An All-Embracing Review of Solar Energy

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Abstract- This paper deals with utilization of solar energy. Solar energy reduces the greenhouse effects and pollution by simply replacing the generated power supply with the solar panels. Fossil fuels are one of the most pollutants that are why contribution in the greenhouse effects is more. The increasing importance of environmental concern, reduce these greenhouse effects, pollution and fuel saving.

Keywords-:- *Solar cell, PV cell, Solar panel.*

I. INTRODUCTION

Solar energy is really available source of energy on the earth. Earth receives energy (174 PW in the upper atmosphere) from sun is far larger than the current world energy consumption. This energy does not deals with big mechanical equipment. Solar radiation is a direct source for generating the solar power therefore it is free, solar energy is nonpolluting that's why does not produce the greenhouse effects [1].

Thanks to the research of photovoltaic effect in semiconductor due to which we can transform the sun light to electricity. Solar power is produced by collecting sunlight and convert it into electric energy by the use of solar panel. Solar panel is a collection or a set of many individual solar cell also called photovoltaic cell (PV cell). PV cell was invented in the 1954 at bell laboratory in U.S by Alexander Edmond Becquerel.

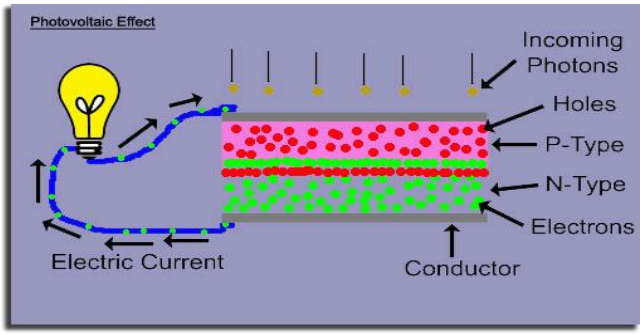

Fig.1: Photo-Voltaic cell

Photo votive power generation employs solar panels, contains a set of solar cell containing a photovoltaic material which are- mono crystalline silicon, poly crystalline silicon, amorphous silicon, cadmium telluride, and copper indium gallium selenite [2, 4].

II. SOLAR CELL TECHNOLOGY

Solar cell deals with the photovoltaic effects which means generation of a potential difference at the junction of two different materials in response to radiation of sun.

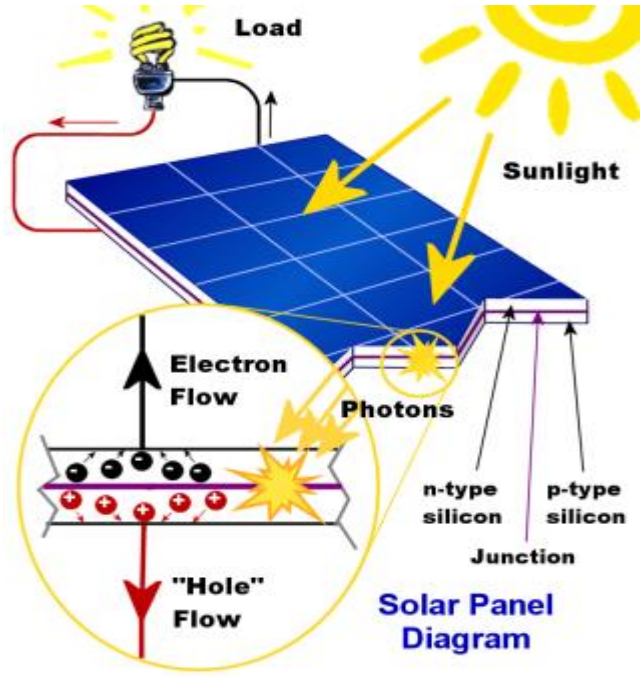

Fig.2: Solar cell technology

For manufacturing of solar cell the light purity silicon crystal are used: A P and N type semiconductor material put together to form a P-N junction where p-type with less electron and holes which attracts the free electron from the n-type to stabilize itself. Thus the flow of electrons create, which generates the electricity. When same semiconductor put in sunlight and the sunlight hit the surface of semiconductor material, a string of electrons up and attracted toward the n-type, semiconductor. This flow create a more –ve in the n-type and more +ve the p-type this generating a higher flow of electron and generate a higher flow of electron and generate a higher electricity called a photovoltaic effects [3].

Solar panels

Solar panels work through, called a photovoltaic process where radiation energy (photo) is absorbed and generates electricity (voltaic). Traditional systems, crystalline silicon solar modules, have wafers of refined silicon, beneath sheet of glass, panels are surrounded with the metal frame.

