

Current Status, Outlook and Review Analysis of Solar Energy Sector in India and the Way Forward

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Abstract: Solar have proven to be the best support mechanism to rapidly increase the share of renewable energy production and use. This paper presents a review of Indian solar market with the current status of potential, installation of solar in country and different scheme which promote solar energy in the country. In this paper a comparative analysis different tariff structure of solar in India also presented. This helps in how bidder's interest can be enhanced to participate in the bidding process of solar projects inside the solar park and different factors which contribute to determining the tariff of solar in a solar park.

Keywords: Solar Parks, National Solar Mission, Indian Solar Market, Rewa Solar Park in Madhya Pradesh, Trends of Solar Tariff in India.

I. INTRODUCTION

India has endowed with vast solar energy potential about 5,000 trillion kWh per year energy is incident over India's land area with most parts receiving 3-5 kWh per sq m per day. Based upon the availability of land and solar radiation, the potential of solar power in the country has been assessed to be around 750 GWp.

The Government of India has revised the National Solar Mission (NSM) target of Grid Connected Solar Power projects from 20,000 MW by 2022 to 1, 00,000 MW by 2022. The government has planned to achieve the target of 100 GW by setting up Distributed Rooftop Solar Projects and Medium & Large Scale Solar Projects, the break-up of which is as shown in figure 1.

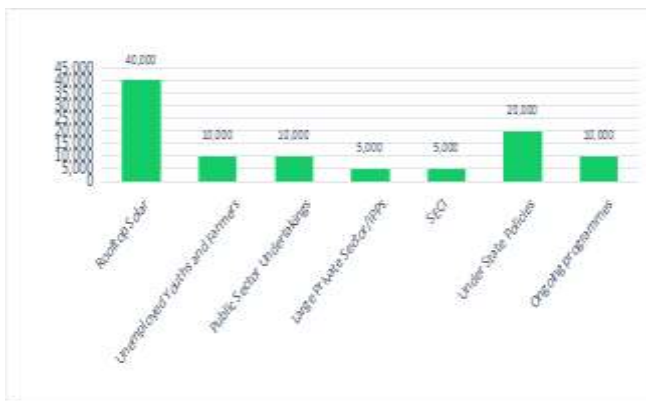


Figure 1 Classification of proposed 100 GW target

Year-wise capacity addition envisaged under the above categories is in figure 2, 3 and 4.

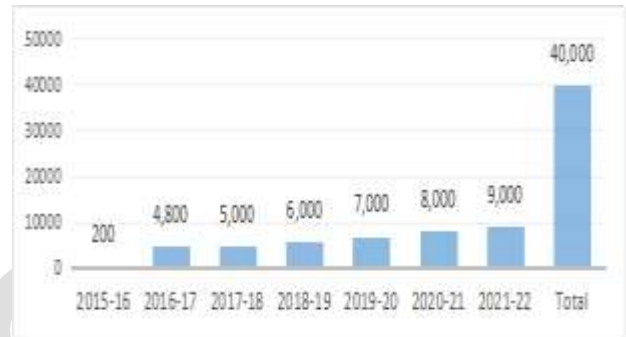
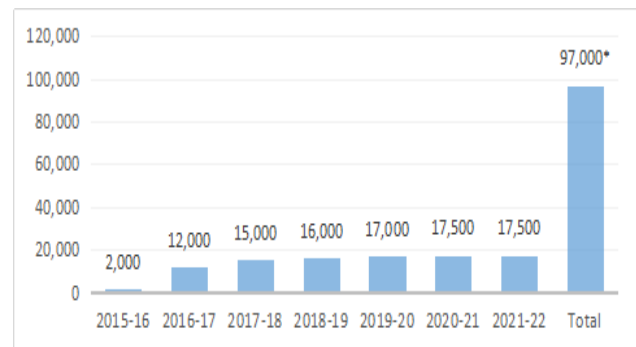


Figure 2 Year wise target in Rooftop Solar



Figure 3 Year wise target in Large-Scale Solar



*3,743 MW commissioned up to 2014-15.

Figure 4 Year wise target in Rooftop Solar & Large Scale Solar by 2022

II. GOVERNMENT SCHEMES

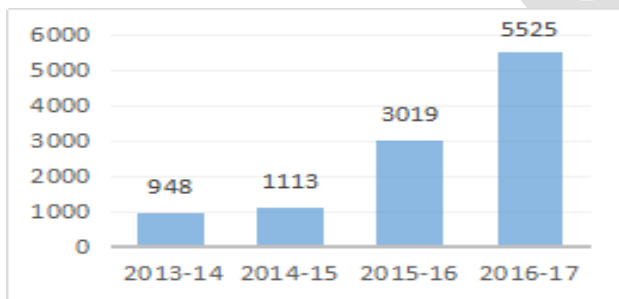
The government has launched several schemes to achieve the target of 100 GW. The details are given as in table 1.

