

STUDY AND PERFORMANCE OF PHOTOVOLTAIC SOLAR PANEL

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ABSTRACT

Human demand for new energy sources is urgent, because the traditional fossil energy is unable to meet human needs, and the fossil resource will make pollution, in this situation, solar energy gradually comes into the vision of scientists. As science advances, humans can already extensively use of solar energy to generate electricity. Solar energy is an inexhaustible and clean energy. India is a developing country and, as a developing country, its energy needs are increasing day to day and to meet all those energy needs that we require to find alternative ways through which we can meet all our energy requests. Therefore, we must move towards renewable energy sources and among all renewable sources The Solar energy is a large amount favorable energy source as all the available energy is available throughout the year. Sun's Solar radiation differs based on geographic location. To get the most out of solar devices such as a solar cell, a solar panel; the only need is that they are economic in economic terms, their level of absorption must be high and be readily available. A micro-level lesson was conduct to uncover out how dust affects the overall effectiveness of the plant, in particular radiation, which will be directly linked to the consequence of the panel on the photovoltaic solar module and hereby suggested how to increase plant performance for the months of January, February, March 2021 is done.

Keywords:

Photovoltaic conversion, Environmental cleaner, Diffusion.

INTRODUCTION

Solar energy has the greatest potential of all the sources of renewable energy and it will become one of the most important sources and supplies of energy if only a small amount of this form of energy could be used, mainly when the rest of the sources are getting depleted in the country.

A very large inexhaustible source of energy is the solar energy. All the present and future need of the world can be supplied by solar energy on a regular basis. This makes it one of the most promising of unconventional energy sources. It can be seen that the energy from the sun can be used directly or indirectly. The direct means include thermal and photovoltaic conversion, while indirect means include the use of water (hydroelectric) power, the winds, biomass, wave energy, temperature differences, tidal energy etc. The sun is a constant resource of energy. All day the sun enriches the earth immeasurable amounts of a solar energy, most of which comes in the shape of yellow light. Across the earth planet, sunlight is through far the nearly all essential energy source for all living beings. Without it, the earth has no life. The Solar energy has been used ever since prehistoric times, but in the most prehistoric way. Prior to 1970, a few investigate and improvement was conceded out in some countries to further make use of solar energy. Resourcefully, but nearly all of

that work has remained primarily academic. Subsequent to the impressive climb on oil prices in the 1970s, more than a few countries began to formulate extensive investigate and improvement programs to exploit a solar energy. A Solar energy is the simplest available energy source. There is also nearly all essential of the unconventional source of power since it is not polluting and, consequently, helps to reduce a greenhouse outcome. Sunlight can be a free renewable energy source for every day. Jobs like cooking, heating water or heating houses. A Solar energy can be too used to get together our electricity necessities. Through photovoltaic solar cells (SPV), solar radiation is converted directly into DC electricity. This electricity can be used to store on a battery. This accumulates an electrical energy can then be used at night. A SPV can be use in favor of a various applications is as given: Domestic lighting, public lighting, Electrification of the rural community, Water pumping, Desalination of saline water, Railway signals.

If the resources to make well-organized use of solar energy could be set up, reduce our dependence on non-renewable energy source and do Environmental cleaner. The energy received as of the sun can be classified as firstly through the manifestation of heat (or thermal energy), and secondly in the appearance of light energy.

RENEWABLE ENERGY RESOURCES IN INDIA (Short)

As clearly seen, that for the augmentation of our economy and advancement of our society, energy is an underpinning factor which has a key role in facilitating development and sustainability. While taking into consideration the process of advancement in societies around the globe, we always have a sense of the perpetual concern that policy-makers confront frequently, for instance expanding and improving access to healthcare, education, curtailing negative environmental impacts, enhancing and producing employment opportunities, and developing striking trade and investment conditions. In spite of that, at times we neglect the fact that energy encompasses all of these goals.

Renewable energy sources in India

Renewable energy is increasingly a part of an economic sustainability calculation. Due to the prevailing energy crisis issues, India needs to ensure security and set larger goals to attain self-sufficiency in production of energy. There exists a considerable energy demand supply gap in India. The primary reason for electricity shortage is an over-reliance on thermal energy from coal and gas. There are many sources of renewable energy like wind power, biomass energy, solar energy, energy from waste, small hydropower plants, etc. India has a great potential in renewable energy sources for electricity generation. The most utilized power in India is wind energy.

Solar green energy:

In India as they directly displace greenhouse gas emissions while contributing to sustainable development by reducing local pollutants. According to them, solar energy technologies have been developed through research and development, and some of these technologies have reached maturity and a user-friendly status. These are suitable for decentralized applications, but are not yet deployed in rural areas. Solar energy is clean and available in abundance. Make use of the solar technologies, sun to provided light, heat, electricity etc. for domestic & business applications. With the alarming rate of exhaustion of a chief conventional energy resource, such as oil, Coal and natural gas, added to the Environmental degradation caused Through a method of exploiting these energy sources, it has happened to an urgent need investing in renewable energy resources that would fuel the future enough without harming the environment through the emission of a

greenhouse gas.