Fig.3: Solar panel

These are earlier used solar panel. The new breed of solar technology is thin film. Solar panels which is less bulky then crystalline silicon, and cheaper to produce, but thin-film solar power system have a lower photovoltaic efficiency than earlier method, converting around 8% of radiation exposure.

III. GREEN HOUSE EFFECTS

Greenhouse gases keep the earth warm through a process called a "greenhouse effect" earth get the energy from the sun in form of radiation or sunlight. Surface of earth absorbs some of them and heats up and remaining absorb by atmosphere which makes atmosphere warmer. Some of greenhouse gases are water vapor, carbon dioxide, sulphur dioxide, nitrogen dioxide and other greenhouse gases in the air makes these effects too stronger, which is responsible for global warming [5].

Greenhouse gases emission from electricity production

Approximately a 3 KW system will replace around 2.5 tons of greenhouse gases, possibly more not less. It depends what the actual o/p is.

According to Bull frog in 2010 one megawatt hours of electricity from the "on margin" power source in worth:

0.0676 tons of Carbon dioxide.

1.908 KG of Sulphur dioxide.

0.877 KG of Nitrogen oxide.

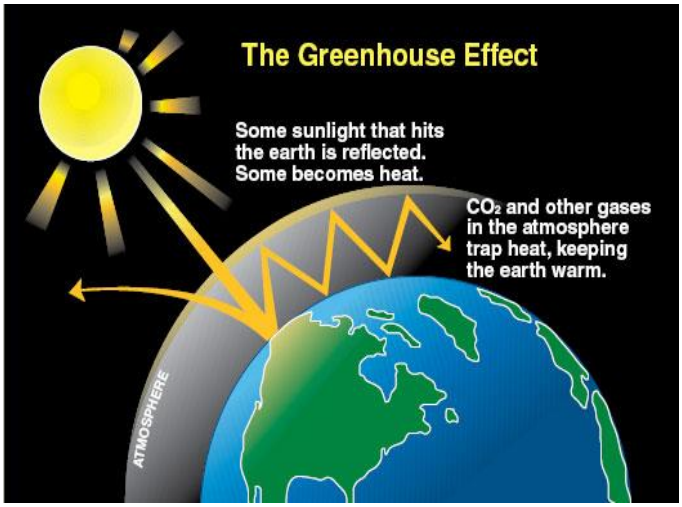

Fig.4: Greenhouse effect

For solar array of panel, one year of electricity (1, 03,000 watt * 365 days= 3.75 MWH) will dominate 2.54 tons of carbon dioxide, and 3.3 kilogram of nitrogen oxide. Green house effects refers to a global warming and climate change which increase the average global temperature the main cause of thin is carbon dioxide affects weather in various ways.

If we compare a solar power with the coal generated power, we find coal causes a pollution as well as lots of effects on human body. Coal generates 44% electricity and is biggest air polluter.

Air pollution

By burning coals causes smog, soot, acid rain, global warming and air emission. Coal plants one of the top sources of carbon dioxide gas emission which is the primary cause of global warming. A typical coal plant generates 3.5 million tons of co2 per year. Coal plants also generates a sulphur dioxide (SO_2) and nitrogen oxides (NO_X) pollution. It contributes to form a small acidic particulates that can penetrate in to human lungs and absorbed by blood stream. So2 is main cause of acidic rains, which destroy our crops, forests and soils, also acidify our lacks, rivers and ocean.

NO_X causes ground level ozone or smog which burn the human lung tissue, exacerbate asthma and make people more chronic respiratory diseases. An uncontrolled coal plant can emits 3,300 tons of NO_X /year as per EIA data:

Typical coal plant assumption:

Capacity= 600mw

Capacity factor= 69%

Heat rate= 10, 415

Co2 emission rate= 206 pounds of co2/ million Btu.

It was the gas emission by coal plants but there are other factors which effects the environment as well as human life,

Solid wastes were originated by coal plant contain more than 125,000 tons of ash and 193,000 tons of sludge from the smoke stalk scrubber each year [6].

Fig.5: Solid waste of coal plants

Waste also contains toxic substances such as arsenic, mercury, chromium and cadmium- these all contaminated drinking water supplies and harm the vital human organs and neurons system, as per study one out of 100 children who drinks directly a ground water which is contaminated with arsenic due to coal power plant waste have the risk of developing cancer.

