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A Review PAPER On Electricity Generation from Solar Energy

SUMITTED BY :- SANJAY JANGID

SAQIB NADEEM

GUIDED BY:- ASST. PRO. PANKAJ KUMAR

Abstract: Solar energy is generated by sunlight. It is a renewable energy source that is not environmentally friendly and never disappears. Every hour, enough solar energy reaches the earth to meet the world's energy needs for one year. Today's generation needed electricity every hour. This solar energy is generated for industrial, commercial, residential and other uses. You can easily extract energy from direct sunlight. So it is very efficient and free of surrounding environmental pollution. In this article, we reviewed solar energy from sunlight and discussed its future trends and aspects. This article also describes the types of solar panels that work. Highlights the different applications and methods for promoting the benefits of solar energy.

Keywords: **renewable energy, solar panels, solar cells, solar panel, modelling, solar concrete collector**

INTRODUCTION

Due to the increase in world population, development in industrial activities, and enhancement in living standards, the human demand for electricity will grow in the future years.1 Traditional fossil fuels such as oil and coal cause carbon dioxide emissions and global warming.2 Thus, it is necessary to explore appropriate alternatives sources for electricity generation which are environmentally benign and sustainable. Solar energy is one of the most attractive sources of energy for electricity generation. Typically, solar energy harnessed in the daytime needs to be stored (thermally or electrically) for utilization in the night. Every day the earth exceeds the sunlight (about 1366W). This is an unlimited energy source available for free.

TYPES GENERATION OF ELECTRICITY FROM SOLAR ENEGY:

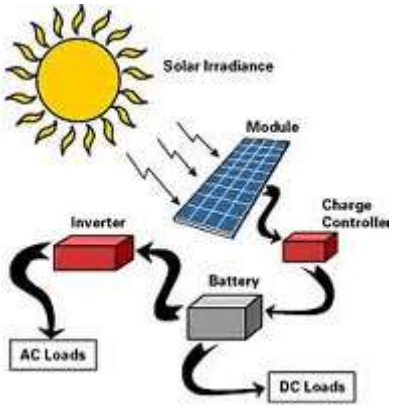
Directly and indirectly Method of electricity generation, In the direct method, PV modules are utilized to convert solar irradiation into electricity. In the indirect method, thermal energy is harnessed employing concentrated solar power (CSP) plants such as Linear Fresnel collectors and parabolic trough collectors.

A: Direct method of electricity generation

Photovoltaic (PV) technology is applied in order to directly convert solar irradiations into electricity. It utilizes diffused elements of incoming solar irradiations. Hence, PV technology is appropriate in regions with either high or low solar radiation. There are several types of photovoltaic materials which can be used for power generation. Mono and poly-

crystalline silicon, Cadmium telluride (CdTe), Gallium arsenide (GaAs), triple- junction solar cells composed of Indium gallium phosphide (InGaP) are among the most common materials used for PV cells. In order to generate electricity at a larger scale, solar cells are combined to form a module of multiple cells; these modules are then assembled into a (photovoltaic) PV array containing the length up to several meters. Based on NREL report,138 there are several solar modules which are inter- connected utilized to generate electricity in utility- scale. The technology of PV is sustainable especially for small- scale applications.139 These systems can be used both grid- connected and off- grid. The PV modules can be installed as fixed systems or can be assembled with a tracking system to obtain higher electricity; however, tracking system requires more area for installation. PV technology firstly was used to provide electricity in satellites and aircrafts. However, PV technology is utilized for both off- grid and grid- connected electricity generation nowadays.140 This technology can be applied for other

purposes including transportation, telecommunication, rural electrifications etc.



Dircect conversion of solar energy

PHOTOVOLTAIC (PV) TECHNOLOGY

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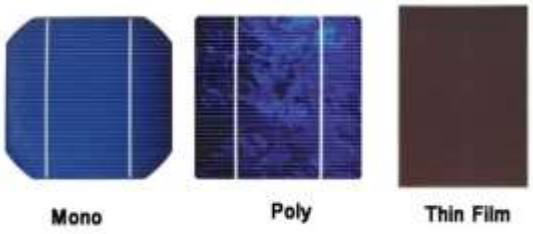
Generations of photovoltaic technology

PV technology is categorized 1st Generation PV, 2nd Generation PV, and 3rd Generation PV. Since the used semi-conductors in these generations differ, the efficiency and performance of these types are different. The first and second generations of PV modules are more commercially mature yield large- scale generation, while the third generations are still in R&D phase Open circuit and short circuit condition were applied on both models for further mathematical calculations. The obtained results from both predicting model were compared to the manufactures datasheet under different surrounding conditions. In overall, it is concluded that model with 7 parameters is more efficient and provide more accurate responses. . Several standard parameters such as performance ratio, yield energy, reference energy, and capacity utilization factor were considered and different presented PV technologies were compared. In addition, energy efficiency and exergy efficiency were also discussedAccording to Fraunhofer ISE,144 Si- wafer based technology had a share of about 90% of the total production in 2013 and the share of multi- crystalline PV technology was about 55% of the total production. It has also been emphasized by Fraunhofer ISE44,121 and Energy Informative,145 that among the thin- film technologies, CdTe leads with an annual production of 2GWp and currently has the largest market share. implies that a- Si is now commercially mature technology and being used for small-scale applications only. CPV systems have gained much popularity and yield higher efficiencies.



