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SOLAR POWER GENERATION AND ITS IMPLICATIONS

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ABSTRACT

The SOLAR ENERGY is produced by the Sunlight which is a continual source of energy which is free from eco friendly. The sunlight energy reaches our earth to meet the world's energy demand for the complete year. Now, in this new generation we needed Electricity every minute. This Solar Energy is generated by as per applications like industrial, commercial, and residential. This paper also tries to discussed about the working of solar system, its panel types and highlights the various method to raise the benefits of solar energy. This paper is also analyzes its current market status, its economic conditions and policy aspects of solar energy development .The cost of solar energy has reduced rapidly in the recent past, but still it remains much higher than the cost of conventional energy technologies. Unless these barriers are controlled, manage and increasing the electricity supplies from solar energy will require continuity of the support of potentially costly policies.

Keywords: *Continual Energy, Solar Panel, Photovoltaic Cell, Modeling of PV Panel, Climate Change.*

Introduction

The sun supplies the majority of the energy available on the Earth such as wind biomass, wind power, hydropower and all fossil fuels can detect their energy source behind one to the sun. These indirect routes for providing the solar energy are having the various advantages. For eg. storage of energy in the case of fossil fuels and hydropower, and transportation of energy in the case of wind. Solar energy is an important source of renewable energy and its technologies are classified as either passive solar or active solar depending on the process of its cauterization and the distribution of solar energy or converting it into solar power. Active solar approaches involve the use of photovoltaic systems, concentrated solar power and solar water heating to harness the energy. That energy which is present in the form of radiations and heat is called solar energy. Solar power is available to makes highly appealing source of electricity on the large scale. About 70% of solar radiation is absorbed by clouds, land masses and oceans while the remaining portion is back to space. Solar energy has experienced an impressive technological shift. While the previous solar technologies consisted of scaled-down photovoltaic cells, the current technologies are represented by solar concentrated power and also by the considerable PV systems which is feed into electricity grids.

Review of Literature

Renewable energy systems are distinguished to various natural renewable energy resources for eg- sunlight, geothermal heat, wind, rain, tides, and sunlight, which are naturally restock. According to the 18% portion of renewable solar energy in electricity generation is divided into 15% of global electricity coming from hydroelectricity and 3% from new renewable energy. Nevertheless, the energy revolution scenario demonstrates how by 2020 an impressive 32% of global electricity needs can be met by renewable energy. The global target for new renewable energy is 20% by 2020, whereas the proposed target of UK is 15%.Challenging financial crisis and economic drop off during the last three years, wind power continued rapid growth, and wind turbine installations are increased day by day. This is testament to the inherent attractiveness of the technology which is clean, reliable and quick to install. Wind power becomes the power technology for a growing number of countries around the world. Solar energy systems also sustained in the face of the economic disaster. In 2009, the Photovoltaic industry production again increased by more than 50% and reached a world-wide production volume of 11.5 GWp of Photovoltaic modules. According to the report of "European Commission's Joint Research Centre", a three-forth part of global newly installed PV power generation which was located in Europe. This study discloses the different number of PV generations. This shows that in 2009, the peak amount of electricity estimated at 7.4 GW, of which 5.8 GW was located in Europe is generally produced by newly installed PV cells.

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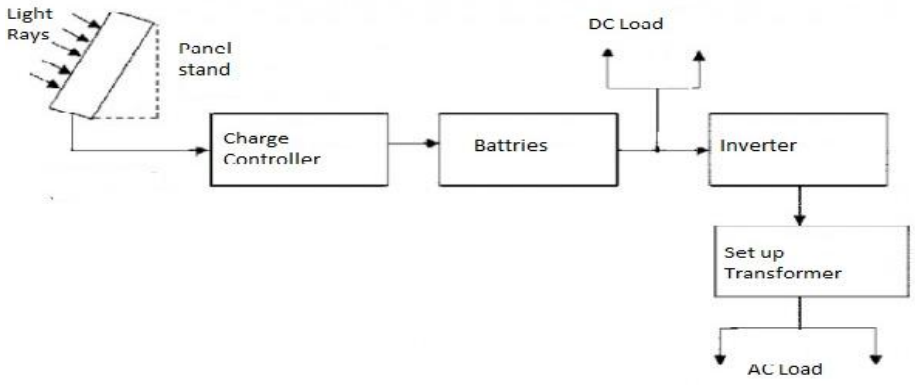
Objectives

- To improving the quality of life and weaken rural poverty in the deenergized and off-g rid areas by providing the some basic needs such as entertainment, lights, education and communication through the accessible and reliable source of energy .
- To Promote the use of continual, economic, and cheep decentralized electrification solutions for areas not probable for grid connection with the local government sectors, e and private sectors.
- To Increase production, promote maintenance and contact with the community by increasing their time at night.
- Apply solar energy technology as the enabling technology for sustainable development.

