STUDY AND IMPLEMENTATION OF 15 KW ROOFTOP SOLAR PV SYSTEM AT GOVERNMENT ITI, AMGAON.

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ABSTRACT

In today's world as the problem of pollution and global warming and decreasing fossil fuels is increasing the need has arise to switch over to renewable energy sources for generation of electricity. Solar energy is available in abundance and so research has been done on increasing use of solar energy at consumer level In these paper the importance of installing solar pv roof top is been studied in detail. This is done at Government, ITI, Amgaon.

Keyword: *solar pv grid connected, islanded mode,solar panels,solar inverter,solar net meter.*

INTRODUCTION

Due to the lack of conventional energy sources to produce electricity we are moving towards renewable energy sources which will help us for electricity generation as well as to reduce the burden on conventional energy sources. This also results in reduced our electricity bill. Our case study based on the energy generated by the solar panels installed at Government ITI, Amgaon. The analysis provides us with a relatively quick and simple method of determining not only how much energy is being consumed but where and when it is consumed.
The PV solar panels are installed on the roof top in grid connection. The excess energy produced by this power plant can be sold back to the servicing electric utility. So, this arrangement provides payback of the investment.
This power plant generated DC energy which is converted to 440V, 50Hz AC electric energy with the help of inverter. The AC electrical energy is utilized by electrical appliances while the excess energy is transferred to servicing electric utility. This result to reduce in tariff[1].

SOLAR PV GRID CONNECTED SYSTEM

A grid-connected photo voltaic system, or grid-connected PV system is an electricity generating solar PV power system that is connected to the utility grid. A grid-connected PV system consists of solar panels, one or several inverters, a power conditioning unit and grid connection equipment. They range from small residential and commercial rooftop systems to large utility-scale solar power stations. [2].

ISLANDED MODE

Islanding is the condition in which a distributed generator (DG) continues to power a location even though electrical grid power is no longer present. Islanding can be dangerous to utility workers, who may not realize that a circuit is still powered, and it may prevent automatic re-connection of devices. A common example of islanding is a

distribution feeder that has solar panels attached to it. In the case of a power outage, the solar panels will continue to deliver power as long as irradiance is sufficient [3].

COMPONENTS

1. Mounting structure:

The mounting structure is coated by GI (galvanized iron) to prevent it from corrosion. The width of structure is 42 mm x 42 mm in size. The latitude and longitude of Amgaon are 21.3684° and 80.3798° respectively. The tilt angle of the panels is 19° above the ground surface. Mounting structure should be capable to withstand in any weather condition i.e. heavy rain, heavy wind blowing, etc.

2. PV Module:

Generally the modules are made up of silicon (Si), cadmium telluride (Cd- Te), copper indium gallium salenite/sulphide (CIGS). In this project, polycrystalline silicon type solar cell is used Here on the roof top there are total 46 panels are mounted. Each panel is of maximum power 330Wp. The efficiency of module system is 17.05%.Each module is under standard test condition (STC) rated by its DC output power.

3. Solar inverter:

Solar inverter is one of the most essential elements of solar electric power system. There are two types of inverter, string inverter and micro inverter. In our project we use the string type of inverter. Its maximum allowable limit is 18Kw DC power. Power AC normal is 15Kw.Mamimum voltage DC is 1000V DC.

4. Solar net meter:

Solar net meter is a bidirectional meter i.e. it can measure the flow of electricity in two directions. It measure energy flowing from grid to solar power plant as well as excess generated energy flowing from solar power plant to the grid. It records how much electricity is generated and sent to grid and consumed from grid.

5. DC and AC distribution box:

The DCDB (Direct current distribution box) is a component of electricity. DCDB controls DC power from solar panels and having necessary components such has surge protection device (SPD) and DC MCB to protect solar inverter from over voltage and over current respectively.

The ACDB (Alternating current distribution box) receives the ac power from solar inverter and direct it to ac load through the distribution board. ACDB include necessary surge protection device (SPD) and AC MCB to avoid any type of damage or heavy voltage.

