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Study of Energy Consumption Rooftop Solar PV System in India

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ABSTRACT

Indian power sector is facing unprecedented challenges with the growing economy; a rapid increase in electricity demand on one hand and supply constraints and increasing costs of major fuels, such as coal and natural gas used for power production coupled with growing concerns about climate change and greenhouse gas emissions from the use of fossil fuels on other. Providing energy security and energy independence to billion plus population is also on the government agenda. It has been established that to meet power demand, India needs to have a basket of energy resources. Solar energy that is abundantly available across the country could be a logical choice. Solar photovoltaic technology, which has inherent advantages of being modular and solid state, is one of the best technological options for distributed generation close to the point of consumption. Hence, roof mounted solar PV systems can play an important role in augmenting the power generation capacity.

Keywords : Rooftop Solar, JNNSM, NAPCC, SPV, SECI, NISE, SERC

I. INTRODUCTION

The National Action Plan for Climate Change (NAPCC) released in June 2008 outlines a national strategy that aims to enable the country to adapt to climate change and enhance the ecological sustainability of India's development path. As a part of NAPCC, the Government of India launched the Jawaharlal Nehru National Solar Mission ("JNNSM" or, "National Solar Mission") which inter alia targets 20 GW of grid connected solar capacity by year 2022. The JNNSM Phase I (2010-13) implementation has witnessed appreciable scaling up of solar capacities in India in a short time span of three years. In addition, several state governments have declared their own state level solar policies to promote solar generation. As a result, the installed capacity of solar energy has increased from mere 2 MW in 2008-09 to more than 1,686 MW by 31 March 2013. The aggressive participation from the private sector in the grid-connected segment under Phase I of JNNSM has already resulted in lowering of solar tariffs for both the solar thermal and solar PV projects.

Apart from promoting the ground mounted solar PV projects, the JNNSM also has a mandate to encourage the rooftop solar segment. Under Phase I of JNNSM, a separate scheme called 'Rooftop PV and Small Scale Solar Generation Program (RPSSGP)' was implemented for developing solar PV projects with maximum capacity of 2 MW as rooftop or, small scale ground mounted solar projects. A total of 100 MW capacities of projects under this program were to be installed and connected at a level below 33 KV and same GBI linked tariff was provided for both the categories of project. While more than 90 MW of projects have been installed under this scheme, it is observed that this scheme garnered enthusiastic responses primarily in the ground-mounted segment, while it received almost negligible responses in the rooftop segment. Similarly, the focus under most state solar policies, programs has been on the ground mounted grid-connected solar PV projects.

India current potential for rooftop SPV has been estimated in terms of technical ,economic, and market potential. The technical potential is assessed from the rooftop space offered by its built area however GIS is

best technology available to get near accurate measurements of area through satellite mapping .In this study GIS technology is not used due to involvement of reasonably higher cost and time but in another study,TERI has undertaken a detail assessment of rooftop solar pv potential for Chandigarh city using GIS technology,which can be assessedin the website www.regisindia.com. In this study , the estimated realistic market potential for roof top solar pv in urban settlement of India is about 124 GWp. It may be noted that the current total installed power generation capacity is 280GWp. Thus, rooftop solar pv can play an important role in providing energy security and in multiple utilization of land, a scarce resource.

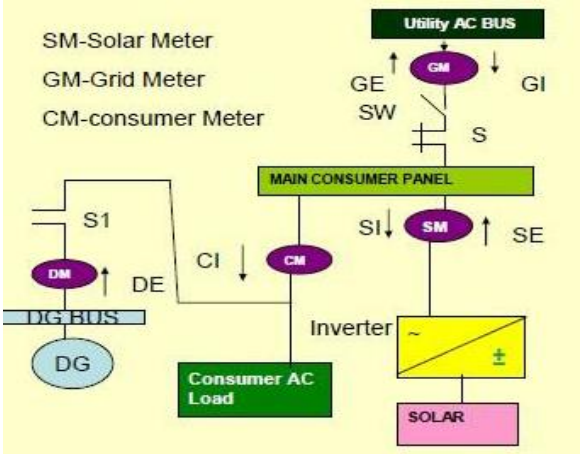
II. METHODS AND MATERIAL

Working and Construction

The roof top SPV system can be installed in two configurations , namely

a) Standard system
b) Grid interactive system

In urban areas the grid interactive system are more feasible than the standalone systems as almost all locations are connected by grid. These grid act as storage for an intermittent source of generation. In this study we are focusing on grid interactive rooftop SPV system. In this system there are different grid interconnection configuration depending on reliability of electricity supply to the loads and the consumer needs.



