

Enhancing Efficiency And Limitations of Solar Power Generation

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Abstract- In past some years back the energy requirements gone to top gear with rise in use of limited natural resources and depleting the environment balance, so we need to be stop this and let's focusing on clean, pure, unlimited and eco-friendly energy sources i.e. renewable energy sources. solar energy is key in the future solutions but due to drawback of efficiency they are neglected. we have noticed this point and addressed to problems of temperature of panels and irradiance on sun, so proposed system which is auto sun tracking with cooling system and mirror concentration method to enhance efficiency of existing system. This proposed system has vast scope and will driver of the energy shift movement to serve the whole world.

I. INTRODUCTION

Energy is one in every of the foremost basic would like for person nowadays. Energy is one in every of the leading problems everywhere the planet and everybody is trying to find energy resources. Non-renewable energy resources are restricted and that they are eventually aiming to finish shortly. The employment of renewable energy resources is one in every of the key solutions to those issues. Alternative energy is one in every of the first sources of fresh, torrential and inexhaustible energy that provides one in every of the most effective energy resources.

Solar Energy generation plays the crucial role in generating renewable energy. Increasing the output type the solar panels will facilitate us generate a lot of quantity of energy from the present setup. During this paper, we've mentioned a number of the ways by which we can increase the potency of the system.

II. BACKGROUND

Principle of the solar cells:

Solar cells are made of the semi-conducting material such as the silicon which are doped with the impurity to create unequal distribution of the free electron (n-type) on the one side and (p-type) holes on the other side of the junction to make diode. Solar light has the photon which excite the

electrons and the electricity is generated. Current/Voltage are directly proportional to intensity of the light.

Solar panels:

PV cells are arranged in solar panel that serves the purpose of exciting electrons of material consisting in solar cells using photons. The average amount of sunlight received by solar panels depends upon position of sun also efficiency of solar panels depends on temperature of panels, intensity of light so it is better to modify solar panels on needs.

Microcontrollers:

They act as the brain of all the system. They gather input from other devices and control the functions of the embedded systems.

LDR (Light Dependent Resistors):

They are used to measure incident solar irradiance. We aligned 4 LDR's on the four corners of the panel so that we can get more accurate measures of incident solar irradiance.

Temperature sensor:

As the name suggests, it measures temperature of the solar panels so that we can get exact idea about when to initialize cooling system and when to stop it.

III. METHODOLOGY

The system of methods used in this project are basically based on the knowledge that more of the irradiance leads to more of the output required.

The supportive technological method which contributes to the maximum efficiency which happens to be the goal of this project is "dual axis tracking system".

Since the project has sunlight as its base, solar panels are definitely the basic gadgets used and their efficiency is

exponentially incremented by the method “With Mirror and With Cooling”.

IV. OPERATIONAL PRINCIPLE

Efficiency=1/Temperature (Efficiency is inversely proportional to the Temperature). This the fundamental operational principle used in the project.

Since temperature is important source till it reaches the limit where it starts to have its adverse effect on the material of the solar panel it must be maintained to the optimum value.

To maintain the temperature to the optimum level the method we used is cooling which cools up the heat in the system and the panel is protected.

Dual axis system focuses all the surrounding sunrays to the panel with the help of the mirrors fixed and the efficiency generates by virtue of this system is certainly increases.

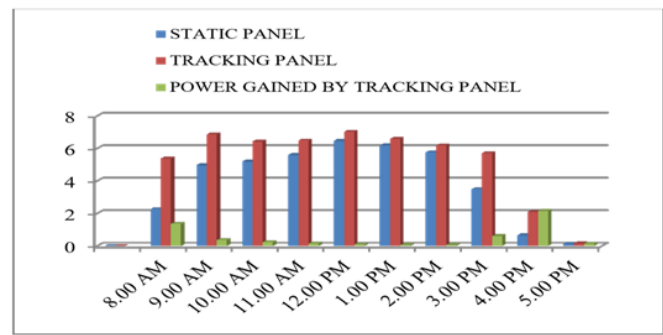
So basically the “Dual Axis System” in addition to “With Mirrors and With Cooling” produces the maximum possible output and this project is based on this operational principle.