Water waste, *in* coal plant with once through cooling system 70 to 180 billion gallons of water have cycled through the power plant (value for 600 megawatt plant) which is released back in the lake and river. This waste water is hotter than the normal water, so it causes thermal pollution. This can decrease the fertility and it causes heart diseases in fish. Coal power plants also add chloride or other harmful chemicals which are harmful to the environment.

Figu.6: Water waste of coal plant

Heat waste, due to burning the coal too much heat produced by the coal power plant. Only 33 to 35% of coal heat is used to produce electricity, 60 to 70% heat affects the environment (rises the temperature). About 60% of coal is derived from the surface mine of the earth rest of coal is found from underground mines. Underground coal mine is one of the most hazards of occupation; create a chronic health problem in workers [7].

IV. FUTURE ASPECT OF SOLAR ENERGY

The demand of energy is increasing nowadays. We need clean and safe energy which has no dangerous effects on environment. Solar energy is alternative source of energy. Solar panels which are typically guaranteed to perform for as long as 25 years, produce the electric power without harming the environment. Developing solar panel is also a clean and safe process with lowest carbon foot prints. The panels made by the silicon, with in an enclosed process that contains recycles 100% of chemical used in the process. Solar panel required nothing more than sun energy for generation of electricity. Solar technology provides energy security for every nation and reduced tension that carbon- based energy source often creates. Solar panels can generate electricity anywhere even in dense populated area, so it help reduce the load on long distance electricity transmission network [8].

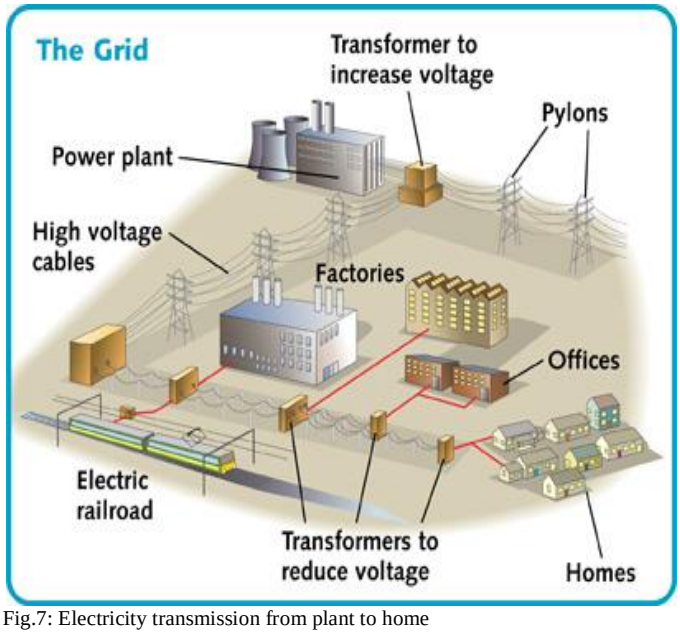

Fig.7: Electricity transmission from plant to home

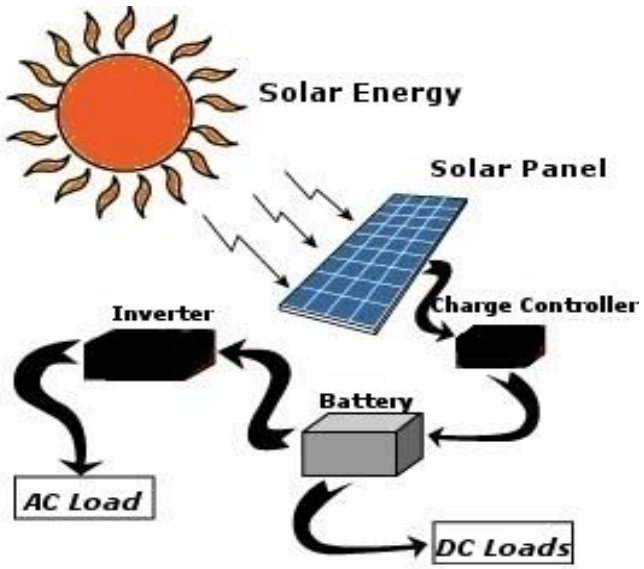

Fig.8: Solar power system

V. CONCLUSION

Electricity which is generated by solar cell is pollution free. Therefore it is not harmful for environment. Coal plants produces wastes in various form that is very hazards for atmosphere. To produce green electricity we have to switch solar system from coal plants. Solar panels can be placed in dense population area, where electric transmission lines cannot be placed. Solar panels are long life. Less maintenance is required in solar panels almost there is no maintenance in solar system. Solar energy is plenty available on earth surface so no limitation of energy source in solar system to generate electricity for homes in green environment.

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