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ijirset@gmail.com



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A Study on Installation of Rooftop Solar PV System in SMSMPITR, Akluj

Dattatray V. Ekatpure¹, Sanket S. Magar², Prof.Priti P.Somwanshi³, Prof.Suraj.S.Shinde⁴

UG Students, SMSMPITR, Akluj, Maharashtra, India^{1,2}

Asst. Professor, Electrical Engineering Department, SMSMPITR, Akluj, Maharashtra, India³

Head of Electrical Engineering Department, SMSMPITR, Akluj, Maharashtra, India⁴

ABSTRACT: Non conventional energy resources become very popular and commonly used nowadays. An example of a clean Non conventional energy resource is the energy generated using photovoltaic (PV) systems. As a result of using PV as a Non conventional energy resource, components of PV such as an inverter become widely used for this purpose and in order to enhance the high strength obtained from PV, various methods were used achieve the desired power, where it become a very considerable to use different methods to achieve desired maximum power received from PV. The main goal of this manuscript is to introduce the idea of using photovoltaic system, along with its components, (sizing of arrays, charge regulator ratings, inverter ratings and other related information), for a specific load, to achieve a design generates power from solar PV system. providing details of the available area of the rooftop. Solar irradiation data will be utilized to estimate the annual energy output as well and the cost per kWh of electricity generated from a specific PV system.

KEYWORDS: Solar ,rooftop Photovoltaic

I. INTRODUCTION

Nowadays many issues appear due to the using fossil fuel as a primary resource in generating electricity. The solution to such issues can be eliminated or reduced by means of using a Non conventional energy such as a solar power system. The first issue that is related to use of fossil fuels is the global warming, where the increase of using fossil fuels such as oil and natural gas in generating electricity resulted several health and environmental problems. Natural gas gives off 55% of the carbon dioxide, the principal greenhouse gas, released by coal and 30% less carbon dioxide than oil, for the same amount of energy produced. Coal contains about 85% more carbon per solar energy is one of the most popular harnessed form of Non conventional energy in the globe; Considering its availability in the major section of the globe, outrunning other sources such as availability of wind, water resources as well as natural heat producing elements more.

Global warming has many effects such as earth temperature increase, sea level rise. Second issue is the air pollution. A lot of pollutants are produced by fossil fuel combustion that is used to produce electricity such that Sulfur oxides, and hydrocarbons. In addition, total suspended particulates contribute to air pollution can combine in the atmosphere to form tropospheric ozone, the major constituent of smog. Third issue, is the cost of the fossil fuel, the electricity that produced by the fossil fuel process is more expensive than the electricity produced by the Non conventional energy such that solar power. In fact, the estimated costs of building new coal plants have reached \$4,000 per kW, without financing costs, and are still expected to increase further. This would mean a cost of over \$2.5 billion for a new 620 MW coal plant when financing costs are included. Another issue that is noticeable nowadays is the water and land pollution. Floods cause damage to plants and animals. widely used for this purpose and in order to enhance the high strength obtained from PV, various methods were used. Coal mining also contributes to water pollution. Coal contains pyrite that is a Sulfur compound.

On the other hand Photovoltaic offers consumers the ability to generate electricity in a clean, quiet and reliable way . To expand the PV utility, a number of PV cells are connected together in a closed, weather-resistant package called a module. Modules connected by series or in series. The flexibility of the modular PV system allows designers to build solar power systems that can meet a wide range of electrical needs.. There are two broad categories of PV system: Grid-connected systems connected to the public power grid and stand-alone systems that are single systems. Which is isolated system?

PV is attached to a grid connected to the power grid at all times and does not require battery storage. A solar PV system can provide power to a home or business, reducing the amount of power required from the utility; when solar

PV production exceeds energy requirements, the remaining energy will be automatically discharged back into grid. The solar PV system will not work during power outages unless it has a backup copy of the battery. Standalone systems are totally self-sufficient with no connection to the utility grid system. They generate electricity during daylight hours, and store excess for night time use.