INDIRECT METHOD OF ELECTRCITY GENERATION (WITH VARIOUS CONCENTRATORES)

parabolic trough reflector:This technology attracts intentions in 1980s due to oil crisesIncludes a straight parabolic reflector that focuses the light on a receiver located along the reflector's focal line. The receiver consists of a tube located directly above the parabolic mirror and a fluid containing working fluid. The working fluid is heated to 150-350 ° C and flows, so the receiver is used as a heat source in the power generation system.

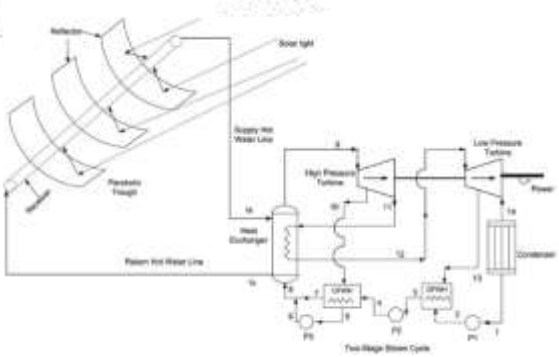
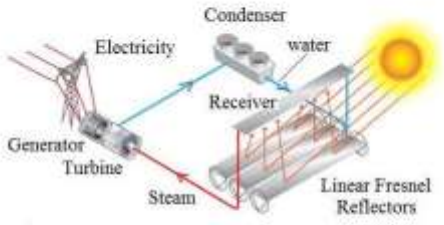


Figure 7 Parabolic Trough Reflectors

B. Fresnel

In a Fresnel lens, refraction occurs at the surface, but large materials between the two surfaces have no problem with refraction. It uses higher temperatures than conventional ones and is also used for heating furnaces. It is used for surface modification of metallic materials. This device uses solar energy in hot and very hot areas. These temperatures

are achieved in seconds. The Fresnel Concentrator has a 34.3% reduction in reflective area compared to a parabola of the same diameter. The 20-minute series of action performance required for manual adjustments to track the sun has proven to be a major drawback of this device.



Linear Fresnel Reflector
Solar Power Plant

C. parabola dish

Appearance resembles a large parabolic antenna, but absorbs mirror-like reflectors and focus. Using dual axial sun tracking. 30% efficiency has been achieved. This dish is produced at the MW level in a solar power plant. This is the highest conversion performance of concentrator photovoltaic technology.

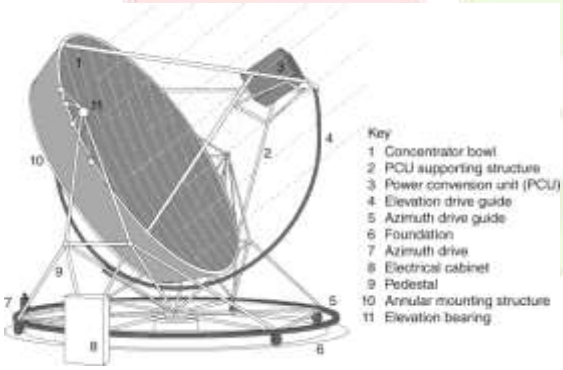


Figure 9 Parabolic Dish

D. Central receiver

In 1981, the first central receiver established,It is typically used primarily in large plants that produce more power. Also called "power tower". It works by focusing a field of thousands of mirrors on a receiver at the top of a centrally located tower. The receiver collects the solar heat transfer fluid. It is used to produce a stream turbine at the foot of the tower for the production of electricity.

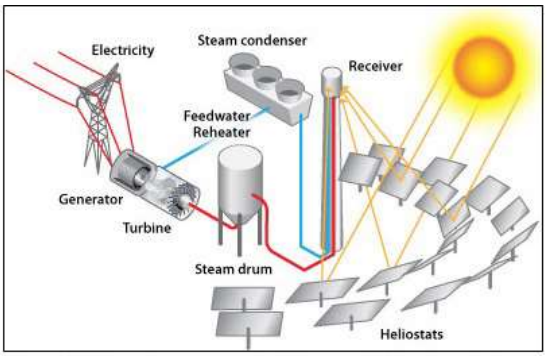


Figure 10 Central Receiver

VI. Benefits of solar energy

Save up to 20% on energy costs. Can be used at remote locations. Easy installation (that is, no wires, cords, etc.) rooftop requires no new space, meaning every home or commercial user can generate their own electricity. Sunlight is widely available, inexpensive, environmentally friendly and a renewable resource. There are no moving parts, and no additional fuel other than sunlight is needed to generate electricity. No need for water and fuel.

VII. Solar energy issues

When the sun is not shining, there is no energy production. High initial cost. More space is needed for large amounts of power. For inverters and alternating current (AC) applications required for night-time storage. Production photovoltaic systems monocrystalline silicon is technically challenging and consumes energy and time.

VIII. Application of solar energy

It is used in many applications, including electricity, evaporation, hot water, building heating and cooling, food preparation, pumping, and more.

Figure 11

Application for heating water

Figure 12

Application for Water pumping

Fig.13

Application for cooking food

IX. Conclusion

Most people are aware of non-renewable energy resources. Solar energy is growing in popularity due to its economic benefits. By using battery backup, solar energy can be powered 24/7, even on cloudy days and nights. It is also used in grid-to-grid systems with continuous power. There are more advantages compared to other forms of energy such as fossil fuels and petroleum deposits. This is a promising and consistent alternative to meet high energy demands. Research on solar cells and solar energy has future potential around the world.

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