

An Electricity Generation from Renewable Energy (Solar Energy)

PRATEEKSHRIVASTAVA¹
M.E. ELECTRICAL¹

BIRINDERJIT SINGH KALYAN²
ASSISTANT PROFESSOR²

DEPARTMENT OF ELECTRICAL ENGINEERING
CHANDIGARH UNIVERSITY, MOHALI, INDIA

Abstract: - The several types of energy that are found in nature like conventional and nonconventional sources of energy. We used both sources of energy in different forms like heat, sun light, water, wind etc. As we know these energy sources are also called **Renewable** and **Non-Renewable** energy Sources. Renewable energy is most of the useful energy that is we can get from renewable sources which are naturally recharged for human time scale. Renewable energy can be formed in these four major areas like: Electricity generation, Heating or Cooling (air and water), Conveying of sources, and generation of energy in rural areas. The Various sources of electricity generation are fuel like solid, liquid, gaseous and water and nuclear energy.

Keywords: - Solar power generation, Green power, PV modules, PV cell collector.

1.Introduction:

Solar energy is the one of the most usable resources of energy that's we consumption in different formats as electricity, heat, or cooling, or cooking purposes. The solar energy is generated from the process of thermonuclear bonding in the sun. The solar light comes on earth and spread equally the conversion of this light energy into different form we use a smallest tool PV solar cell. These PV solar cell converts sun light into electrical energy. China is the biggest solar power generation country. Till 2019 the installed capacity is 200 GW. As well as in India is the most of the energy used by solar power targeted by Indian government is 20 GW capacity in 2022. but as on date 31 august 2020 the solar installed capacity is 35,735 MW.

2.Solar Power generation: -

The solar power generation from the sun radiations by using solar thermal energy. This solar thermal energy is captured by using crystalline silicon solar cell. These crystalline silicon cells are transparent in nature that's why direct sun rays by photovoltaic cells. We know that Photovoltaic means "light- electricity" it is formed by Photo means light and Voltaic means electricity in form of current. The various smaller sections of solar cells make a PV Panel and the charge from these panel is to be stored in Batteries. Then its power is calculated in the unit of Watt. The charge storage by the batteries can be connected in series and parallel combination in the parallel combination the voltage is constant and current is additive. So as per the application possible combination can we used and get more efficient.

3. Formation of PV (Photo-voltaic) Panel: -

In the formation of solar PV system the important role is played by the PV cells, PV modules, PV panels, PV arrays: Solar cells are also called PV cells that convert solar energy into electricity and then they utilized in less power requirements like watches and calculators; The various cells structured are mounted on a chip is formation of PV modules and these pv modules are used in railways signal and signal to be used in traffic system, these modules are wired or inter-connected in series or parallel combination takes a new model named as Solar panel. Solar panel is responsible for collection of solar energy and then converts this energy into electricity. To be concern energy requirement the solar panel is formation several solar cells or pv array are connected in series or parallel form.

The most of the common manufacturing technology is used to design or model a solar cell

1. Mono crystalline silicon cell

2. Poly crystalline silicon cell

- **Mono crystalline panel: -**

A single crystalline cell panel also known as Mono crystalline panel these panels are made up of single piece of silicon. And highly pure silicon is to be used to make this panel the shaped we get after this cylindrical panel. As per name mono crystal the whole efficiency is depend on single crystal of silicon cell. to produce a pure silicon cell we use pure semiconductor material.

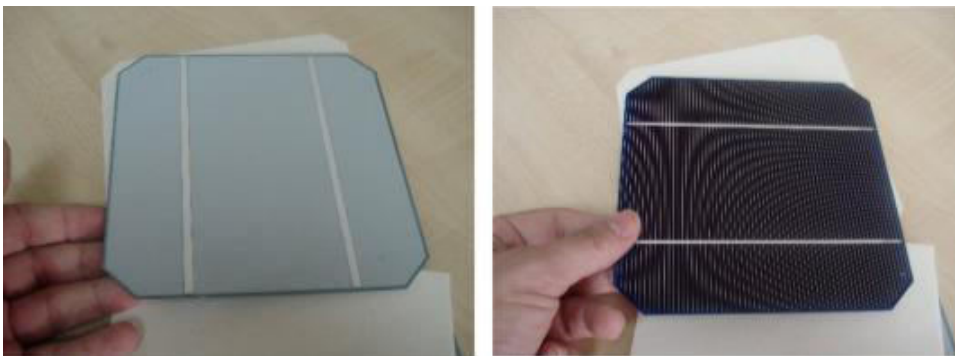


Figure01. A single crystalline solar cell [2]