Both India is densely populated and have high solar insolation, which provides a suitable combination of Solar Power in India. Power is the lifeline of any development of the nation. At present the power requirement is being met by three main sources viz., Thermal, Hydel and Nuclear. While Hydro and Nuclear have their inherent limitations, Thermal Power is often confronted by the challenge associated with the availability of fuel. Currently thermal power stations that meet most of the demand for electricity use coal as fuel Ordinary oils such as oil, gas and coal cannot meet the ever-increasing demand. In addition to the requirement of huge funds, the implementation of more such projects using conventional power generation systems will include issues of growing environmental concern, and declining fossil fat.

In order to bring down the dependence of finite fossil fuel for power generation, it is necessary to look into the viability of generating power locally using Non conventional energy sources. Fortunately, India lies in sunny regions of the world. Most parts of India get 4.8 kWh of solar radiation per square meter per day with 280-310 sunny days in a year. India has abundant solar resources, as it receives about 2900 hours of sunshine every yearly, India lies in sunny regions of the world. Most parts of India get 4.8 kWh of solar radiation per square meter per day with 280-320 sunny days in a year. India has abundant solar resources, as it receives about 2900 hours of sunshine every year, equivalent to over 5,000 trillion kWh. India can easily use solar energy. Today The Government is encouraging generation of electricity from various Non conventional energy sources such as wind, solar, small hydro, biomass by giving various fiscal & financial incentives. This apart, the state governments are procuring electricity from Non conventional energy projects at preferential tariff. So far 28,900 MW of Non conventional power capacity have been installed in the country, which includes 2000MW from wind, 2079 MW from solar, 3746 MW from small hydro and 3776 MW from bio energy. The Ministry of New and Non conventional Energy is providing various Non conventional energy systems for decentralized generation of electricity. So far, 12,000 villages have been electrified using various Non conventional energy systems. About 2.60 lakh solar street lights, 9.95 lakh solar home lightening systems, 9.40 lakh solar lanterns and 140 MW of decentralized solar power plants have been installed.

Government of India has separately set up a Ministry called MNRE - Ministry of New Non conventional Energy for the promotion of Power Generation through Non conventional Energy. The Ministry has been facilitating the implementation of broad spectrum program's including harnessing Non conventional power/ Energy(make use of one), Non conventional energy to rural areas for lighting, cooking and motive power, use of Non conventional energy in urban, industrial and commercial applications and development of alternate fuels and applications.

MNRE has announced a number of financial benefits such as a licensed Custom Tax, tax exemption and a sharp decline in the value of Solar PV-based Energy Industries At the State level, promotion of Solar Power generation is being encouraged by local policies that cover buy back, wheeling tion for Solar PV based Power Plants. At the State level, promotion of Solar Power generation is being encouraged by local policies that Cover buy back, wheeling and banking for electricity generated by State Electricity boards, without any inconvenience

Considering the good power of Solar Power and the trust that has been given to the Central Government and the State in the use of much of Solar power. in the State of Maharashtra for Power generation, SMSMPITR Akluj is proposing to set up 35KWp Roof Top Solar PV based Power Plant in Maharashtra situation. The proposed Power Plant will have Solar PV modules, String Inverters as major components and other Power generation accessories.

All the necessary auxiliary facilities of the Power Plant like Plant Monitoring system, Safety equipment's, Instrumentation, Control system etc., will be provided for the Power Plant. The water requirement for the module cleaning & for other requirements can be met from bore-wells at site. The Plant and equipment facilities will be designed to comply with all applicable stipulations guidelines of statutory authorities such as State and Central Pollution Control Boards, Electrical Inspectorate, Inspector of Factories etc.

For the purpose of this report, it is considered that the capital requirement of the project will be met by SMSMPITR Akluj. This report highlights the details of the proposed Power generation scheme, site facilities, features of the main plant, electrical systems evacuation of generated power, environmental and safety aspects, distribution mechanism, Cost estimation, risk mitigation plan and Project viability. It also highlights the complete schedule for the project implementation

II. PV SYSTEM DESIGN

The step by step design for a PV rooftop setup can be categorized in the following order.