LITERATURE REVIEW

The importance of renewable energy sources in energy security and supply side management of energy sector analyzing the technical and economic aspects (Luise, 2013). (Chaurey, Ranganathan, & Mohanty, Electricity Access for Geographically Disadvantaged Rural Communities- Technology and Policy Insights, 2004) Literature also depicts the positive contribution of electricity to Human Development Index (HDI), reflecting that the poor are most likely to benefit from electricity inputs. F. Mejaet al. (2013) [7] has been studied that the effect of dirt on solar panels which causes a reduction in the optical efficiency of concentrated solar energy (CSP). Dirt losses were found to be almost 0.21% per day. The site was observed to experience a decrease in efficiency intervals from 5.8% to 7.2% during a 108-day drought during the summer season, when a rain event occurred that lost efficiency and recovered at 7.1%.

(Reddy, Kaushik, & Panwar, 2013), in lines with the available literature, further contributes pointing out that, energy is the most compelling feature in social-economic growth as well as the creation of a wealth of a country. Derived from chronological data, it is found that, admittance to energy resources and economic activities possess a strong Review of Literature 28 correlation. Thus, electricity is the leading driver for the economic development of any emergent nation like India, which is thriving for a vigorous economic growth rate. (Molyneaux, Wagner, & Foster, 2016), added, evolving social and economic advancement with the clean energy is the aim of leaders internationally. India remains a leading example of a country that is putting forth its right to nurture and produce energy access for all of its citizens. Clean energy from renewable sources is a principal component of elucidation and will be indispensable to accomplish that aim.

Zeki Ahmed et al. (2013) [1] has been studied that the generation of electricity around the world occurs mainly through the use of non-renewable energy, sources mainly fossil fuels. However, these resources will disappear at some point in the not too distant future. Solar energy can be harvested to produce electricity through a variety of methods. Among these methods, Photovoltaic systems have been very successful for many reasons. To name a few, it is the oldest and researched more thoroughly and has been tested and implemented for a long time around the world. The Executions of photovoltaic systems have exposed that their reliability and efficiency depend on a lot of factors, dominant geographic (latitude, longitude and solar intensity), environmental (temperature, wind, humidity, pollution, dust, rain, etc.) and the type of photovoltaic used. Dust is the most delicate factor recognized significantly affects the performance of photovoltaic systems. The importance of this study was due to the large-scale transfer of photovoltaic technology to the desert area of Arab countries. This area is hot and dusty for the most part time and dust represent the main obstacle to the use of photovoltaic energy. This article examines the research to study its impact of dust in the performance of the photovoltaic system.

EXPERIMENTAL SETUP (Where is Experimental Setup) ?

Solar cell: (Introduction)

Solar cell is made of two types of semiconductors which are called P-type and N-type silicon. Because of adding atoms, the P-type silicon loses one electron. The N-type silicon is made by adding atoms so that it gets one more electron. A solar cell is made by a P-type silicon layer and the N-type silicon layer. There are too many electrons in N-type layer, and in P-type layer, there are too many electron-holes. Near the junction of those two layers, the electron moves into the electron-hole from N-type layer, this creates a depletion zone so that the electrons fill the holes. The solar cell like crystalline silicon based solar cell given in Figure 3.1 below is the Solid position semiconductor p-n junction device that converts sunlight into direct electric current through the principle of the photovoltaic effect.

The photovoltaic panel (Introduction)

As the most important part of solar PV system, solar cell matrix is in a big role for transforming light into electricity. According to the raw materials, it can be divided into three types, single crystal silicon solar cells, polycrystalline silicon solar cells, and amorphous silicon solar cells. In the solar PV systems, single crystal and polycrystalline maximum battery are the main types currently. From the above analysis, the development of crystalline silicon is closely related to photovoltaic industry and manufacturing industries. The development of photovoltaic industry will directly promote the development of crystalline silicon production industry. Photovoltaic Solar Panels absorb sunlight from the sun as an energy source to generate electricity. A photovoltaic module is a connected package with typically 6×10 photovoltaic solar cells dimensions.

Solar Inverter: (Introduction)

The device can transform direct current into alternating current. Since solar cells and batteries are DC power supplier so that an inverter is necessary when it is an AC4 load. According to operating mode, the inverter can be divided into stand-alone inverters and grid inverters. As a stand-alone inverter, it is used in an independently operated solar power generation system for supplying a separate load. Grid inverters are used in network operation solar power generation systems. The inverter can be divided into square wave inverter and sine wave inverter according to the type of output waveform. The circuit of square wave inverter is simple, cost of production is low, but the harmonic component is large. It is generally used for the system which is a few hundred watts or less and low requirements on the harmonic. However, the cost of sine wave inverter is high, but it can be applied to a variety of loads. The inverter can be connected with a charging output controller to drive AC loads. Here are some protection functions of an inverter: 1. Overload protection; 2. Short circuit

protection; 3. Reversal protection; 4. Undervoltage protection; 5. Overvoltage protection; 6. Overheating protection.

Data ?

Method?

