

India's Solar Power Current Status, Challenges and Policies- A Review

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Abstract: The demand for energy is increasing a day by day in the whole world. As the Conventional energy sources like coal and petroleum fuel are limited and it is depleted very rapidly. Renewable energy resources like Solar, Wind Tidal etc. will play an vital role in Power generation infurther future for the fulfillment of increased demand. As we know the application of solar energy is increased rapidly, India is situated in Northern hemisphere, sunny belt India and the average estimation of solar radiation received on the surface of earth is probably better in some part of India. Government of India has launched various schemes to increase the focus of use of this natural resource for generation. The target was to start Grid connected Solar Projects of 20 GW by 2022. This paper reviews the current status of solar energy in India. The paper also focuses on the economic and technical challenges and reviews the government of India's acts.

Keywords- Solar Energy, Solar Mission, Acts and Policies

I. INTRODUCTION

There is a need to accelerate the development of clean energy technologies in order to address the global challenges of energy security, climate change and sustainable development. India is closely dependent on fossil fuels for its energy desires. Maximum of the power technology is executed by way of coal and mineral oil-primarily based energy flowers which contribute closely to greenhouse gases emission. India's economy is one of the quickest developing economies inside the global and has experienced a median 7 % boom rate in the ultimate decade.

In India there is huge amount of radiant energy receiving from the sun. In most parts of India, clear sunny weather is experienced 250 to 300 days a year. The annual global radiation varies from 1600 to 2200 kWh/s-m. The highest annual solar radiation is received in Rajasthan and northern Gujarat. In Rajasthan, large areas of land are unproductive and less populated, making these areas suitable as locations for large central power stations based on solar energy. Theoretically India's solar power reception is about 5000 trillion kWh/year with about 300 clear sunny days in a year. The daily average global radiation is around 5 Kwh/m² in north - eastern and hilly areas to about 7 Kwh/m² in Western regions and cold desert areas.

Solar energy is a clean resource with zero discharge has got huge potential of energy which can be utilized using a variety of devices. With recent developments, solar energy systems are easily available for industrial and domestic use with the added advantage of minimum maintenance. Thus, it is necessarily to tackle the energy crisis through sensible utilization of abundant the renewable energy resources, such as Biomass Energy, Tidal Energy, Ocean-Thermal Energy, MHD power generation, solar Energy, Wind Energy and Geothermal Energy. Indian government in now days mostly focuses on the solar energy. The amount of solar energy produced in India in 2007 was less than 1% of the total energy

demand. Government-funded solar energy in India only accounted for approximately 6.4 MW as of 2005. 25.1 MW was added in 2010 and 468.3 MW in 2011. By July 2012 the installed grid connected photovoltaic had increased to 1040.67 MW, and India expects to install an additional 10,000 MW by 2017.

In India, PM Modi has set an ambitious target of installing 100 GW (100,000MW) of solar power up to 2022. The current solar capacity in India stands at 8 GW as on July end, 2016. Thus, the target of moving from 8 GW in July 2016 to 100 GW by 2022 is one of the most ambitious targets globally [1].

II. CHALLENGES TO SUSTAINABLE SOLAR ENERGY IN INDIA

There are a number of challenges in meeting the solar power capacity targets. First is the requirement of land. Solar energy installations are directly linked to land. The large scale utility projects which constitute 60 percent of the 100 GW target require vast amounts of land.

The other challenge is integrating the variable nature of solar PV to the grid. Solar power cannot be generated during the night or on a cloudy day. And the power sector, so far has not witnessed a breakthrough in large scale storage of electricity in a cost effective manner. Battery storage in case of solar energy is very expensive and not economically viable yet. Various barriers and challenges on solar energy in India have been pointed below.

- Unavailability during night and cloudy days.
- Unavailability of the land for large scale generation.
- Requires huge investments in the power grid infrastructure for transmission smart supply and demand management.
- International fund for solar projects in India is very less.
- Solar cell manufacturer industries are less.
- Storage problems.

Hence to achieve the Modi’s ambitious mission in solar energy in 2022, Indian government will be faced these type of challenges in today and may be in future.

This paper mainly focuses on the current status of solar energy in India, challenges in front of India and discusses some government policies and figured out the upcoming strategy to become world leader in solar energy generation.

