

Generation of electricity from solar energy

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Abstract: -Sun is the primary wellspring of delivering solar energy, and it is free type of eco-accommodating energy since it is non-scattering environmentally friendly power source. A month at an at once of solar came to the outside of the earth for satisfaction of the need of yearly power shoppers. What's more, we realize that cautiously that the power is the very need full thing for the present world. The principle part of environmentally friendly power source is for utilization of petroleum product for a negative area and giving them a correct event to amass and locate another way. That is the reason rather than all sustainable power source, which is now present on the planet the intensity of solar idea having a greater necessity and give of consideration in the overall. For age the power should be possible either straightforwardly and in a roundabout way strategy utilizing intensity of solar radiation. In direct strategy: - the component of PV cell is used to change radiation of solar energy in to power. In aberrant strategy: - con-gotten the intensity of solar is been adjusted utilizing by warm energy. The intensity of solar is produced by as need of the customer as like mechanical work, business work extra. It is available in nature as daylight, that is the reason it is free situation and productive for circling. In this research paper we found out about the intensity of solar from daylight and to discuss their future objectives and furthermore talk about working standard, boards, and types and its advantage.

Keywords: -renewable energy, solar panel, photovoltaic cell, making of PV panel, solar concrete collector.

Introduction:- For increasing the demand of electricity and some shortage of non-renewable sources, it seems that the solar energy device more useful for domestic and industrial work in last ten year, because the range of solar energy/radiation is approximate 1366w and yes this is available on earth free of cost, and no doubt that in coming year solar energy is a very cheap economic power generating station for better growing technology in generating and applications both.

For use this technology in daytime to be stored the solar energy in the form of (thermally or electrically) for make use in the night. Make use of solar energy unit typically growth in investment and maintenance cost for increasing the level the generating electricity.

Based on internationally energy agency (IEA) report, the global energy consumption is approximate 82% of fossil fuel, however it predict that this rate of percentage will be decreased up to 70% by 2035 by finding new renewable source or adding more sufficient to the present renewable energy system. As per calculation the solar radiation is received by the earth in 1 day can be sufficient to fulfil the all requirement of the whole world's energy for more than 20 years because 120×10^5 watts solar radiation fall on the earth surface.

In this present paper, a summarise literature is that solar energy is more sufficient and eco-friendlier and more useful technologies and, in this paper, we study about how the electricity generated by the help of PV module, and solar concentrated collector. and in this paper a short description about the solar energy and how they operate and generates the electricity.

Solar energy: - As we know that the bulk amount of energy in the form of radiation comes from sunlight and fall down to the earth surface. the radiant light and heat from sun that is natural source of energy for taking this in use for develop the new technology such as solar thermal energy, solar heating extra. For the high generate source of electricity depend upon its magnitude. When the solar radiation come from the space, its 30 % of radiation reflected back in to the space and some percentage absorbed by the ocean and and some cloud and some this else rest of the radiation is absorbed by the earth. By

generating the electricity from solar energy radiation, solar cell plays an important role. a solar cell also known as a Photovoltaic cell, and that device directly converted this radiation in to the form of electricity. Recently INDIA achieved 5th position in global in solar power. Because solar power capacity has increased by more than 11th time in last 5 years from 2.6 GW in march 2014 to 30GW in July 2019. Due to this increment in solar power generation the electricity solar terrify in INDIA is very competitive and has achieved the grid priority.

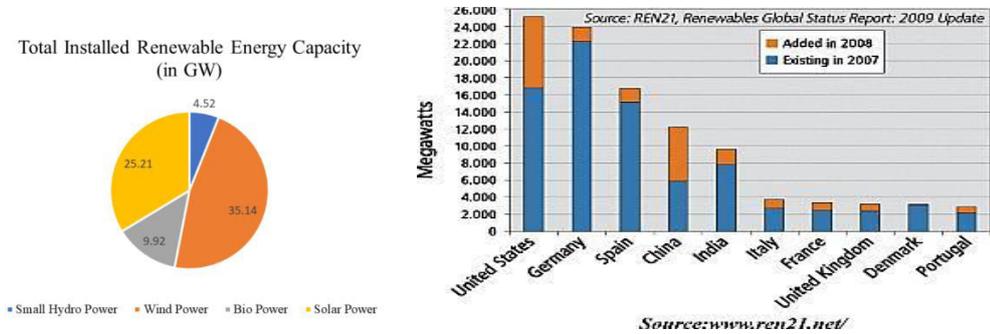


Figure:1 percentage of solar power and 5th position in global chart

Working of solar energy: -It works by convert the light from the sun radiation in to the electricity. When the sunlight comes from space and fall down the solar panel the solar panel absorb the sunlight with PV cell and generated the dc energy and symmetrical situated inverted sudden change this voltage usable ac current .and ac energy flow through the electricity panel and distributed accordingly. The working of solar energy is in some step. When the sunlight hits solar panel, which is made up of silicon then PV cell absorb that radiation and produced the electricity by Photovoltaic effect and generated the direct current (DC) electricity. that dc current directly goes to the situated inverter and this is able to convert that dc current to ac current. and ac electricity is directed to your switch board. The main work of switch board is the is give the permission that ac electricity to be sent to usable appliances in home, industry extra. The solar panel may not be able to calculated that what quantity of solar radiation absorb by the solar panel. when solar energy used in to industry and home that in nobody in that place that solar energy too much stored in to the backup setup(battery) they may collect surplus energy - more that of our need. Any electricity is not needed upon the generation flows through the utility meter and into the utility grid. When the extra electricity provided through the meter, it means that energy to run backwards, and creating own property for excess generation.

