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ENHANCING THE PERFORMANCE OF PV CELL SYSTEM

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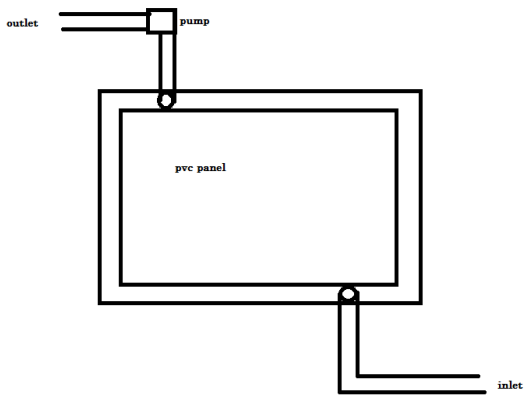
Abstract - *In this paper, we have designed and fabricated a setup of PV panel. Solar energy is the most abundant source of renewable energy. PV panel a is widely used application of solar energy. It is a well known fact that for efficient performance of any equipment it needs be maintained wisely. The same goes for PV panel. The panel is continuously exposed to radiation, due which it operates and functions. But continuous exposure leads to increase in the normal temperature of the panel. This rise in temperature is undesired, and tends to decrease the performance of the system. Hence to overcome this obstacle it is required to maintain the temperature of the system. Temperature can be maintained with the help of cooling. This project intends to increase the efficiency of the PV panel by using water as a cooling medium. Water is very commonly used as a coolant in many areas. The water will help to control overheating of the panel. A better performance rate can be achieved. The set up consists of a pump, storage tank, aluminum tray, PV module. The cooling set up will be placed below the panel such that it completely covers it. The tray has one inlet and one outlet. From the inlet cold water will be passed, as the water will flow below the heated panel it will absorb the heat from the panel due to which the water will be heated. This heated water will be flown out from the outlet. The water from the outlet will be collected in a reservoir from where it can be taken for use. Further this heated water can be used in domestic applications. This is how the project helps in cooling as well as the utilizing the excess heat of PV panel. The cooling phenomenon will ultimately reduce the surface heat of the PV panel.*

***Key Words*: PVC panel, pump, storage tank, aluminium tray.**

1.INTRODUCTION

The main objective of the research is to reduce the excessive heating of PV panel. This can be achieved by removal of heat from the PV panel. The surface is the element which faces all the radiations. The intensity of the radiations vary throughout the day. As a result of which the panel attains a high temperature. It is found that rise in temperature leads to improper functioning of the system. To retrieve maximum output from the system, the operating temperature must be sustainable for the system. During studies it is found that PV panel yields the maximum energy output if cooling is provided at an allowable temperature of 45° C. In this project water is the cooling agent. The water flows below the PV module. The flowing water carries extra heat away and thus the temperature is maintained. This method is found to be very effective as there is no complex mechanism in the set up and makes it very simple in construction. The set up can be easily achieved. The cooling mechanism aids in increasing the present efficiency of the PV panel. This project provides with data analysis of the performance of the panel with and without cooling. Comparison can be done. This way of cooling is found to be effective in controlling the temperature of the module. The water which cools the panel is also collected and can be used in some or the other ways, say domestic applications.

2. BLOCK DAIGRAM



3. HARDWARE DESCRIPTION

1] PV panel: The PV panel used, traps the radiation from the Sun and drives the system to function.

2] Water tank: The water tank stores the water which is to be supplied for cooling.

3] Pump: Pump delivers water from the tank to the cooling assembly.

4] Aluminum tray: It has one inlet and one outlet through which cold water will enter and leave the tray.

5] Storage tank: This tank will store the heated water which comes out from the tray after cooling the panel.

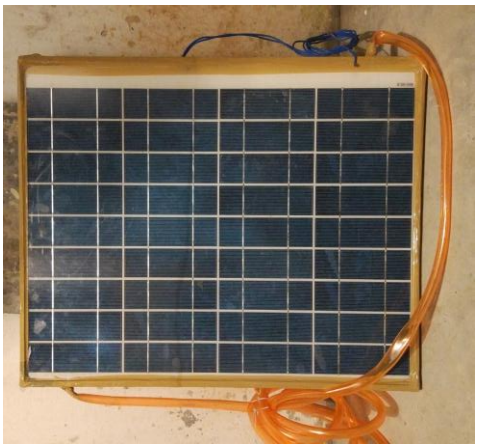


Fig-1: Front view of the assembly

Fig-2: View of the aluminum tray

4 . CALCULATIONS

Maximum power	Pmax	40W
Voltage at max power	Vmp	20.6V
Current at max power	Imp	1.7amp
Open circuit voltage	Voc	22.3V

- Output Power = voltage * current
- Input power = 1000w/m2 * 0.622m * 0.465m
- Efficiency = o/p power / calculated power
- 1. O/P Power = V*I = 18.6 * 1.62

  = 30.132

  Calculated Power = std power rating * area

  =1000 * 0.622 * 0.465

  = 289.23 W

  Efficiency(ŋ) = (30.132 / 289.23) * 100

  = 10.41 %
- 2. O/P power = 19.1 * 1.57
  = 29.987 W

  Calculated Power = 289.23 W

  Efficiency = 29.987 / 289.23
  = 10.36 %
- 3. O/P Power = 19.1*1.4
  = 26.74 W

  Calculated Power = 289.23W

  Efficiency = 9.24 %

5. CONCLUSION

The cooling method proposed in this paper is effective. It helps improve the rate of performance. Control over the exceeding temperature can be achieved. The assembly is very simple and hence can be easily set up. A simple but fruitful way of cooling the PV panel is presented.

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