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Comparative Study of 100 KWp on Grid Solar Power Plant in Different Location in India

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ABSTRACT

Solar energy is an unconventional energy source. Humans have used a variety of technologies to harness solar energy since antiquity. The majority of the non-conventional energy that is currently available on Earth comes from solar radiation and secondary solar-powered resources like biomass, hydroelectricity, and wind and wave power. Just a tiny portion of the solar energy that is available is used. Heat engines and photovoltaic systems are necessary for the production of electricity using solar power. The applications of solar energy are only restricted by human ingenuity. Using photovoltaic panels, which capture photon energy from the sun and transform it into electrical energy, is the most popular method of harvesting solar energy. Depending on how they are used, solar technologies are generally categorized as either passive or active.

KEYWORDS: *Grid connected solar plant, PV plant, Roof top solar plant, Solar energy, solar plant installation, solar system*

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INTRODUCTION

India's need for electricity is growing at a startling rate every day. Coal, liquid fuels, gaseous fuels, and other energy-generating resources are scarce. The best course of action is to use renewable energy resources because the supply of these resources is steadily declining while demand is rising. The sun is the best alternative for producing energy, based on the climate in India. Eco-friendly and pure energy is produced by the sun. Earth receives some of the solar energy. This component is

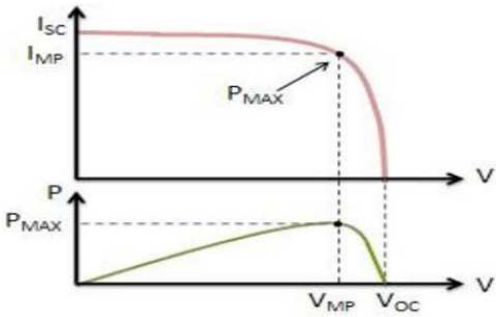

Fig.1. P-V and I-V curve of a solar cell at a particular temperature & irradiation

System Components and Specifications:

1. Solar panel:

Polycrystalline solar panel of 320Wp each of total 3 no are used.

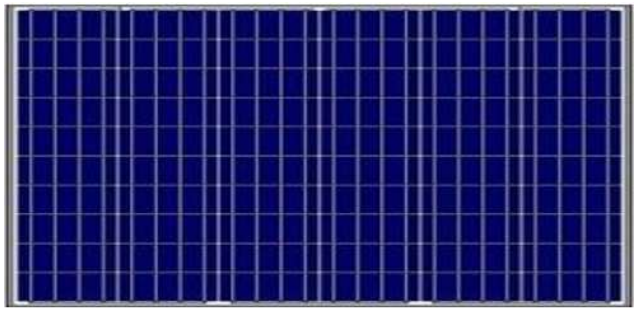

Fig. 2: Polycrystalline solar panel

Table 1 Solar panel specifications

Parameter	Specification
Manufacturer	Sova
Module	SS330P36C
Technology	Polycrystaline silicon72
Number of cell	9.30 A
in series Isc (A)	46.31 V

Vsc	9.98 A
(V)Imp	36.7
Vmp	7 V
Fuse rating	15 A
Rs(ohm)	0.33 ohm
Rsh-ohm	550 ohm

2. Solar Inverter:

A PWM charge controller, charge regulator or battery regulator restricts the rate at which electric current is added to or strained from electric batteries. It averts overcharging and may defend against over voltage, which can diminish battery performance or lifecycle, and may posture a protection risk. It may also prevent totally draining ("deep discharging") a battery, or perform controlled discharges, dependent on the battery technology, to defend battery lifetime. The standings "charge controller" or "charge controller" might refer to any a stand-alone device, or to regulator circuitry integrated inside a battery pack, battery-powered device, or battery charger[4].

Table 2 Solar Inverter specifications

Parameter	Specification
Manufacturer	Microteck
Module	24 V system: 1734VA
Input voltage	170 V – 260 V
Output voltage	230 V
Efficiency	>80%

3. Battery Specifications:

Total 4 no of 42Ah batteries are installed in series-parallel combination for the system.

4. PVSyst:

PVsyst software is used in this analysis to model and simulate a grid-connected photovoltaic system. Determining the annual energy yield and performance ratio of the designed PV system is the primary goal of this analysis. In order to analyze the performance analysis, various parameters are evaluated.

