parabolic reflector that concentrates light onto a receiver positioned along the reflector's focal line. It consists of a receiver tube positioned directly above the middle of the parabolic mirror and filled with a working fluid. A working fluid is heated to 150-350°C. It flows through the receiver and is then used as a heat source for a power generation system.

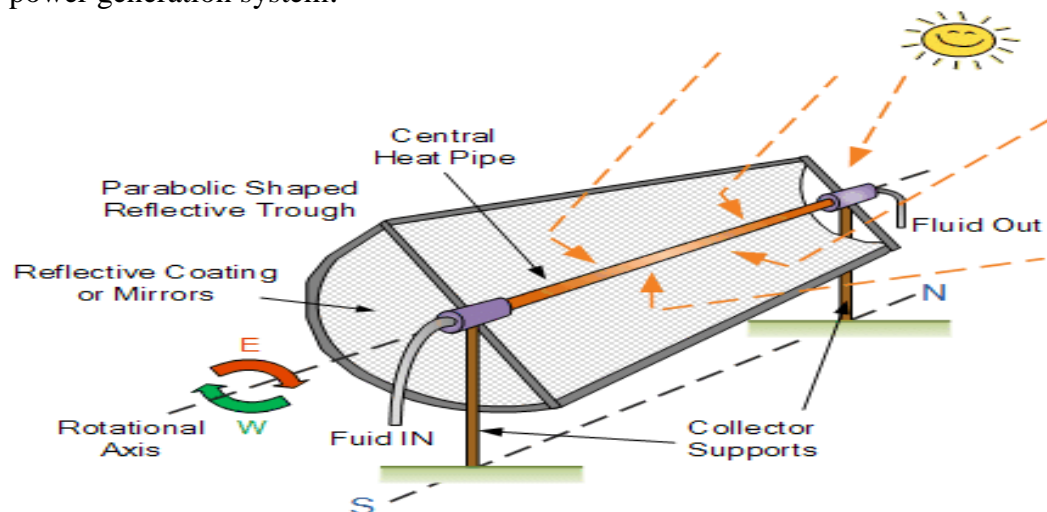


Fig. 4 Parabolic Trough Collector

C. CENTRAL RECEIVER COLLECTOR:-

It is mostly used in large scale plants that are usually making a large amount of power. It is also called as "Power Tower". It operates by focusing a field of thousands of mirrors on to a receiver located at the top of a centrally located tower. The receiver collects the sun's heat transfer fluid, which is used to generate a steam turbine located at the foot of the tower for production of electricity.

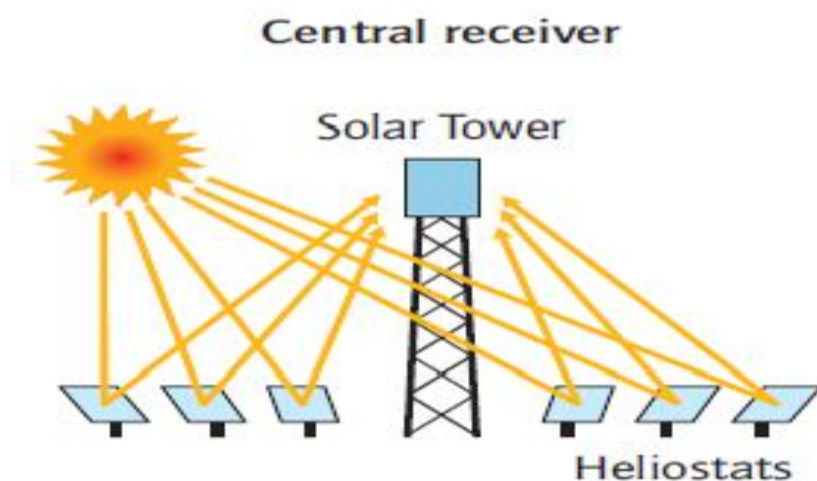


Fig. 5 Central Receiver Collector

D. Fresnel lens collector:-

In a Fresnel lens, the refraction happens to produce in the surface, while the large material between the two surfaces doesn't have any problems in the refraction. It will use raise more temperature than conventional one and also used in furnace heating. Its installation has been used for surface modifications of metallic materials. This equipment is applying solar energy in the field of high and very high temperatures. These temperatures are achieved in a few seconds. Fresnel concentrator performed 34.3% reduction in reflective area compared to a parabolic of the same diameter, the 20 minutes series of action performance needed for manual adjustment in order to track the sun proved to be a major disadvantage with this device.