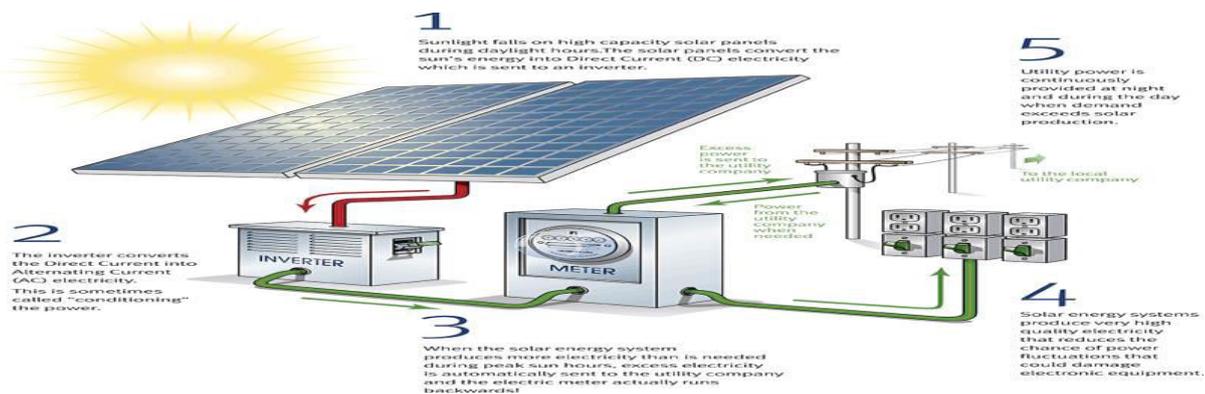


Figure:2 working of solar energy in step wise

Modelling of PV panel: -

1. Solar cell(photovoltaic cell): -It is also known as the Photovoltaic cell, and it is directly converting the solar radiation in to electricity. Basically solar cell made up of the silicon material and that’s why it is called a semiconductor material because to convert the radiation in the electricity basic principle of semiconductor is used in that application. And this is all based upon the photoelectric effect, which was known in our country since 19th century. Electrons that have potential who create the electric current and found on the valance band and at a low energy level. An energy barrier (called the band gap energy) must be overcome before the electricity carrier by jumping so that is called conduction band. The solar radiation in the form of photon is found in conduction band and provided the needed energy. The photon strikes on the semiconductor surface then some electrons goes from valance band to conduction band and they generate the electricity. The single junction silicon solar cell can produce a maximum open circuit voltage of approximately 0.5 and 0.6 volts.

2. Photovoltaic module: -Where the single junction solar cell provides 0.5 to 0.6 volts in the form of output form that is not sufficient energy for useful work. So main work of PV module to increase the output power level of PV system to connect number of solar cell (60 or 72 connected in series). The way of connect these number of solar cell is series method. And after connected in series these solar cell give more output power. One solar PV module can be rated from 3 watts to 300 watts. This module are commercial available on the roof of the building block of solar electric power generation system. For back up energy this solar modules are connected to the battery bank system. That means positive terminal of one cell connected to negative terminal voltage of solar module is simple sum of the voltage of individual cells connected in series in the module.

3. Photovoltaic panel: -The number of PV module connected in electrically in series that is called a optimal output PV panel. In PV panel tested solar cell optimize whose output voltage match with the PV panel requirement. The electrical characteristic of a solar cells are identically in the subpanel string and that string do the help to optimal the output voltage (in requirement of PV panel) and operate at the MPP of each cell. when the no. of PV module is attached in electrical in series that individual that module checked for their power output and binned with cells of similar power output and electric characteristics. The bypass diode is used for every string of these subpanel that turn on if the PV subpanel string becomes reverse biased beyond the forward voltage of the diode. PV panel can be categorised into 3 common type: 1. Mon crystalline PV panel 2. Polycrystalline PV panel 3. Thin film PV panel.

4. Photovoltaic array:- Now we know that PV cell are absorbs the sunlight and convert that in electrical term, than no. of couple PV cell made a PV module whose increase the voltage level and no. of couple PV module made the PV panel whose PV cells are individually tested than increase the generation of electricity these whole process come under to PV array. Means that PV array is a whole generating unit of power, whose consisting of any number of PV module and PV panel also. The performance of PV module and panel and array also depend upon the voltage quality(DC power output) and it s comes under the standard test conditions(SEC).