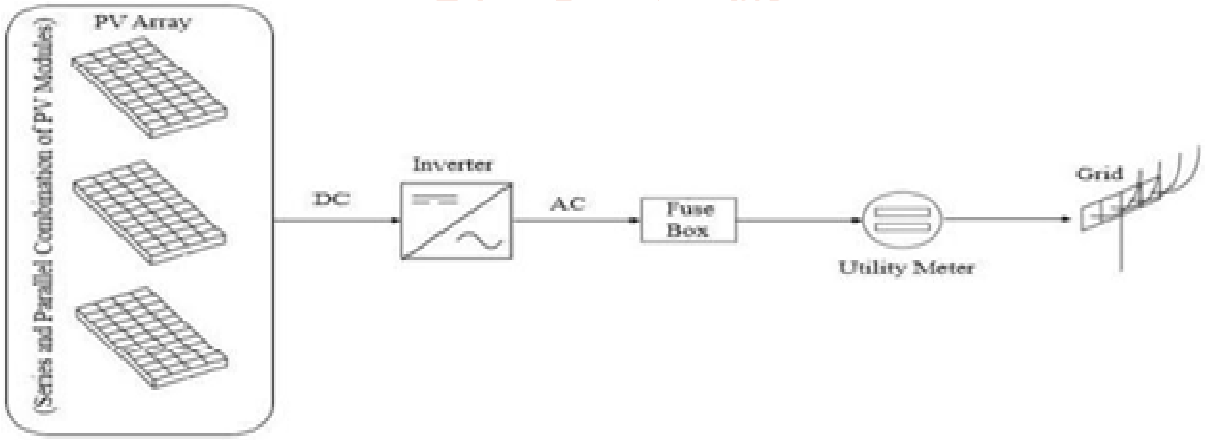

Fig. 3. Layout of grid connected photovoltaic system

PVSyst is a photovoltaic design and simulation program. It is designed to be used by architects, engineers, and researchers. It offers a user-friendly approach to develop a project. PVSyst has a large databaseof meteorological data for a number of sites all over the world. It also provides manual insertion of measured data for sites which are not enlisted in the software. It presents results in the form of a full report which includes specific graphs and tables. The data can be exported for use in other software's. To obtain results, wehave to provide some inputs to the software.

Simulation variables in PVSyst are: -

- Meteorological data
- Incident irradiance in collector plane
- Incident energy factors
- PV array (field) behavior
- Inverter losses
- System operating conditions
- Energy use
- Efficiencies
- Normalized performance index [5,6]

PVSyst required Input:

The design of a photovoltaic system is totally depend upon location because every location receives different amount of solar radiation. It happens due to the position of that particular location with respect to sun. This

difference of position is observed in the form of unique set of parameters like latitude, longitude andaltitude of a location [7,8].

Table 3 Meteorological and System Data

Parameter	Location: JSPM Wagholi
Latitude	18.58°N
Longitude	74.00°E
Tilt Angle	18°
Azumith	0°
Angle	0.2
Albedo	1KW
PV	SS330P
System	36C
sizePV	Microtech1734 VA,
module	230V
Inverter	Amron quanta 42Ah,
Battery	12V

Result and Discussion:

Here we will discuss the result with four different cases.

E Useful (KWH)

Efficiency				
Month	**Case 1**	**Case 2**	**Case 3**	**Case 4**
Jan	0.884	0.871	0.89	0.871
Feb	0.857	0.848	0.862	0.848
Mar	0.822	0.814	0.832	0.814
April	0.801	0.797	0.806	0.797
May	0.795	0.789	0.795	0.789
Jun	0.806	0.804	0.805	0.804
July	0.82	0.822	0.819	0.822
Aug	0.822	0.825	0.817	0.825
Sept	0.818	0.815	0.82	0.815
Oct	0.825	0.815	0.828	0.815
Nov	0.858	0.846	0.862	0.846
Dec	0.88	0.865	0.882	0.865
Year	0.829	0.824	0.831	0.824

E Useful (KWH)				
Month	**Case 1**	**Case 2**	**Case 3**	**Case 4**
Jan	9324	13312	9926	13312
Feb	11239	14324	11813	14324
Mar	14768	15990	14966	15990
April	13831	15448	14457	15448
May	13685	14518	14091	14518
Jun	11439	13200	12841	13200
July	9883	11653	11556	11653
Aug	10611	11903	11804	11903
Sept	10454	12952	12527	12952
Oct	11154	13831	12065	13831
Nov	9602	12868	10130	12868
Dec	9684	13121	10116	13121

Conclusion:

From the entire results of these four different zones and locations, on comparison we found that the Performance ratio of the west zone I.e. Jaipur is best and is 83.1 % among all of the other zones.

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