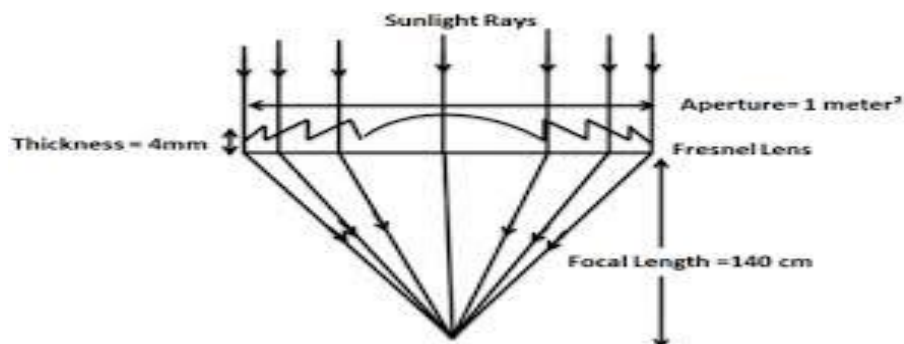


Fig. 6 Fresnel lens Collector

E. COMPOUND PARABOLIC CONCENTRATOR:-

The compound parabolic concentrator is a trough like arrangement of two facing parabolic mirrors. This is not focusing, but a solar radiation from many directions is reflected toward the bottom of the trough. It is possible to concentrate solar radiation by a factor of 10 without diurnal tracking.

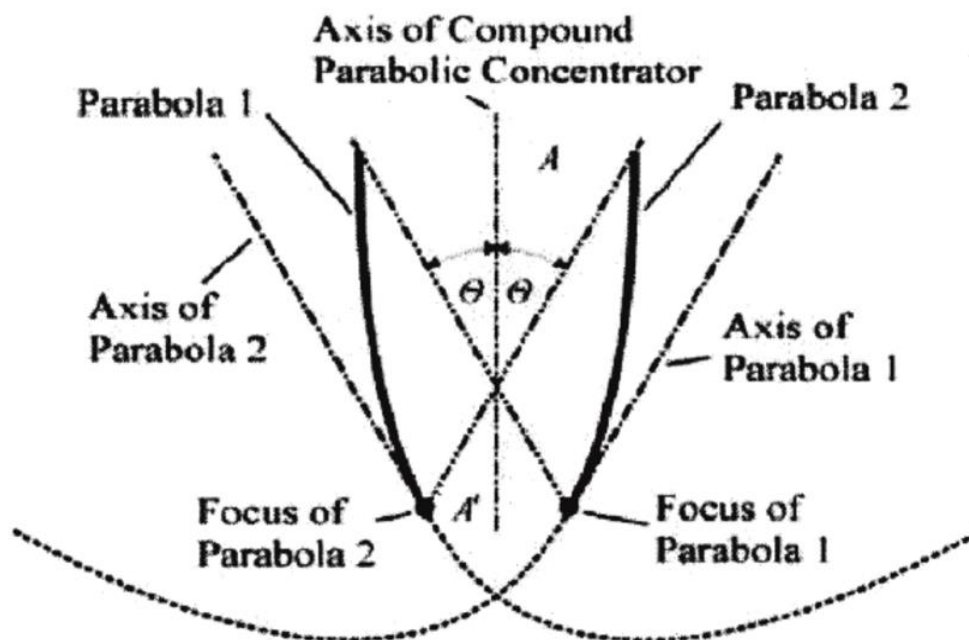


Fig. 7 Compound Parabolic Concentrator

V. MERITS OF SOLAR ENERGY:-

It is save up to 20% of energy costs. It can use in Remote Locations. Easy Installation (i.e. does not required any wires, cords etc.). Rooftop which means no new space is needed & every domestic or commercials user can generate their own electricity. It is widely available of sunlight with free of cost, eco-friendly, renewable resource. It has no moving parts and not required any additional fuel, other than sunlight, to produce power. No need of water and fuel.

VI. DEMITS OF SOLAR ENERGY:-

No generation of energy, when the sun is not shining. Initial cost is high. More area needed for large amount power. For alternating Current (AC) application required of inverter and also storage at night. Production PV systems single silicon crystals is technically challenging, energy, time consuming.

VII. APPLICATIONS OF SOLAR ENERGY:-

It is used in many applications including electricity, evaporation, heating water, Heating and cooling of buildings, cooking of food, water pumping etc.



Fig. 8 Applications for Heating Water



Fig. 9 Application for Water pumping



Fig. 10 Application for cooking food

VIII. CONCLUSION:-

Most of the people are aware about non-renewable energy resources. Solar energy has become increase more popular due to their economic benefits. By on Battery Backup, Solar Energy can even provide Electricity 24x7, even on cloudy days and at night. This also used with inter-grid System with Continuously Power supply. It has more benefits compared to other forms of energy like fossils fuels and petroleum deposits. It is an alternative which is promise and consistent to meet the high energy demand. Research on solar cell and solar energy is promise has a future worldwide.

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