



# SOLAR PARKS

Accelerating the Growth of Solar Power in India

**Anindya S Parira**, discusses about the objectives, targets, the progress made so far, the solar power park developers (SPPDs), and the challenges that lie ahead of the Solar Parks flagship scheme under the National Solar Mission of the Government of India.



The recent downward trends in solar tariff may be attributed to the factors like economies of scale, assured availability of land, and power evacuation systems under the Solar Park Scheme. The scheme aims to provide a huge impetus to solar energy generation by acting as a flagship demonstration facility to encourage project developers and investors, prompting additional projects of similar nature, triggering economies of scale for cost-reductions, technical improvements and achieving large scale reductions in greenhouse gas (GHG) emissions. It would enable States to bring in significant investment from project developers, meet its solar renewable purchase obligation (RPO) mandate and provide employment opportunities to local population. The State will also reduce its carbon footprint by avoiding emissions equivalent to the solar park's installed capacity and generation.

The solar park is a concentrated

zone of development of solar power generation projects and provides developers an area that is well characterized, with proper infrastructure and access to amenities and where the risk of the projects can be minimized. Solar Park also facilitates developers by reducing the number of required approvals. The most important benefit from the solar park for the private developer is the significant time saved.

### 🚩 Objective

Solar power projects can be set up anywhere in the country, however the scattering of solar power projects leads to higher project cost per MW and higher transmission losses. Individual projects of smaller capacity incur significant expenses in site development, drawing separate transmission lines to nearest substation, procuring water and in creation of other necessary infrastructure. It also takes a long time for project developers to acquire land, get change of land use and

various permissions, etc., which delays the project. To overcome these challenges, the scheme for "Development of Solar Parks and Ultra-Mega Solar Power Projects" was rolled out in December 2014 with an objective to facilitate the solar project developers to set up projects in a plug-and-play model.

### 🚩 Target

It was planned to set up at least 25 solar parks, each with a capacity of 500 MW and above; thereby targeting around 20,000 MW of solar power installed capacity. These solar parks are proposed to be set up within in a span of five years commencing from 2014–15.

### 🚩 Progress Made So Far

Due to excellent response from the states, 34 solar parks of aggregate capacity 20,000 MW have already been approved in 21 states. The details of solar parks approved are given in Table 1.

**Table 1: Details of the approved solar parks**

Sl. No.	State	Capacity (MW)	Name of the Solar Power Parks Developer (SPPD)	Land identified at
1.	Andhra Pradesh	1,500	AP Solar Power Corporation Pvt. Ltd, JVC of SECI, APGENCO and NREDCAP	NP Kunta of Ananthapuramu and Galiveedu of Kadapa Districts
2.	Andhra Pradesh	1,000		Kurnool District
3.	Andhra Pradesh	1,000		Galiveedu Madal, Kadapa district
4.	Andhra Pradesh	500		Talaricheruvu Village, Tadipathri Mandal, Anathapuramu District of Andhra Pradesh
5.	Arunachal Pradesh	100	Arunachal Pradesh Energy Development Agency (APEDA)	Tezu township in Lohit district
6.	Assam	69	JVC of APDCL and APGCL	Amguri in Sibsagar district
7.	Chhattisgarh	500	Chhattisgarh Renewable Energy Development Agency	Rajnandgaon, Janjgir Champa districts
8.	Gujarat	700	Gujarat Power Corporation Limited	Radhanesda, Vav, District Banaskantha
9.	Haryana	500	Saur Urja Nigam Haryana Ltd (SUN Haryana)	Bugan in Hisar district, Baralu and Singhani in Bhiwani district and Daukhera in Mahendergarh district