- **Poly crystalline panel: -**

A poly silicon cells are also defined as poly silicon, poly crystal, and multi crystal cells. These crystal silicon cell manufactured from cast square –ingots process, these cells are less efficient compare to mono crystalline cell because of their property the consume less solar energy the reason behind the less energy consumption is the solidification of materials. The standard size of the poly silicon is 15.24 cm. The conversion efficiency is between 14%-16% as compared to mono crystalline cell. The crystal is coated with black or dark polishing as shown in figure.

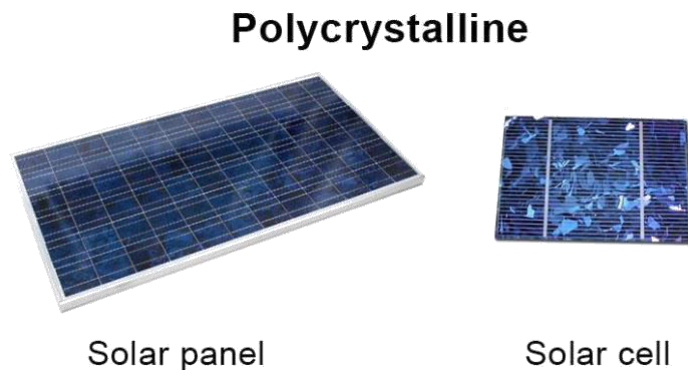


Figure 02. A poly crystalline cell [4]

4.The concept of Green power: -

The green power is the most beneficial for environment and for us.it is the part, subdivision of renewable energy that consist of solar and wind power that are free from pollution and highly efficient. The green power is produced from the solar and wind, geothermal, biogas, and biomass. We use mostly pollution free sources which have zero percent emission and used increasingly renewable sources. The renewable energy sources recharge itself from the nature over a period and do not diminish. So as these fuel sources are like solar, wind, geothermal, and hydro. So, we get efficiently and effectively energy from them. The figure 03 shows the Green power concept.

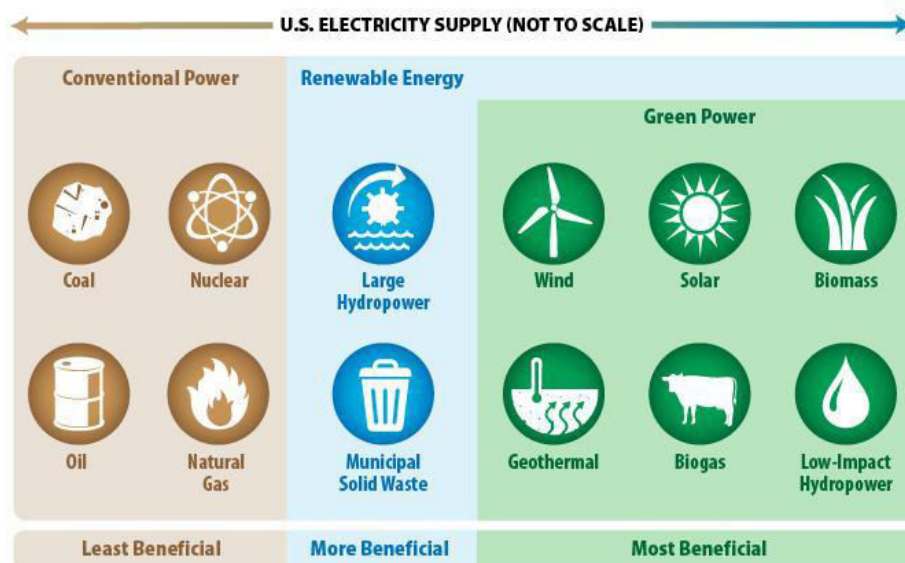


Figure 03. Green power graphic representation [4]