Working Of Solar System

PV cells Convert Sunlight to Direct Current (DC) electricity. Basically the charge controller is used as a current and voltage controller to charge the battery and protect the cells from overcharging. Battery system is used as a storage devices of electric power when sunlight is not present. Now a inverter is connected to this PV system for the conversion of direct current in to alternating current.



Photovoltaic Cell

A PV cell is comprised of many layers of materials, each with a specific purpose. The most important layer of a PV cell is the specially treated semiconductor layer. It is comprised of two distinct layers (p-type and n-type), and is what actually converts the Sun's energy into useful electricity through a process called the photovoltaic effect. On the both side of the semiconductor is a layer of conducting material which "collects" the electricity produced. Note that the backside or shaded side of the cell can afford to be completely covered in the conductor, whereas the front or illuminated side must use the conductors sparingly to avoid blocking too much of the Sun's radiation from reaching the semiconductor. The final layer which is applied only to the brighten side of the cell is the anti-reflection coating.

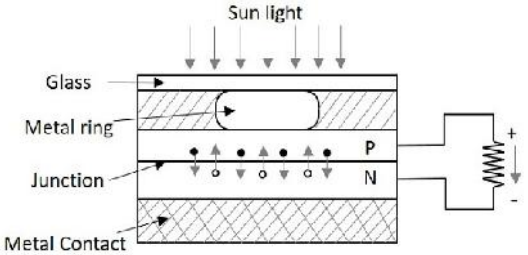


Fig. Construction of Photovoltaic Cell

Photovoltaic module

A photovoltaic (PV) module is a unit comprised of number of PV cells and the principal unit of a PV array. PV modules be a part of the photovoltaic array of a photovoltaic system that generates and supplies solar electricity in commercial and residential applications. These modules use the photons from the sun for the generation of electricity through the photoelectric effect. Most modules use wafer-based crystalline silicon cells or thin-film cells.

Fig. Photovoltaic Module

PV Pannel

Solar panels are consisting of individual PV cells which are connected together as shown in fig. these modules are assembled as a pre wind and field unstable unit. Inside the PV panel all PV cells are arrange in series combinations.

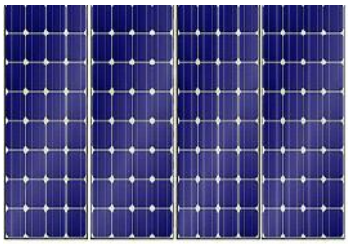


Fig. Photovoltaic pannel

Photovoltaic Array

A photovoltaic array is a connected collection of solar modules. That amount of power which produced by one module is seldom enough to fulfill the requirements of homes or business So we can say that the modules are connected together to form an array. Most of the PV arrays use an inverter for the conversion of the DC power which is produced by the modules into AC current that can power lights, motor and other loads. The modules of a PV array are firstly connected in series to obtain the desired voltage and the individual strings are then linked in parallel combination to allow the system to produce more current. Solar panels are typically measured under STC (standard test conditions) or PTC (PVUSA test condition).

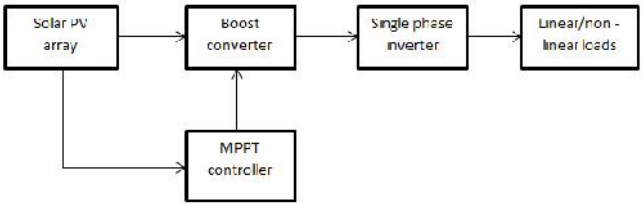


Fig . Photovoltaic Array

Current Market Status

Over the last decade, the installation of solar energy technologies has grown exponentially on the global level. For example on the global scale the installed capacity of PV is increased from 1.4 GW to 40 GW with an average annual growth rate of around 49%. By the end of 2010 the installed capacity of CSP more than doubled over the past decade to reach 1,095MW. Solar energy markets have retain their motivation since early 2000, expressing the recently phenomenal growth. Now the aggregate capacity of solar based electricity generation capacity is increased to more than 40 GW by the end of 2010. Solar energy becomes the biggest source of renewable energy supply. Effectives solar radiation reaches our earth's earth ranges from around 0.06 Kw/m2 at highest attitudes to 0.25 kW/m2 at low attitudes.