Sl. No.	State	Capacity (MW)	Name of the Solar Power Parks Developer (SPPD)	Land identified at
10.	Himachal Pradesh	1,000	HP State Electricity Board Ltd.	Spiti Valley of Lahaul and Spiti District
11.	Jammu & Kashmir	100	Jammu and Kashmir Energy Development Agency	Mohagarh and Badla Brahmana, District-Samba
12.	Karnataka	2,000	Karnataka Solar Power Development Corporation Pvt. Ltd	Pavagada Taluk, Tumkur district
13.	Kerala	200	Renewable Power Corporation of Kerala Limited	Paivalike, Meenja, Kinanoor, Kraindalam and Ambalathara villages of Kasargode district
14.	Madhya Pradesh	750	Rewa Ultra Mega Solar Limited	Gurh, Rewa, MP
15.	Madhya Pradesh	500	Rewa Ultra Mega Solar Limited	Neemuch and Mandsaur
16.	Madhya Pradesh	500	Rewa Ultra Mega Solar Limited	Agar and Shajapur
17.	Madhya Pradesh	500	Rewa Ultra Mega Solar Limited	Chhattarpur
18.	Madhya Pradesh	500	Rewa Ultra Mega Solar Limited	Rajgarh, Morena
19.	Maharashtra	500	M/s Sai Guru Mega Solar Park Pvt. Ltd (formerly M/s Pragat Akshay Urja Ltd.)	Sakri, Dhule district of Maharashtra
20.	Maharashtra	500	Maharashtra State Electricity Generating Company Ltd. (MAHAGENCO)	Dondaicha, district Dhule, Maharashtra
21.	Maharashtra	500	M/s Paramount Solar Power Pvt. Ltd. (formerly M/s K P Power Pvt. Ltd)	Taluka Patoda, district Beed, Maharashtra
22.	Meghalaya	20	Meghalaya Power Generation Corporation Ltd (MePGCL)	West Jaintia Hills and East Jaintia Hills districts
23.	Nagaland	60	Directorate of New and Renewable Energy, Nagaland	Dimapur, Kohima and New Peren districts
24.	Odisha	1,000	Green Energy Development Corporation of Odisha Limited	Balasure, Keonjhar, Deogarh, Boudh, Kalahandi and Angul
25.	Rajasthan	680	Rajasthan Solar Park Development Company Ltd	Bhadla Phase II, Bhadla, Rajasthan
26.	Rajasthan	1,000	Surya Urja Company of Rajasthan Ltd	Bhadla Phase III, Bhadla, Rajasthan
27.	Rajasthan	750	M/s Essel Surya Urja Company of Rajasthan Limited	Villages Ugraas, Nagnechinagar and Dandhu, tehsil Phalodi, district Jodhpur (450 MW) and villages Lavan and Purohitar, tehsil Pokaran, district Jaisalmer (300 MW)
28.	Rajasthan	500	M/s Adani Renewable Energy Park Rajasthan Limited	Bhadla Phase IV, Bhadla, Jodhpur Rajasthan
29.	Rajasthan (421 MW through support of Gol out of 1,500 MW)	421	M/s Adani Renewable Energy Park Rajasthan Limited	Fatehgarh and Pokaran, Jaisalmer, Rajasthan
30.	Telangana	500	Telangana New & Renewable Energy Development Corporation Ltd (TNREDC)	Gattu, Mehboob Nagar District
31.	Uttar Pradesh	600	Lucknow Solar Power Development Corporation Ltd	Jalaun, Allahabad, Mirzapur, and Kanpur Dehat districts
32.	Uttarakhand	50	State Industrial Development Corporation Uttarakhand Limited (SIDCUL)	Industrial Area, Sitarganj (Phase I), Industrial Area, Sitarganj (Phase II) and Industrial Area, Kashipur
33.	West Bengal	500	West Bengal State Electricity Distribution Company Ltd	East Mednipur, West Mednipur, Bankura
34.	Tamil Nadu	500	To be finalized	Initially proposed in Ramanathapuram district. Site under revision.
<b>TOTAL</b>		<b>20,000</b>		

In Andhra Pradesh, four solar parks with aggregate capacity of 4,000 MW have been approved. The solar parks are: (i)

Ananthapuramu Solar Park (1,500 MW); (ii) Kurnool Solar Park (1,000 MW); (iii) Ananthapuramu-II Solar Park (500 MW); and (iv) Kadapa Solar Park (1,000 MW). The Ananthapuramu Solar Park and Kurnool Solar Park are at advanced stages of development. 250 MW has already been synchronized with grid in Ananthapuramu Solar Park (Pictures 1 to 5). The tariff as low as ₹4.63 per unit has been achieved in Kurnool Solar Park.

