

# Power Generation by Hybrid Solar Power System

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**Abstract**— The vital use of fossil fuel creates a deficiency of energy sources. Solar energy is the most promising source of power in the future. Solar energy is clean and environmental energy sources among renewable energy options. The pressing problem in solar power is the varying output owing to the prevailing varying environmental conditions. For mitigation of this problem, a maximum power point tracking (MPPT) strategy is imperative in order to extract maximum power possible from combine of solar energy and hydro power plant at all times. Although photovoltaic solar panels don't produce radiation. The objective of our work maximum power point tracking by use of solar voltaic panel hydropower plant and other renewable energy sources. In these years we have to vigorously promote distributed photovoltaic power Generation, the biggest benefit of course are the owners of the roof.

**Keywords:** MPPT, Solar Energy, Hybrid Solar Power System

## I. INTRODUCTION

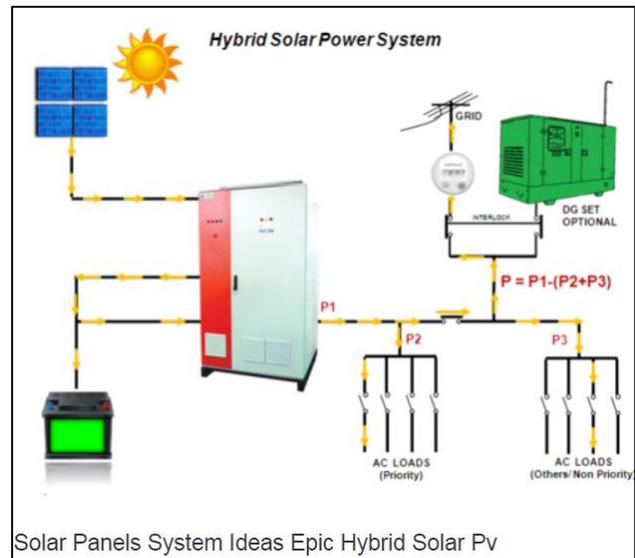
Energy is a basic input for sustenance of life. It plays a major role in our daily Activities. Energy is necessary for development of a country. The degree of Development of a country is measured by the amount of energy utilization by Human beings. Increase in population, urbanization increases the demand of Energy. The world's fossil fuel supply viz. coal, petroleum and natural gas will thus be depleted in a few hundred years. Energy crises results due to increased Energy consumption and decreased energy supply resulting in energy inflation and shortage. Hence alternative or renewable sources of energy have to be developed to meet future energy requirement.

Solar radiation is the radiant energy that we get from the sun, specifically electromagnetic energy. At the surface of the sun, an average of 63, 00,000 Watts per square meter is emitted. A fraction of this energy reaches the Earth's Surface.

## II. SOLAR ENERGY

Solar energy is radiant light and heat from the Sun that is harnessed using a range of ever-evolving technologies such as solar heating, photovoltaics, solar thermal energy, solar architecture, molten salt power plants and artificial photosynthesis.[1][2]

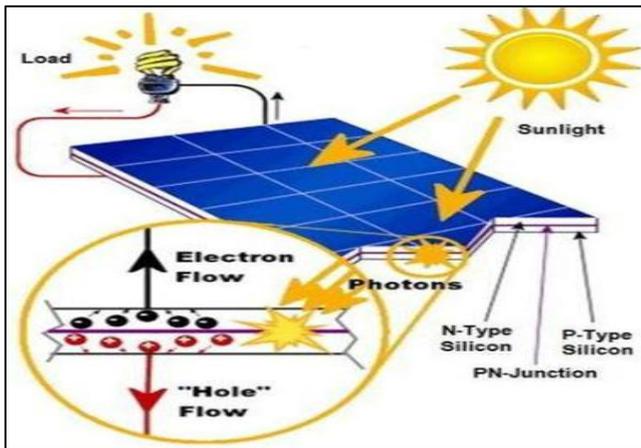
It is an important source of renewable energy and its technologies are broadly characterized as either passive solar or active solar depending on how they capture and distribute solar energy or convert it into solar power. Active solar techniques include the use of photovoltaic systems, concentrated solar power and solar water heating to harness the energy. Passive solar techniques include orienting a building to the Sun, selecting materials with favorable thermal mass or light-dispersing properties, and designing spaces that naturally circulate air.