5. Working Principal of solar energy: -

We know that from previous paragraphs that the Solar panel are used the silicon photovoltaic (PV) cells to develop a panel. And the working process of this cells is sunlight's hits the panel and then absorbed by silicon cell this produced electricity by a photovoltaic effect. The form of electricity in the DC (Direct Current) electricity and thus dc is suitable used for home appliance's as well in industry also so inverter and storage of this power should be considered. For storage of power a battery used when the sunlight is not available that means in night the power backup from the battery source. And thus, system of inverter converts DC power into AC (Alternating Current) power for better utilize.

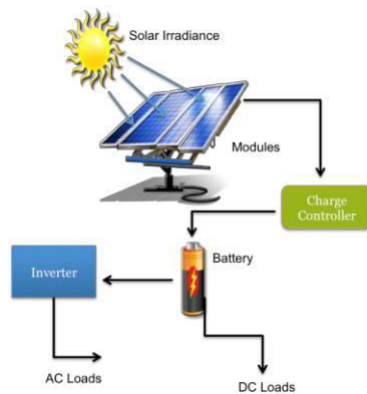


Figure 04. Solar energy Utilization [1]

6. Pros of Solar energy: -

Solar is more helpful to us its complete daily basic need by using solar energy as well as our electrical system to improve efficiency and make system healthier. By using solar power, the electricity bill reduces and if we supply the power to government save some capital. Thus, Renewable energy source so we used lifetime as well maintenance is exceptionally low it is a surplus point to us use renewable energy sources. Other than this the technology of the generation of power from the sun directly uses in home and after some power devices used, we can run our industry also. This makes effective of our solar system.

7. Cons of Solar energy: -

The first and basic most disadvantage of this system is power backup if Sun is not visible then there is no power or electricity generation is not possible. The initial cost of installing the solar power plant is fairly high so everyone or individual customer can be installed the power generation system and the storage of the system by using battery so it has made system costlier.

8. Applications of Renewable energy: -

Solar energy is widely used in power generation in Various area like Schools, Collage, and Factories, and big buildings. Other than this solar power is used in heating or cooling the building

and cooking the food as well as water pumping system for agriculture purposes. Street lighting system in highways and local streets solar panels used by railways to signal monitoring.

9.Conclusion: -

The conclusion is to be get from the analysis of solar power generation is that the Solar power is the ultimate source of energy that can be found in nature and it is endless most of the earth surface used solar power directly and by using of battery backup this solar energy can be used 24X7, and the power backup from the batteries can be used in cloudy days and in nights. In a large scale if we connected with a grid connected system with continuously power supply will be possible. in alternative demand the power should be delivered to Grid. It meets the high energy demands.

10.References: -

- [1] A short term paper on solar power generation and solar forecasting: A novel Approach: Department of electrical engineering afyon kocatepe university turkey.
- [2] Shruti Sharma, Kamlesh Kumar Jain, Ashutosh Kumar Sharma, a review paper on “Solar cell: in research and Application” Dec.,2015
- [3] M.J Aschwanden & A.O Benz, Apj, 480,830,1997
- [4] Types of solar cells and Green power generation its application, Mohsen Mirhababi:Payame Noor University, Mohammad Askari: Iran university of science and Technology, Vahid Mizael Mahmood Anadi, Sahid Bahonar University of Kerman.
- [5] Moss, S. J and Ledwith, A (1987). The solar power generation and the utilization of energy sources. ISBN 0-216-92005-1
- [6] A paper on Electricity generation from solar energy: Mohd Rizwan Sirajuddin Shaikh, Santosh B. Waghmare, Suvarna Shankar Labade, Pooja Vittal Fuke, Anil Tekale, Students of Students of Electrical Engineering Savitribai Phule Pune University.
- [7]N.Gupta, G.F Alapatt, R. Podia, R Singh, K.F Poole, (2009). “Prospects of Nanostructure – Based Solar cells for manufacturing Future Generation of Photovoltaic Modules” International journal of Photo energy 2009.