In Rajasthan, five solar parks of aggregate capacity 3,351 MW have been approved. The solar parks are: (i) Bhadla Phase-II Solar Park (680 MW); (ii) Bhadla Phase-III Solar Park (1,000 MW); (iii) Bhadla Phase-IV Solar Park (500 MW); (iv) Phalodi-Pokaran Solar Park (750 MW); and (v) Fatehgarh Phase1B Solar Park (1,500 MW; 421 MW under Central Grants). The entire capacity of 680 MW in Bhadla Phase-II Solar Park is planned to be synchronized with grid by March 2017. The tariff as low as ₹4.34 per unit has been achieved in this solar park.

In Madhya Pradesh, five solar parks with aggregate capacity 2,750 MW have been approved. The solar parks are: (i) Rewa Ultra Mega Solar Park (750 MW); (ii) Neemuch–Mandsaur Solar Park (500 MW); (iii) Agar-Shajapur Solar Park (500 MW); (iv) Chhattarpur Solar Park (500 MW); and (v) Rajgarh–Morena Solar Park (500 MW). The Rewa Ultra Mega Solar Park and Neemuch–Mandsaur Solar Park are at an advanced stage of development.

The Pavagada Solar Park in Tumkur district of Karnataka would be the largest solar park in the world with capacity of 2,000 MW once it is developed. The park is also in its advanced stage of development. An interesting thing about the Pavagada Solar Park is that the almost entire land (10,800 acres out of 11,000 acres) is private land. The Solar Power Park Developer (SPPD) could manage to take the land on lease for 28 years from the land owners.

There are three solar parks in Maharashtra each of capacity 500 MW. Two out of these three solar parks are fully owned by a private agency.

The other solar parks are in Chhattisgarh, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Kerala, Odisha, Telangana, Uttarakhand, Uttar Pradesh, and West Bengal. Solar parks have also been approved in Northeastern states, such as Assam, Arunachal Pradesh, Meghalaya, and Nagaland.

### ⚡ Solar Power Park Developer (SPPD)

The park developers are designated as Solar Power Park Developer (SPPD). The SPPDs for these solar parks are state government designated agency or JVC between the state government designated agency and the Solar Energy Corporation of India (SECI) or JVC between the state governments designated agency and private agency or fully private agency.

### ⚡ Responsibilities of SPPDs

The responsibilities which are essential for the SPPDs are as follows:

- Acquisition of land;
- Getting land related clearances;
- Developing approach road to each plot;

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- Developing internal transmission system and maintaining it;
- Making arrangement to connect to the grid, i.e., ISTS or State Transmission Network;
- Providing basic drainage; and
- Providing water supply (minimum essential quantity).

The optional responsibilities of the SPPDs are as follows:

- Levelling and developing of land (to be avoided as far as possible);



➤ **Picture 1:** 1,500 MW in Ananthapuramu Solar Park, Andhra Pradesh

**One of the major challenges in development of solar parks is the acquisition of land. The lands acquired for solar parks are government land, assigned land, SJ lands and patta land. The other change is matching the timelines between development of solar parks including power evacuation arrangements and setting up of solar projects .**



- Construction of offices, housing, and common building infrastructures;
- Forecasting, Scheduling;
- O&M or related functions;
- Solar radiation data;
- Metalled road to all plots and within plots to each array;
- Maintenance of internal power supply and water supply;
- Security;
- Cleanliness and waste disposal;

- Technical support services (consultancy, etc.).


 **Financing**

The cost involved in developing solar parks is generally being met from three major sources:

1. Grant from the Government of India @₹20 lakh per MW.
2. Payment by the solar project developers against land purchase or taken on lease by them, part of


which is generally being taken at the time of signing of agreements.

3. Loan from financial institutions, if and when required.

 **Challenges and the Way Forward**

One of the major challenges in development of solar parks is the acquisition of land. The lands acquired for solar parks are government land, assigned land, SJ lands and patta land. The other change is matching the timelines between development of solar parks including power evacuation arrangements and setting up of solar projects. However, with active involvement of the state governments, SPPDs, SECI, Power Grid, and STUs these challenges are getting over. Due to excellent response and more demand of solar parks coming from the states, the Ministry is contemplating to enhance the capacity of the scheme from 20,000 MW to 40,000 MW. **AU**



 **Picture 2:** Photovoltaic (PV) module in Ananthapuramu Solar Park

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