6. Lightning Arrester:

The lightning arrester is made up of copper and is nearly about 6ft long. The purpose is to limit the rise in voltage when power line is struck by lightning.

7.Earthing:

Electrical earthing provides a low resistance path for the current to flow to the earth. In this project, the photovoltaic (PV) power system is of 15kw and produced hazardous voltage and currents. To ensure the safety of the public and protection of equipment's, Rod type earthing system is provided to solar PV System.

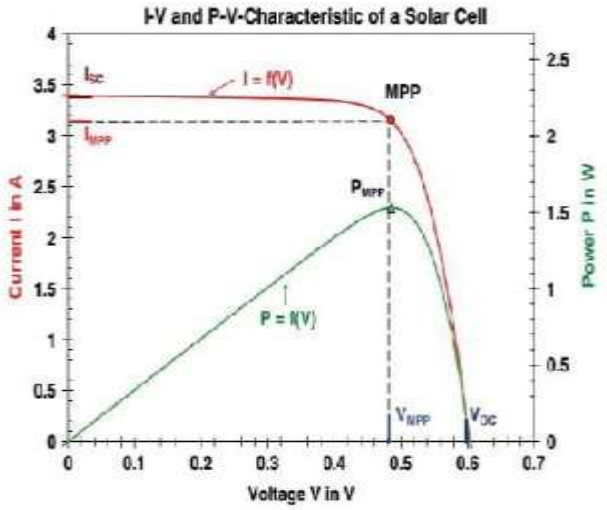

Fig 1: I-V and P-V-characteristics of solar cell

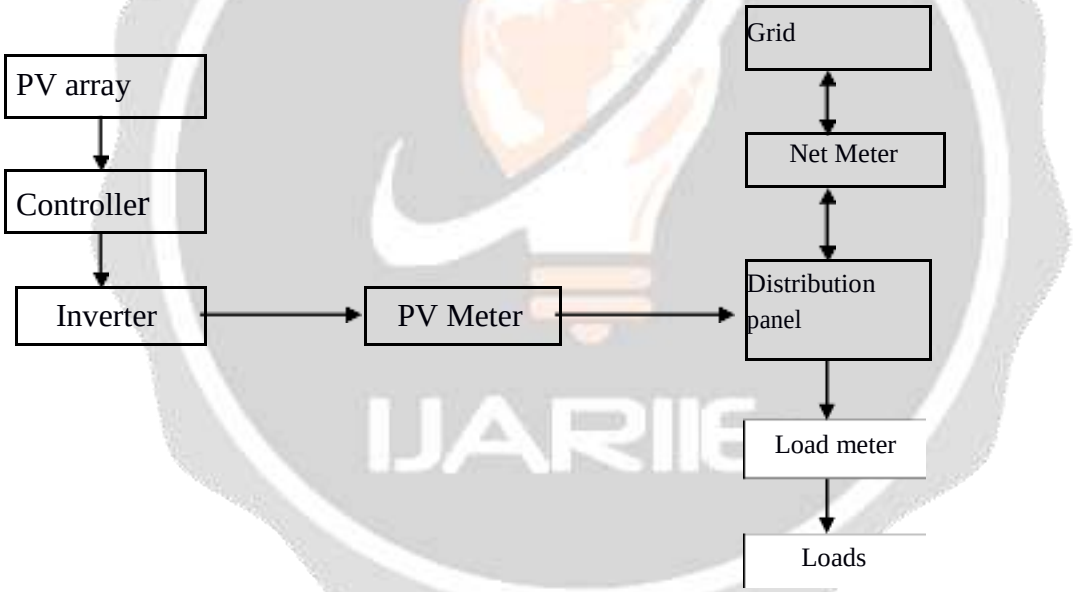

fig 2: Schematic diagram of energy dissipation in a grid connected roof top solar PV system[3]

Results and Conclusion:

The 15 KW system of Government ITI, Amgaon is studied as above. It is found that it will generate near about 1800 unit/month i.e. 4 unit/day .In this way we can generate clean and efficient electricity and reduces the cost of electricity bill.

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