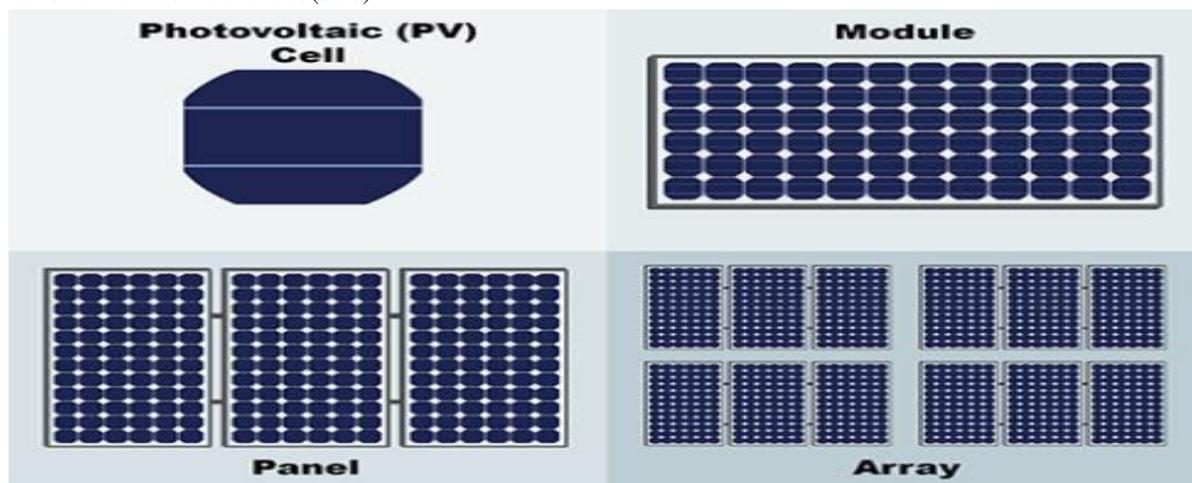


Figure: modelling of PV panel

Solar concrete collector:-

1. Parabolic trough solar collector: -It is a type of mechanism who used to track the sun radiation. It consisting of parabolic shaped collectors and made of reflecting materials. Its join on the horizontal axis and the collector reflect that radiation onto its focal line towards a receiver that absorbs the solar energy to raise the temperature of the fluid inside. As I mention above line that is has a horizontal axis line due to this the solar radiation fall parallel to its axis. The operating temp of the parabolic trough solar collector is in range of 500-700k and the geometric.

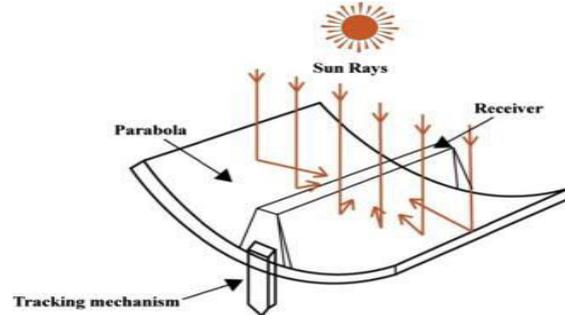


Figure: parabolic through collector

2. Parabolic dish: -Its main work is that itsends the solar radiation which comes from the space towards the thermal receiver located on the focal point of the dish. Where the parabolic solar collector has a one axis of focal point there it has a two-axis solar tracking system. This the main advantage of this collector.it consists of the parabolic dish type shaped mirror and the operating temperature of this collector is over 1800K and the range of this in between of 1000K to 5000k . due to this advantage of that type of collector most are appropriate this due its high concentration ratio and photovoltaic application.

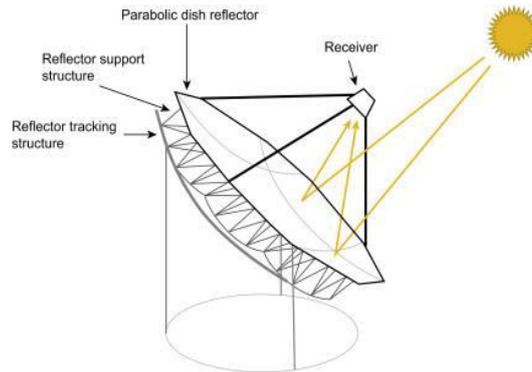


Figure: parabolic dish

Merits:-

1. It can be use in remote location
2. It is save upto 20% of energy costs.
3. Easy installation
4. It has no moving parts and o required any one

Demerits:-

1. In winter time mostly when the sun is not rise, no generation then.
2. Cost is high for installation
3. Not situated in any location, need more area to setup that.

Application: -evaporates, heating property, water pump, and building cooling.

Conclusion: -The total conclusion is that many renewable sources is presented in nature and useful accordingly but most of the sufficient in and useful today's world according that is solar radiation which comes from space. Solar power is an immense source of useable energy and direct convert in to electricity. When the radiation comes and falls on the PV cell then light s hifts electrons in some semiconductor materials and then it is capable of large scale generation electricity and then it's all comes under the photovoltaic effect. And last total conclusion of this paper is that direct use of renewable energy to make a capab le use of the solar radiation.

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