Site Selection:

The site selection for a Solar Power Plant is pre-dominantly determined by solar insolation availability & grid connectivity for exporting power. Equally important are other essential factors/considerations such as:

- Availability of adequate roof top space for Power Plant and green belt development.
- Availability of water and power during construction.
- Availability of labor force in the proximity.
- Availability of load centers (towns) within vicinity.
- Easy accessibility of the site.

Load Calculation

This process involves the calculation of the amount of actual load utilized in the building.

Table 1: Load Calculation

Equipment	Rating(watt)	Quantity	Working hrs.	Total load (kwh)
Fan	70	141	5	41.73
Tube	40	54	5	9.04
PC	110	136	1	56.65
AC	1000	1	1	0.1
Printer	255	11	0.2	0.357
Xerox machine	1500	2	0.2	0.64
Water filter	400	6	2	4.8
Pumping motor	3730	1	1	3.73
S.T. lamp	400	4	11	17.6
				135.531

Design:-

We propose to install 35 KW Solar Photovoltaic grid interactive (Net Metering) connected power plant. Net metering (also known as net energy metering or NEM) is a payment system that allows businesses and individuals to produce their own electricity to deliver unused energy back to their local power grid and get credited back for its retail price. The most obvious benefit of net metering is that it can help reduce your annual expenditure on electricity. Other benefits include Enabling your organization to monetize the electricity your commercial solar system produces without having to install a second meter or battery storage system. Helping to reduce demand on the grid, especially during peak consumption periods Encouraging active to participate in the production of alternative energy, which helps to protect the environment and conserve natural energy resources.

BOM for Of 35 KWP Grids Interactive SPV Power Plant:

Table 2: BOM for 35 KWP Grid

SR. NO	DESCRIPTION	MAKE	TOTAL QTY	UNITE
1	Solar module 24V / 540W	JA/JINKO/Goldi	64	nos.
2	Fabrication work	MS ROOF MOUNT	AS	
3	Inverter (30Kw, - 3phase, 415V, 50 Hz)	/Growatt MNRE approved	1	no.
4	Bidirectional Meter (et Meter)	Secure/HPL	1	no.
5	ACDB / DCDB	ABB/Havells	2	no.
6	1C x 4 sq mm Cu cable XLPE	polycab	AS	M
7	2C x 10 sq.mm Cu Cable XLPE	polycab	AS	M
8	3.5C x 25sq..mm Aluminum Armed Cable (Inverter to customer DB)	polycab	AS	M
9	Lightning arrestor	MNRE Approved	1	No
10	Earthing Kit	MNRE Approved	4	set
11	Panel cleaning system	Prince	AS	set
12	MSEB Permission Net metering	--	30	
13	Cable trays, Fasteners, SS Nut bolts, Cable ties & other BOS Material,	--	AS	set
14	Installation & Commissioning	--	35kwp	set
15	MC4 Connectors, Lugs	--	COMP.	set

Financial Overview:

Table 3: Financial Overview

Sr. No.	Description	Solar Power Plant Capacity (kW)	Amount in RS.	With GST Amount
1	35KW Solar Power Plant 3 Phase Grid Connected	35Kw	1925000/+	2156000/-

III. CONCLUSION

As observed from the cost analysis as well as the cleanliness of the PV system, it is by no objection, one of the best methods of power generation systems to exist in this era. The cost of Rs 2.061 is to be further added along the Taxes and the other components apart from the basic calculation, approximately Rs.4 more per unit . This cost is still cheaper than the per unit cost of a non-Non conventional source of energy supplied in our grid. The usage of solar photovoltaics is being promoted to a high extent by the Ministry of new and Non conventional energy, providing subsidy for solar. This way, the solar PV system is slowly becoming popular in this country, especially rooftop PV system, mostly in Metropolitan cities. Hence, as an energy consumer, it is very important of us to be familiarized to this technology so that we can leap forward to a greener world.



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