Solar Panels System Ideas Epic Hybrid Solar Pv

## III. FUNCTION OF SOLAR PLATE

Solar cells [6] are mostly made of crystalline silicon and its working is based on Photo-electric e act. Silicon is generally available in a pure form called intrinsic silicon, but to make it n-type or p-type doping of silicon with an impurity is done [2]. When phosphorous is added as impurity the silicon is called N-type due to the presence of free electrons. It conducts better than pure silicon. Similarly when boron is used for doping P-type silicon is obtained. Thus N-type and P-type silicon come in contact to form an electric led. The free electron from N side combines with holes of the P side. At the junction, a barrier is formed called potential barrier which prevents further movement of electrons on the N side to cross over to P side. On reaching equilibrium an electric eld is developed demarcating both the sides. When the sun's rays strike the solar module the energy in the photon exceeds the semiconductor band-gap energy and creates an electron-hole pair. Once an electron-hole pair is generated within the depletion region both the carriers are acted upon by the electric eld. The eld is from N to P as a result holes move towards the P side and electrons towards the N side. When these carriers move out of the depletion region they contribute to the majority carriers in their respective regions and di use away from the depletion region due to high concentration near the junction. Hence voltages across the external terminals of the junction are developed due to the collection of more majority carriers on both sides of the depletion region. Connecting a load across these terminals photon current starts owing in the external path.



#### IV. SOLAR CELLS TO PV SYSTEM

The solar cell is basically a current source where the energy from the sun is directly converted to electrical energy. The basic structure of the solar cell is N on P-type silicon cell. The main bulk material is made of P-type silicon. Mostly the thickness is taken to be 100 to 350 microns. At the upper surface lays a thin layer of N-type silicon, thus the N layer forms the active top surface. It has an ohmic contact with metallic grid structure for collecting the current due to photons striking the cell. Thus the two metallic contacts P and N layers form the positive and negative terminals of the solar cell. The cell top surface is also provided with anti-reflective coating on near the surface for capturing maximum photon toward the junction

A photovoltaic module is made up of 32 to 36 number of crystalline silicon solar cells connected in series. Solar cells of the same batch are mostly considered for making modules in order to prevent mismatch losses. The solar cells on both the sides are encapsulated by two sheets of ethylene vinyl acetate (EVA). Finally, a glass cover is provided on the front side of the module. The rear side of the module is covered with a hard polymer material polyvinyl chloride (tender).

Mostly series/parallel connection of solar modules are done to get a high voltage and current rating. Thus Solar panel is a combination of several solar modules either connected in series or in parallel. A combination of blocking diodes and bypass diodes are connected in these solar panels so that when any one of modules fails the healthy modules will get protected. In parallel connection of modules series connection of blocking diode with each string is done. Thus when any string fails the power output of remaining healthy string can be preserved.

A group of solar panels is connected to form solar PV array. The PV array can either be stationary or with the tracking system. Thus a PV system is a solar array connected with several components like mounting, tracking system, cabling, dc isolator, generation meter, charge controller, battery, inverter, fuse box, isolator, electricity meter.