V. RESULT

We have used two LDR to track the sun position so efficient amount of energy is gained by solar panel as compared to static solar panel. If we placed solar tracker instead of static solar, we get higher value of current and voltage so power gets maximize. table 1. Shows the current and voltage comparison for fixed and tracking panel at different times.

Table 1. Current and Voltage comparison

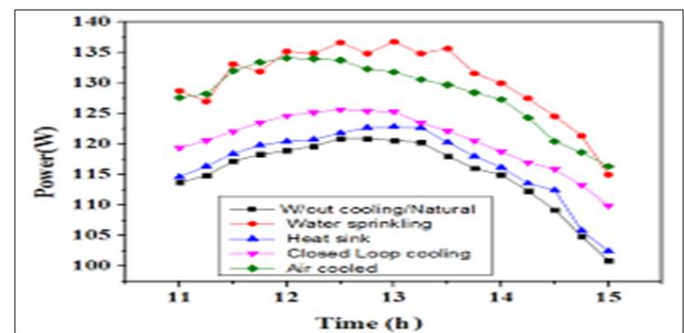
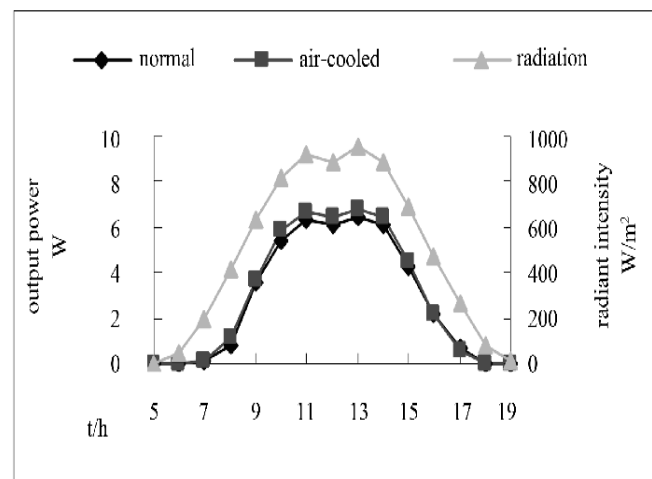
Time	Fixed solar panel		Tracking solar panel	
	Current	Voltage	Current	Voltage
	9.00	0.22	10.9	0.29
10.00	0.23	11.0	0.29	11.8
11.00	0.25	11.2	0.31	11.6
12.00	0.28	11.4	0.34	11.9
13.00	0.27	11.6	0.32	11.7
14.00	0.25	10.6	0.29	11.8



Graph plot for power comparison

When the incident irradiance increases temperature of the panel gradually increases. Increase in atmospheric temperature also causes increase in temperature of solar. According to the estimation, for every degree rise in temperature, efficiency of PV module decreases by 0.5%. To improve efficiency, we have used cooling system.

Power gain for different cooling system



VI. CONCLUSION

Solartracker with cooling system can generate more electricity than present stationary solar panel so more efficient. There are various kinds of solar tracker and cooling system available. one can choose single axis tracker and air cooling

solar or water cooling solar are also available. Considering the factor such as size, weather, our requirements, installation prize you can choose best one for us. As system involves tracker and cooling system it becomes slightly expensive than present one.

This system can be implemented in rural area, residential area and also on many platforms. Solar energy is renewable, clean and eco-friendly energy so it can be a future energy source.

VII. FUTURE SCOPE

There is vast scope of solar panels system some ideas of them are as,

1. Very efficient solar panels: By making structure change in process of manufacturing of panels, by replacing costly, less effective, hazardous, non-reusable material by cheaper, qualitative, reusable, eco-friendly material along with increase power generation capacity.
2. Portable solar panels and light weight.
3. Improving circuit efficiency, motor efficiency and optimal use of technology etc.

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