PROJECT INFORMATION DOCUMENT (PID)
CONCEPT STAGE

Report No.: PIDC32035

Project Name	Shared Infrastructure for Solar Parks (P154283)
Region	SOUTH ASIA
Country	India
Sector(s)	Transmission and Distribution of Electricity (20%), Other Renewable Energy (80%)
Theme(s)	Infrastructure services for private sector development (80%), Other public sector governance (20%)
Lending Instrument	Investment Project Financing
Project ID	P154283
Borrower(s)	Department of Economic Affairs, Solar Energy Corporation of India
Implementing Agency	Solar Energy Corporation of India
Environmental Category	B-Partial Assessment
Date PID Prepared/ Updated	23-Sep-2015
Date PID Approved/ Disclosed	25-Sep-2015
Estimated Date of Appraisal Completion	
Estimated Date of Board Approval	23-Aug-2016
Concept Review Decision	Track II - The review did authorize the preparation to continue

I. Introduction and Context

Country Context

India's power system needs to grow rapidly to fuel its economic growth and provide electricity to its growing population. During the last decade, India's economy expanded at an average annual rate of 7.6 percent, placing it among the top 10 of the world's fastest growing nations; projections are for such high rates of growth to continue. The demand for power is expected to rise to support the growing manufacturing sector and meet the rising aspirations of its people. The Indian power system is among the largest in the world, but per-capita consumption of electricity is less than one-fourth of the world average. An estimated 300 million people are not connected to the national electrical grid, and those who are, face frequent disruptions. To meet the power demand, industrial establishments and manufacturers have been relying on diesel-based back-up power supplies, which are significantly more expensive than grid-based electricity. The cost of un-served energy is high, placing an inordinate burden on households and industries. Lack of regular supply of electricity is

also leading to diversion of resources into coping costs that could otherwise be used to support growth.

The Government of India (GoI) wants a growing share of the country's electricity to come from renewable energy. GoI has set an ambitious goal of providing uninterrupted power for all homes, industrial and commercial establishments and adequate power for farms by 2022, through the 24X7 Power for All Scheme. States are preparing customized plans outlining their requirements for generation, transmission and distribution in order to meet the 24X7 targets within the time frame. Currently, India relies largely on coal, both domestic and imported, for about 60 percent of its electricity generation requirements. India is the world's third largest emitter of carbon emissions behind China and USA, although per capita emissions are far lower. According to a recent World Health Organization report, 13 of the 20 most polluted cities in the world are in India.

GoI intends to supplement non-renewable sources with cleaner and abundant renewable sources and has accordingly announced plans to quadruple India's renewable energy capacity from 35.8 GW (as in June 2015) to 175 gigawatts by 2022 , which is expected to require more than $150 billion in investments. To achieve these targets, GoI is using innovative public private partnership models and has doubled the clean energy cess levied on coal. On the regulatory front through proposed amendments to the Electricity Act 2003, it seeks to remove open access transmission charges for renewable energy generation projects and is proposing to (i) increase renewable energy purchase obligations (RPO) to 8% by 2019 from 3% with severe penalties imposed on failure to meet mandatory compliance, and (ii) introduction of renewable generation obligation (RGO). This will boost the demand for renewable energy and create confidence among developers wishing to invest in new solar and other renewable energy generation projects, that there will sufficient buyers for their output.

Sectoral and Institutional Context

Solar PV has emerged as a promising long-term option to meet the growing energy demand in India while addressing the adverse environmental impacts of conventional fuels. Since India lies in the high solar insolation region, it is endowed with huge solar energy potential with most of the country having about 300 days of sunshine per year with annual mean daily global solar radiation in the range of 3.5-6.5 kWh/m2/day. Solar power can help India meet its growing electricity demand as well as foster energy security by reducing dependence on imported fossil fuel such as coal and diesel. The confluence of declining cost trends in solar photovoltaic (PV) power generation (mainly through dramatic declines in solar panel prices) and innovations in energy storage technology that are putting downward pressure on battery prices, offer exciting opportunities for India. In rural areas, solar PV can offer significant health benefits by displacing the use of kerosene for lighting. Energy efficient irrigation pumps running on solar panels can provide reliable cost effective irrigation for agricultural consumers.

GoI has announced a bold target of installing 100GW of solar power out of the total renewable target of 175GW by 2022 – for solar power this represents about a thirty fold increase from 3.7 GW of available installed capacity in 2015. The push in solar energy is a key part of the government's efforts to reduce environmental pollution and GHG emissions. In 2009, GoI introduced Jawaharlal Nehru National Solar Mission (JNNSM), which is part of the National Action Plan for Climate Change (NAPCC). Under GoI's Jawaharlal Nehru National Solar Mission (JNNSM) there has already been rapid progress, as the total installed grid-connected solar capacity base of the country has reached 3.7 GW (or 3,700 MW) as of June 2015, from less than only 2 MW in 2009. However,

the Government would like to dramatically increase the pace of solar power deployment to meet its ambitious targets. The Government foresees that 60GW of the targeted installations will come from utility-scale ground mounted solar power plants, and the remaining 40GW from grid connected rooftop solar PV installations. It has announced or is in the process of announcing various policy measures and facilitating the regulatory environment to meet these ambitious targets. Of targeted 60GW under utility-scale solar generation, 20GW is targeted to be installed by setting up 20 solar parks each with a capacity of at least 500MW .

