

# Rajasthan Renewable Energy Transmission Investment Program

## FACT SHEET



**The Indian State of Rajasthan will soon be generating and transmitting up to 8,000 megawatts (MW) of renewable energy to the state and national grid. The Government of India, the Asian Development Bank (ADB), and the Clean Technology Fund support this effort through the \$800 million Rajasthan Renewable Energy Transmission Investment Program (RRETIP), which also provides livelihood opportunities for local communities.**

### India and Renewable Energy

India's electricity generation capacity is still dominated by coal, but in 2016–2017 and 2017–2018 renewable energy capacity additions already exceeded thermal capacity additions. By March 2018, renewable energy installed capacity had reached 70 gigawatt (GW)<sup>1</sup> with additional 40 GW under implementation.

Solar energy capacity increased by over eight times, from 2.6 GW in 2014 to 22 GW in 2018. In varying stages of development are 41 solar parks in 21 states, with aggregate capacity of over 26 GW. Based on the early success of the solar park model, the government has doubled its solar parks target from 20 GW to 40 GW.<sup>2</sup> This is achievable, provided constraints in the transmission system can be addressed in a timely manner.

### Rajasthan – The Perfect Place for Solar Power

Due to its geographical and environmental advantages, Rajasthan has huge potential for solar power generation. Among the Indian states, it has the highest solar irradiation with 5.72 kilowatt-hour per square meter per day (kWh/m<sup>2</sup>/day) and the highest solar power potential of 140 GW. In terms of land availability, Rajasthan has vast tracts of unused, barren, and affordable land.<sup>3</sup> Through its 2014 Solar Energy Policy, the state set a target of 25 GW solar capacity. By March 2019, installed solar capacity in Rajasthan is expected to reach 3 GW.

### Highlights

#### ADB—A Partner in Rajasthan's Renewable Transformation

ADB's RRETIP helps finance the development of a transmission network that can support the evacuation of new renewable energy capacity. By delivering solar and wind energy to the state and national grids, the program enables a cleaner electricity mix and a more efficient generation and transmission system, while avoiding greenhouse gas emissions. As of March 2018, the first tranche<sup>4</sup> of RRETIP has completed (i) construction of new 400 kilovolt (kV) grid substations in Bhadla and Ramgarh; (ii) augmentation of existing 400 kV grid substations in Akal and Bikaner; (iii) construction of the 91 kilometer 400 kV Ramgarh–Akal transmission line; and (iv) construction of a substantial part of the 220 kilometer, 400 kV transmission line from Bhadla to the "line-in-line-out" point of the Jodhpur–Merta transmission line.

The technical assistance component (i) developed the solar park master plan; (ii) implemented community development initiatives around the solar park; (iii) developed the institutional capacity of Rajasthan Rajya Vidyut Prasaran Nigam Limited, the state transmission licensee, and Rajasthan Renewable Energy Corporation, the state government nodal agency responsible for developing renewable energy; and (iv) studied the system for the renewable energy integration road map.

<sup>1</sup> Composed of 34 GW wind, 22 GW solar, 4.5 GW small hydro power, and 9.5 GW bio-power.

<sup>2</sup> Ministry of New and Renewable Energy (press release). "A target of installing 175 GW of renewable energy capacity by the year 2022 has been set." 19 July 2018. New Delhi. [pib.nic.in/newsite/pmreleases.aspx?mincode=28](http://pib.nic.in/newsite/pmreleases.aspx?mincode=28)

<sup>3</sup> RREC (2018) (powerpoint). "Rajasthan the solar destination & development of Bhadla solar park". [d2oc0ihd6a5bt.cloudfront.net/wp-content/uploads/sites/837/2018/06/Basant-Dosi-Rajasthan-The-Solar-Destination-and-Development-of-Bhadla-Solar-Park.pdf](https://d2oc0ihd6a5bt.cloudfront.net/wp-content/uploads/sites/837/2018/06/Basant-Dosi-Rajasthan-The-Solar-Destination-and-Development-of-Bhadla-Solar-Park.pdf)

<sup>4</sup> RRETIP Tranche 1 is composed of \$62 million ADB loan, \$88 million CTF loan, and \$2 million CTF grant for the technical assistance.

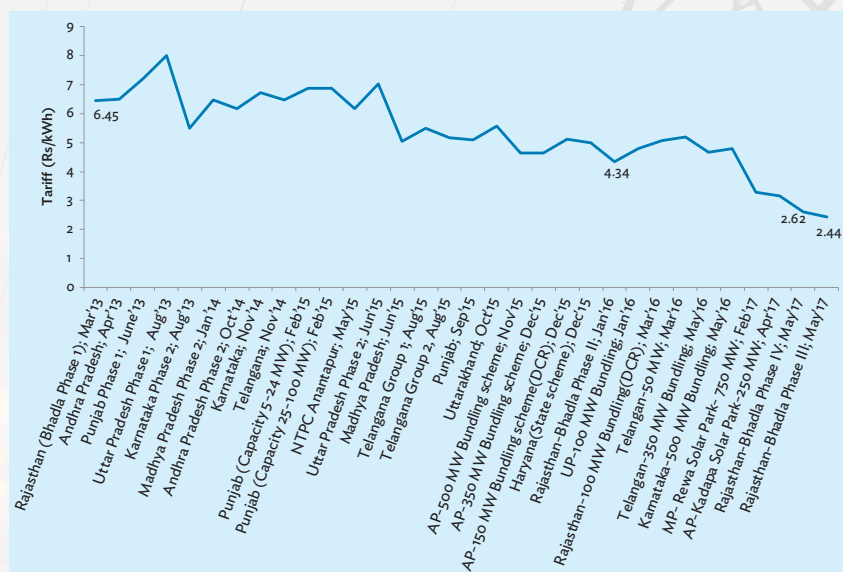
## Bhadla Solar Park: Discovering the Lowest Solar Tariffs in India's History