III. RESULTS AND DISCUSSION

Solar Energy is a great source for fulfilling the increasing energy demands in the country. India is situated between $8^o4'$ to $37^o6'$ north latitude and $68^o7'$ to $97^o25'$ east longitude, which is an ideal location for solar energy utilisation. MNREL in India has setup plans and policies for the uplifting the usage of solar energy. IREDA helps in the development, promotion and expansion of financial support for renewable energy and energy conservation projects. SECI is currently installing a 750 MW Photovoltaic Power Plants as a part of 3000 MW generation capacity to be accomplished through a central scheme. NISE is responsible for the research and techniques related development in solar technology. Thus, India has a potential market for solar energy. The RPV market in India is directed the national targets and the various support schemes at legislative levels. India's solar energy initiatives fall under the vision of National Action Plan on Climate Change (NAPCC), which was opened to public by the then Prime Minister of India on 30th June, 2008. Jawaharlal Nehru National Solar Mission (JNNSM) was launched under NAPCC. It targets for the installation of 20 GWp of grid-connected RPV systems and 2 GWp of off-grid RPV systems which include 20 million solar lights by the end of the year 2022. Recently, the GoI has expressed its commitment for achieving 100 GW of solar capacity in the country by the year 2020, out of which 40 GW is supposed to be achieved through decentralized and RPV projects. Indian government has launched various programmes on central and state level for the achievement of the desired, some of which are listed below:

Apart from the central policies, various states have also announced their state specific policies for the RPV systems. Both off-grid and grid connected RPV projects are being promoted by the state government. SERC of 17 different states have issued the appropriate regulatory order for the grid connected rooftop solar PV projects. Key initiatives taken by few state governments are as under:

- Gujarat became the first state in the country having implemented the rooftop solar PV pilot scheme. This scheme allows direct sale of solar generated electricity to utility grid.
- Andhra Pradesh, Tamil Nadu, Uttarakhand, West Bengal and few other states which have recently launched their policies for the promotion of both, grid connected RPV system and self-consumption of solar electricity.

- Kerala government has proposed schemes for the promotion of both off-grid and grid connected RPV systems.

Majority of the RPV projects implemented in India are policy (central and state) driven. Companies are marketing RPV systems that meet the requirements of different state policies. This clearly shows that the rooftop solar PV market is not yet self-driven in India.

IV. CONCLUSION

Most states have net metering policies coupled with capital subsidy for RPV systems. Policies are encouraging self-consumption, energy banking, and they avoid the direct sale of power to utilities. Excess generation is either not paid for or is paid at APPC (average power purchase cost) decided by the SERCs (as in case of Andhra Pradesh, Karnataka, and West Bengal), or can be banked for limited period. Energy storage and compensation for loss of power generation during grid unavailability is not supported by policies.

V. REFERENCES

[1]. http://wiki.answers.com/q/do_nuclear_power_plants_cause_any_type_of_pollution
[2]. Environmental protection agency
[3]. http://en.wikipedia.org/wiki/world_energy_resources_andconsumption
[4]. http://www.energybangla.com
[5]. http://en.wikipedia.org/wiki/worldenergy resources and consumption
[6]. http://en.wikipedia.org/wiki/solar energy
[7]. http://en.wikipedia.org/wiki/solar_power_by country
[8]. http://www.solarika.org/blog/-/blogs/top10-solar-pv-countries-world-overview
[9]. Photovoltaics in Buildings, A Design Handbook for Architects and Engineers. Editors Friedrich Sick and Thomas Erge, Fraunhofer Institute for Solar Energy Systems ISE Freiburg, Germany.
[10]. International journal of Renewable energy research Nahid-ur-Rahman Chowdhury et al., Vol.2, No.2, 2012
[11]. India"s Solar Energy by Gordon Feller, urban Age Institute, January 18
[12]. Wind and Solar power System. Writer : Mukund R.Patel U.S Merchant Marine academyking"s point" New York. CRC Press Boca Raton London New York Washington, D.C
[13]. Kazy Fayeen Shariar, Enaiyat Ghani Ovy, Kazi Tabassum Aziz Hossainy, "Closed Environment Design of Solar Collector Trough using lenss and reflectors," World Renewable Energy Congress 2011, Sweden.
[14]. Fahim Hasan, Zakir Hossain, Maria Rahman, Sazzad Ar Rahman, "Design and Development of a Cost Effective Urban Residential Solar PV System," December2010.
[15]. Renewable energy projects, IDCOL solar energy program, (2012, March). URL: http://www.idcol.org/prjshsm2004.php