III. SOLAR MISSION

Jawaharlal Nehru National Solar Mission (JNNSM) was launched in 11 Jan. 2009 with the target for Grid Connected Solar Projects of 20,000 MW by 2022. The Mission had adopted a three-phase approach. First four year (2009-13) had marked as Phase-I. The remaining 4 years of the twelfth Plan (2013–17) had been marked as Phase-II and the thirteenth Plan (2017–22) will be Phase-III of the project .The aim of this project was to add 1,000 MW of grid solar power by 2013, and another 3,000 MW by 2017. [2]

The scheme also aims at strengthening indigenous manufacturing capability, and achieving 15 million sq. meters solar thermal collector area by 2017 and 20 million by 2022. One of the steps to achieve this will be to make solar heaters mandatory by incorporating byelaws in the National Building Code. Deployment of 20 million solar lighting systems for rural areas by 2022 is also part of the scheme [2].

But in June 2015 The Union Cabinet of India gave approval for stepping up of India’s solar power capacity goal under the Jawaharlal Nehru National Solar Mission (JNNSM) by five times, reaching 100 GW by 2022. That new solar target of 100 GW is expected to abate over 170 million tons of CO2 over its life cycle. The target will comprise of 40 GW rooftop and 57 GW through large and medium scale grid connected solar power plants.

Following tables shows the targets of mission year wise.

TABLE I

Target of power generation through Rooftop type solar power project up to 2022

Year	Rooftop type solar power project (MW)
2015-2016	200
2016-2017	4,800
2017-2018	5,000
2018-2019	6,000
2019-2020	7,000
2020-2021	8,000
2021-2022	9,000
Total	40,000

TABLE II

Target of power generation through Ground Mounted type solar power project (MW) to 2022

Year	Ground Mounted type solar power project (MW)
2015-2016	1,800
2016-2017	7,200
2017-2018	10,000
2018-2019	10,000
2019-2020	10,000

2020-2021	9,500
2021-2022	8,500
Total	57,000

IV. GOVERNMENTS ACTS AND POLICIES.

The Electricity Act 2003 has promotes electricity generation from co-generation and renewable energy sources. The guidelines for competitive procurement have been framed under Section 63 of the Electricity Act 2003 it states: “The Appropriate Commission shall adopt the tariff if such tariff has been determined through transparent process of mandate in accordance with the guidelines issued by the Central Government”.

The National Electricity Policy 2005 stipulates that the share of electricity from non- conventional resources would need to be increased such purchase by distribution companies shall be through competitive process.

According to Tariff Policy 2006 states the Appropriate Commission shall decide a minimum percentage for purchase of energy from non- conventional source according the availability of resources in that region and its impact on retail tariffs.

V. SOLAR ENERGY STATUS IN INDIA.

In India, Rajasthan has the huge share of solar power generation of 28.4% and Gujarat share is 24.4% as on September 2015.

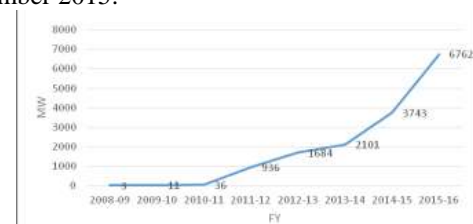


Figure 1: India- Solar Power Capacity Achieved (MW), 2008-09 to 2015-16.

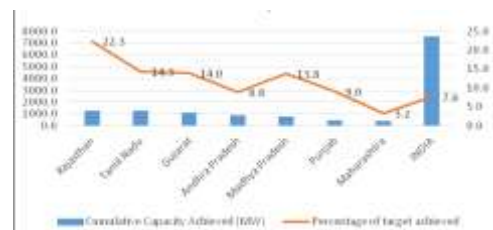


Figure 2: Indian States- Solar Power Capacity Targets and Achieved, 2016.

The Government of India is providing Rs. 15,050 cr. subsidy to promote solar capacity addition in the country. This capital subsidy will be provided for solar projects in many cities and towns. Solar power projects with investment of about Rs. 90,000 cr. would be developed using bundling method with thermal power.[3] Further, investment will come from large Public Sector Undertakings (PSU) and Independent Power Producers (IPPs).

VI. CONCLUSION

In this paper, discuss the current status of India in solar generation. Also discuss the various challenges that may be come in front of government of India by achieving the mission 2022. India needs to reduce its dependence on fossil fuels for a better future. Around the world, there is a greater

acknowledgement and shift towards the use of renewable forms of energy. Solar energy is one form of energy that can be an alternative source of power supply.

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