Economics of Solar Energy

There are lots of solar energy technologies which are challenges in various energy markets, specially in off grid or stand alone applications, grid related distributed power generation and centralized power supply etc. Renewable energy costs have decreased significantly over the last several years as solar

prices dropped dramatically. Their prices are decreases and the arising accrual in investment and assumptions are developing to have a broad ranging effect on electricity markets, profitability and regulations. In this past, we highlight the economics driving the decrease in solar costs and the implications for decarburizing the United State's electricity grids. The main challenge for the economic investigation of power generation technologies is the difference in price data across technology type, plant size, time and country. Fuel prices are highly explosive and capital prices of solar technologies are changing yearly. An economic investigation here could help demonstrate the cost ambitiousness of solar energy technologies with other technologies. Since fossil fuels likely coal and gas produce negative worldliness at the local as well as global level, Whereas solar energy technologies do not. It is totally unfair to compare solar energy technologies with fossil fuels technologies without considering for those worldliness. We further examine the levelized electricity generation technologies cost which developing a structure to trap some of those external costs. The structure accounts for the environmental damage costs of fossil fuels, specially environmental structure damage costs. Due to the lack of data, the damage cots of local air pollution are not included. In the view of the fact that the obtaining actual prices of damage cost of emissions from different types of fossil fuels technologies is widely complex. The above examinations shows that the climate changes alleviations benefits would not be examination for making solar energy technologies economically attractive. Besides the highest generation time of PV systems frequently closely matches highest loads for a regular day so that expenditure in power generation, communications, and distribution may be retarded or removed. Nevertheless, design a structure to quantify all these benefits is beyond the scope of this study.

Policies

Solar power in India is a fast developing industry. The country's solar installed capacity reached up to 31.696 GW by the end of 31 October 2019. Our government had an target of 20 GW capacity initially for 2022, which was achieved four years ahead. India is provided with wide solar energy potential. Approximately 5,000 trillion kWh per year energy is incident over India's land area with most parts receiving 4-7 kWh per sq. m / day. Both technologies namely, solar thermal and solar photovoltaic's can effectively be harnessed providing large climb ability for solar in India. Solar also provides the ability to generate power on a distributed basis and enables fast capacity addition with short lead times. Off-grid decentralized and low-temperature applications will be very useful from a rural electrification perspective and meeting other energy needs for power and heating and cooling in both rural and urban areas. From the energy security point of view, out of the all sources solar is the most secure. A small portion of the total incident solar energy cam encounter the entire country's power requirements. In our country, every effort needs to explore the relatively abundant sources of energy which is available to the country. While, today, the cheapest electricity source is the domestic coal based generation but future outlines suggest that this could well change. This portion is briefly presents a key characteristics of policy instruments which support solar energy for electric and direct heating applications. A huge number of policy appliances have been applied to increase power supplies from solar PV and CSP. Here we highlights the key appliances which included the feed-in-tariffs, speculation tax credits, direct subsidies, favorable financing, mandatory accessing and purchasing, renewable energy portfolio standards and public speculations. Three rationales are generally offered for employing these policies. To encourage the use of low-carbon technology in the absence of a more comprehensive Policy for greenhouse gas mitigation, like a carbon tax is the best encouragement.

Methodology

The special nature of solar PV generation in which systems produce electricity on highest level, produce power at the location of use. They do not require regularly fuel purchases, and having the significant security and environmental benefits over the fossil fuels. These characteristics g raise the value of solar electricity because they allow profitability to keep away from the costs of fuel, generation, retain capacity, communication, and distribution in their centralized resources. Value of its Methodology represents the opportunity for states and profitability across the country to start to assess the advantages of allocated generation and better plan for energy investments that provide maximum benefits to society.

Their estimated studies can help profitability, regulators, and policy makers to:

- To Analyze the Existing Net Metering Programs
- Design Community Shared Solar Tariffs
- Value Exported Solar Energy
- Determine Qualifying Facilities Rates
- To analyze Real Time Pricing with AMI
- Advance Value of Solar Tariffs

This one is also help to advance dialogue around the appropriate value of distributed solar resources in Wisconsin, the Midwest Renewable Energy Association deal with Clean Power Research to develop recommendations for solar estimation.

Conclusion

Solar energy has become increase more popular due to their economic benefits. Solar Energy provides the Electricity 24x7, even on cloudy days and night. This energy is also used with inter-grid System for Continuously Power supply. solar energy has various advantages as compared to other forms of energy such as fossils fuels and petroleum deposits etc. Over the last decade the market of their technologies to harness of solar energy has seen considerable expansion and this expansion of their market for grid-connected PV systems and solar hot water systems have been remarkable. PV applications on the centralized profitability scale have grown strongly in the recent years. off-grid applications are supreme only in developing markets. Lots of budgetary appliances have been used to increase output of solar energy. These appliances involves the tax impulsive, privileged interest rates, direct impulsive, loan programs, construction mandates, continual portfolio standards, voluntary green power programs, net metering, interconnection standards and illustration projects. To overcome the current technical and economical barriers, we will require substantial further outlays to finance applied research and development.

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