Table 1 Details of Schemes for promotion of Solar Energy

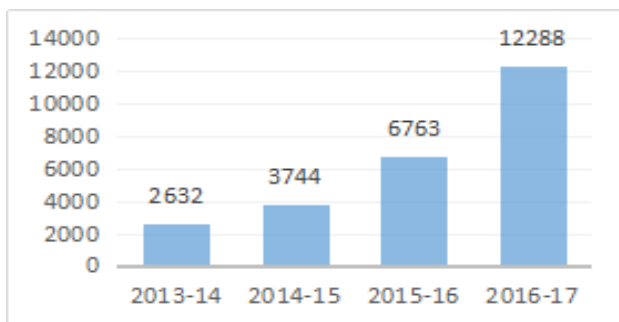
Sr. No.	Scheme
1.	Scheme for Setting up of 750 MW Grid-connected Solar PV Power Projects under Batch-1 of Phase-II of JNNISM with Viability Gap Funding (VGF) Support from National Clean Energy Fund (NCEF)
2.	Grid Connected Rooftop Scheme
3.	Pilot-cum-demonstration project for development of grid-connected solar PV power plants on canal banks and canal tops
4.	Development of Solar Cities Programme
5.	Scheme for Development of Solar Parks and Ultra Mega Solar Power Projects
6.	Scheme for setting up of 1000 MW of Grid-Connected Solar PV Power projects by Central Public Sector Undertakings (CPSUs) under Batch- V of Phase II of JNNISM
7.	Scheme for setting up of 300 MW Solar PV Projects by defense establishment and paramilitary forces
8.	Scheme for SPV Lighting systems
9.	Scheme for Solar Water Pumping Programme for irrigation purpose

III. THE MARKET OF SOLAR ENERGY

The investment in renewable energy sector in India for the years 2013, 2014 and 2015 was US \$6.6, US\$ 8.3 and US\$ 10.2 billion respectively with Foreign Direct Investment increasing from US\$ 4.14 billion in 2013-14 to US\$ 7.76 billion in 2015-16. This shows that the Indian solar market in its growing stage. Details of solar power installed capacity and cumulative capacity addition in India during the last three years and the current year are given below-



(a) Year wise Installed Capacity



(b) Year wise cumulative capacity (in MW)

Figure 5 (a) Year wise Installed Capacity (b) Year wise cumulative capacity (in MW)

As in above figure 5, the installed capacity increased from 948 MW in the financial year 2013-14 to 5525 MW in the

financial year 2016-17 as shown in figure 5 (a) and same in the total cumulative is increased from 2632 MW in the financial year 2013-14 to 12288 MW in 2016-17 as shown in figure 5 (b).

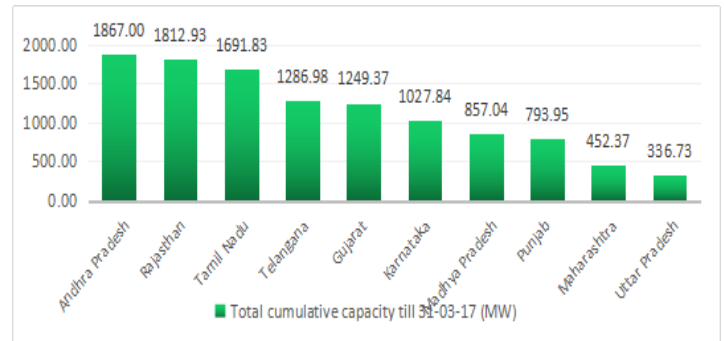


Figure 6 Top 10 States in Solar Installation

The progress of solar installation in the country is increased rapidly due to various factors, in figure 6 the top solar capacity installed states presented. Andhra Pradesh with cumulative capacity of 1867 MW stands on number one position in the country, Rajasthan which was in number one position during in last three years now with cumulative capacity of 1812.93 MW stands on second position in the country.

IV. TARIFF ANALYSIS

Since renewable energies are considered to be the new outlet for dealing with energy shortage and environmental pollution, renewable energy industries expand rapidly in recent years. Renewable energy policies can significantly contribute to the expansion of domestic industrial activities in sustainable energy.

Tariff is a major factor for the development of solar projects in any country. Calculation of tariff depends on a various factor which includes Location, Solar irradiance in the State, availability of conducive State policy for solar, availability of land, the cost of financing and business environment, Willingness of DISCOMS to purchase the solar power, power evacuation infrastructure etc. Tariff in Indian solar market changed regularly as shown in figure 7 (a) and 7(b) that the weighted average tariff varies from Rs. 12.16 per unit to Rs. 3.30 per unit.