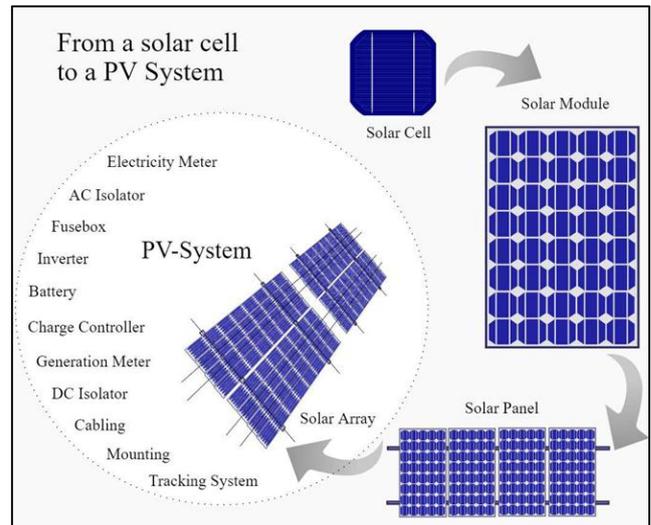


Fig. 1.4: shows the cyclic chain of Solar PV system starting from the basic unit

#### V. SOLAR CONCRETE COLLECTORS

##### A. Parabolic Trough Reflectors

It contains a linear parabolic reflector that concentrates light onto a receiver positioned along the reflector's focal line. It consists of a Receiver, which is a 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 as it flows through the receiver; it is then used as a heat source for a power generation system.

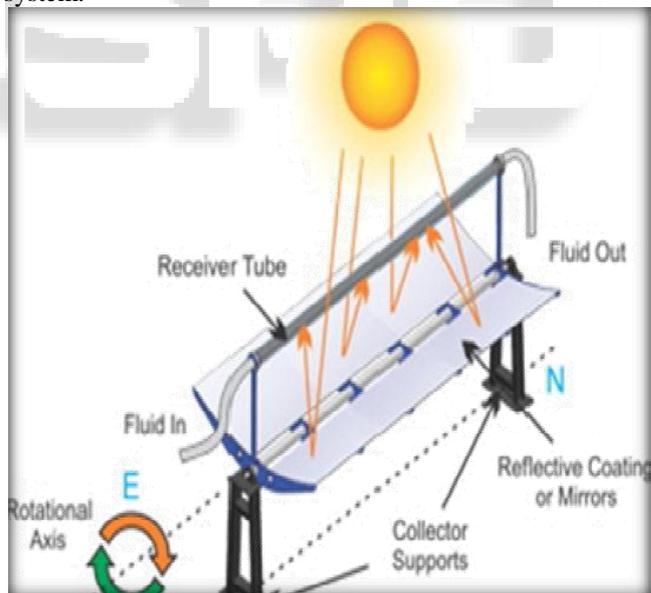


Fig. 7: Parabolic Trough Reflectors

##### B. Fresnel

In a Fresnel lens, the refraction happens to produce a high temperature on the surface, while the large material between the two surfaces doesn't have any problems in the refraction. It will use a higher temperature than a conventional one and is also used in furnace heating. Its installation has been used for surface modifications of metallic materials. This equipment is used for 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.

#### C. 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.



#### D. Central Receiver

It mostly used in large scale plants that are usually making the more amount power. It 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 steam turbine located at the foot of the tower for production of Electricity.

### VI. 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

### VII. DEMERITS 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.

### VIII. CONCLUSIONS

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 because as day by using day the demand of electricity is accelerated and that an awful lot demand can't be meeting up by means of the conventional power plants. And additionally these plant lives create pollution. So if we go for the renewable power it will be better however for the duration of the year the era of all renewable energy plants. Grid tied PV gadget is more dependable than different PV system. No use of battery reduces its capital fee so we go for the grid connected topology. If generated solar energy is built-in to the traditional grid, it can grant the demand from morning to afternoon (total 6 hours often in sunny days) that is the unique time varies when the SPV system can fed to grid. As no battery backup is there, that capacity the utility will precede supply to the rest of the time period. Grid-connected systems have proven an advantage in natural disasters by means of imparting emergency electricity abilities when utility strength was interrupted.

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