RESULTS AND DISCUSSION

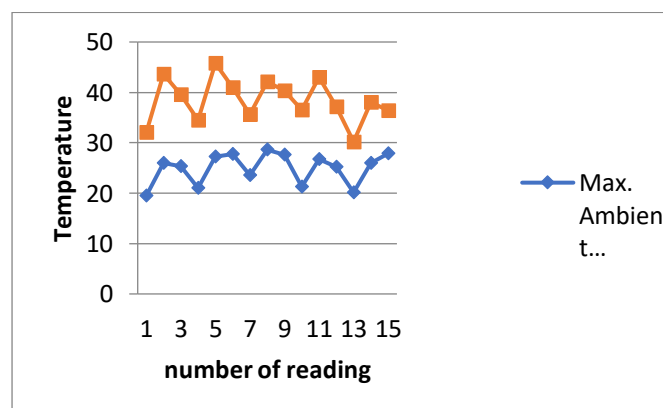
By using different voltage values, lessons are conducted. And current in the photovoltaic solar module with sand sample of dissimilar weight with the different radiation values. Effect of particle size on the production power of the solar photovoltaic module was also analyzed. The production power of the photovoltaic solar unit is obtained with dust samples with different weights for observing a voltage and current measurements. The PV the production power of the unit was measured several times, and the average of the values of voltage and current was detail in the study.

By dividing data into three intervals, readings have been taken. Each interval including of the four-hour data listed below. This data table 4.1 shows the maximum and minimum wind speed, the maximum and the minimum ambient temperature, the maximum and the lowest amount temperature of the model, maximum and minimum Radiant power with the corresponding date and time.

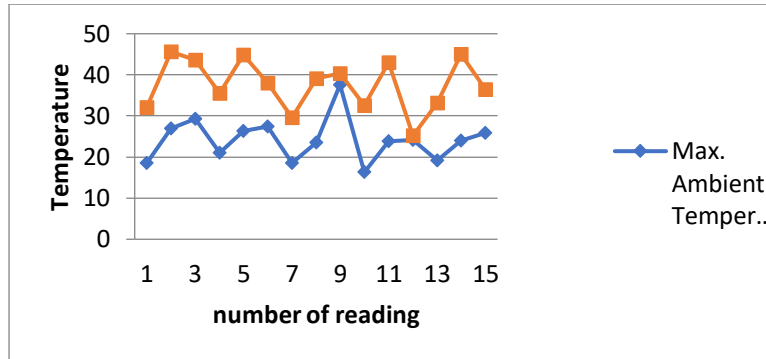
In table 4.1, the data represent meant for the months and comparable data for several months, such as January, February and March 2021.

Experimental Analysis of temperature on different Months

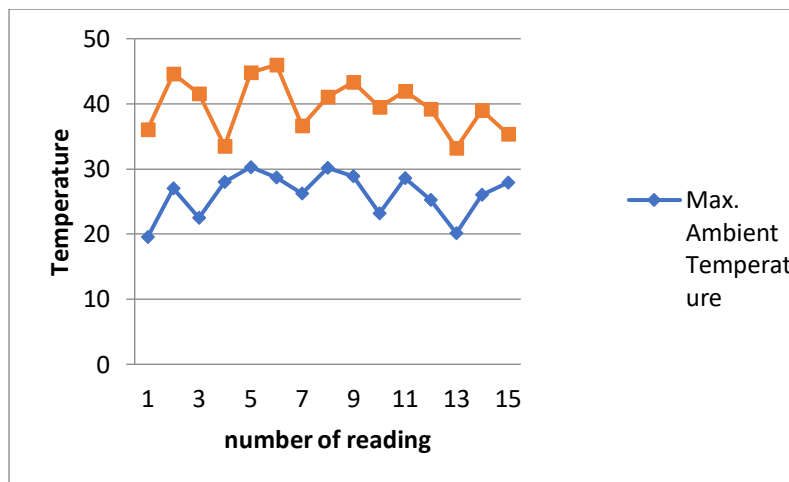
From above mentioned table; the study of deposition of the sand on a panel and the manufacture can be measured or calibrated with the help of a graphic technique. Therefore, monthly graphs are shown below for December, January, February and March:



Graph shows monthly value of Jan 2021



Graph shows monthly value of Feb 2021



Graph shows monthly value of Mar 2021

CONCLUSION

On this topic, the revision of a model in the various months was considered and an attempt was made to discover the model with the corresponding phase of time. This research work is based on the declaration of sand on the solar panel and by whom the manufacture of solar electricity is affected. The depositions of the sand patterns are another aspect of the lessons and also depend on the environmental factor which is also influenced by strong storms, storm surges, etc. This lesson is at the micro level, however due to some limitations, study has been conducted and part of the conclusion will be identified and discussed. In this study

he focused on a photovoltaic module during months like January, February, March and the results are as follows: The rooftop solar power plant should be cleaned in every 5-6 days to increase the effectiveness of solar plates to have been previously formulated and so as to have been washed after every thirty or thirty-five days, which does not help the panel to reach its maximum efficiency.

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