The desert plains of Bhadla, about 320 km west of Jaipur, are host to Rajasthan's first and largest solar park. Rajasthan Renewable Energy Corporation is developing the Bhadla Solar Park with an area close to 5,800 hectares, in a phased manner. Phase I (65 MW) and Phase II (680 MW) are already operational. Phase III (1,000 MW) and Phase IV (500 MW) will be commissioned by March 2019.<sup>5</sup> When all phases are fully operational, the solar park will be capable of producing 2,245 MW of renewable electricity. The RRETIP technical assistance supported the infrastructure planning and implementation of Phase II, high-level master planning for Phase III, and a review of the master plan for Phase IV.

Solar generation costs have seen a significant downward trend. The Bhadla Phase III auction discovered a record low tariff of Rs. 2.44 per kWh (~\$0.037),<sup>a</sup> the lowest solar tariff in India's history, to date.

The solar park model departs from traditional approaches to developing renewable energy projects and achieves greater economies of scale. Rajasthan's natural advantage in solar insolation and land availability provides a starting point. Investment from public sector or public-private partnerships in early development phase for solar park and transmission infrastructure reduces significant project-level risks to private investment in renewable generation assets. Power purchase agreement with credit worthy buyers has proved beneficial. The reduction in international price of modules and cost of capital have also contributed to the decline in tariffs. The solar park also creates opportunities for local businesses and employment in the region. Governments are replicating this model in other parts of India, and other developing countries in Africa, Asia, and Latin America.

Figure 1: Tariff Trend Since the Bhadla Phase I Bidding



AP = Andhra Pradesh, DCR = domestic content requirement, kWh = kilowatt hour, MP = Madhya Pradesh, MW = megawatt, NTPC = National Thermal Power Corporation Limited, Rs = Indian rupees.

Source: Compiled from various reports.

<sup>a</sup> RREC (2018) (powerpoint). "Rajasthan the solar destination & development of Bhadla solar park". [d2oc0ihd6a5bt.cloudfront.net/wp-content/uploads/sites/837/2018/06/Basant-Dosi-Rajasthan-The-Solar-Destination-and-Development-of-Bhadla-Solar-Park.pdf](https://d2oc0ihd6a5bt.cloudfront.net/wp-content/uploads/sites/837/2018/06/Basant-Dosi-Rajasthan-The-Solar-Destination-and-Development-of-Bhadla-Solar-Park.pdf)

<sup>b</sup> This was the exchange rate at the time of auction, May 2017.

## Community Development and Gender Initiatives

Rajasthan Renewable Energy Corporation is committed to creating a positive impact in communities that could be directly and indirectly affected by the solar park development, particularly women and vulnerable communities. This is being supported through: (i) community development policy and action plans as templates for new projects; (ii) micro-enterprise development and skills training for women in animal husbandry, and embroidery work and handicrafts; (iii) skills development through bookkeeping, accounting, finance management and negotiations training; (iii) provisions for supply of drinking water and solar home lighting system for the community; and (iv) health camps for the local community (especially women/girls).

## Support from Clean Technology Fund

The \$5.4 billion Clean Technology Fund is a funding window of the Climate Investment Funds, which provides resources to scale up the demonstration, deployment, and transfer of low-carbon technologies with significant potential for long-term greenhouse gas emissions savings. The Trust Fund Committee has approved about \$5 billion for implementation in renewable energy, energy efficiency, and clean transport projects. In 2013, the Trust Fund Committee approved \$200 million allocation for the RRETIP, to be administered by ADB, to help finance the transmission infrastructure that will be a foundation for solar and wind power development in Rajasthan, India.<sup>5</sup>

### About the Asian Development Bank

ADB is committed to achieving a prosperous, inclusive, resilient, and sustainable Asia and the Pacific, while sustaining its efforts to eradicate extreme poverty. Established in 1966, it is owned by 67 members—48 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.

### CONTACTS

#### ADB Headquarters

Energy Division, South Asia Department  
Climate Change & Disaster Risk Management Division  
Sustainable Development and Climate Change Department

6 ADB Avenue, Mandaluyong City  
1550 Metro Manila, Philippines  
Tel +63 2 632 4444  
Fax +63 2 636 4444

#### India Resident Mission

4 San Martin Marg, Chanakyapuri, New Delhi 110021, India  
PO Box 5331, Chanakyapuri  
Tel +91 11 2410 7200  
Fax +91 11 2687 0945 / 2419 4273

#### Rajasthan Renewable Energy Corporation Limited

E-166, Yudhisthir Marg, C-Scheme, Jaipur, Rajasthan 302001, India  
Tel 91-141-2228198  
Fax 91-141-2226028  
Email [rrec2016@gmail.com](mailto:rrec2016@gmail.com)

#### Rajasthan Rajya Vidyut Prasaran Nigam Limited

Vidyut Bhawan, Janpath, Jaipur - 302 005, Rajasthan, India  
Tel 0141-2740381

<sup>5</sup> Since 2017, ADB (\$175 million sector loan) and Clean Technology Fund (\$50 million concessional loan) have also been supporting the development of high-voltage transmission systems to evacuate electricity generated by new "mega" solar parks to the interstate grid, and to improve the reliability of the national grid system. Earlier in 2011, ADB provided a loan for transmitting electricity from the Charanka solar park in Gujarat.