GoI and state governments are using innovative public private partnership models and approaches to achieve this scale-up. These include pushing to achieve near-parity with thermal power costs through various competitive mechanisms, and to minimize government subsidies required for solar power development. Since distribution companies have the choice of sourcing thermal or solar power, and costs are passed on to the customers through tariffs, the government is focusing on pushing down the quoted tariffs resulting from competitive power procurement. The so-called "viability gap fund" (VGF) is a subsidy that solar developers compete for in order to lower their quoted cost of power.

GoI and state governments have also proactively been taking steps to facilitate the integration of solar power in the grid. The intermittency of solar power generation makes it a variable renewable energy (VRE) source, and creates technical challenges, particularly for congested grids like India's. The Ministry of Power (MoP) constituted the India Smart Grid Task Force (ISGTF), an inter-ministerial task force and the India Smart Grid Forum (ISGF), a public-private partnership initiative, in 2010. ISGTF and ISGF have formulated a comprehensive smart grid vision and road map for India to "transform the Indian power sector into a secure, adaptive, sustainable and digitally enabled ecosystem that provides reliable and quality energy for all with active participation of stakeholders".

The national transmission utility, Power Grid Corporation India Limited (POWERGRID) has taken the lead in implementing the Green Energy Corridor Project to facilitate evacuation of renewable energy across the country. Along with Power System Operation Corporation Limited (POSOCO), a fully owned subsidiary of POWERGRID, it is also exploring the possible measures to manage intermittency and variability of grid connected Renewable Energy. The topic remains challenging, and has never been attempted on this scale before, i.e. introducing an additional 175GW of intermittent energy into a power system that today has a total installed capacity of 275GW. However, the transmission authorities are focused on the problem and are adopting a learning by doing approach as the incremental renewable energy gradually comes on line in various parts of the country.

The Ministry of New and Renewable Energy (MNRE), the nodal ministry for facilitating achievement of GoI's renewable energy targets, has launched 'solar park scheme' to address many of these barriers. This scheme envisages setting up 25 solar parks, each with a capacity of 500 MW and above and hence targeting to install about 20 GW of solar power in five years, starting 2014-15, through a public private partnership model. Large scale solar production in solar farms or solar parks having a capacity of 500 MW or more and connected to the grid, allows the state electric utility or distribution company to buy large amounts of solar power through long-term contracts, and distribute it to all grid-connected customers.

A joint venture (JV) company comprising of the Solar Energy Corporation of India (SECI), state utilities and in some cases the private sector is proposed to be set up in each participating state to

provide specialized services and to be the owner of the park and its shared infrastructure, in order to incentives solar power developers to invest in solar energy in the park. The development of these solar parks is expected to streamline the development timeline for solar power generation projects with government agencies undertaking land acquisition or arranging for lease of a large parcel of land from private owners. The public sector (in this case the JV company) will be responsible for obtaining necessary permits, as well as providing common infrastructure such as site preparation and leveling, construction power, power evacuation and water infrastructure, access roads, security, and related services necessary to set up such power generation projects or plants .

POWERGRID or the State Transmission Utility (STU) will set up a sub-station outside the solar park to feed power from one or more pooling stations into the National Grid or State Grid, respectively. In cases where electricity utilities in the state are not willing to buy entire power generated from such solar parks, POWERGRID is expected to be given the responsibility of setting up 400/220 kV or bigger sub-station right next to the solar park and ensuring its connectivity to the Inter State Transmission System (ISTS). The development of interconnection will be coordinated and prioritized to ensure the availability of the evacuation infrastructure to solar developers well in advance of their plant commission date.

The World Bank's Engagement in the Solar Sector:

As requested by the GoI, the World Bank is proposing a series of three projects in solar power sector.

(i) Shared infrastructure. The first project will assist SECI in setting up shared infrastructure for selected solar parks in phases, in the states of Karnataka, Madhya Pradesh (MP), Andhra Pradesh (AP) and Telangana, in partnership with the State Nodal Agencies for Renewable Energy through joint venture (JV) companies.

(ii) Evacuation. The second project will assist POWERGRID in setting up transmission infrastructure to evacuate power from the selected solar parks in the states of Karnataka, MP and Telangana.

(iii) Rooftop solar. The third project focuses on engaging with a competitive and wide reaching financial intermediary to enable Government of India to facilitate large scale deployment of grid-connected rooftop solar PV that is self-sustaining and is attractive to consumers

The current project is related to the first engagement of the Bank in the solar sector, as listed above.

Relationship to CAS

The proposed project is aligned with the India Country Partnership Strategy along its three pillars – integration, transformation, and inclusion. Under integration, the project will accelerate private investment in solar power in some of India's solar-resource rich states such as Karnataka and Madhya Pradesh. Under transformation, the project directly aims to reduce environmental pollution and GHG emissions, add clean power generation capacity, and foster innovative solar development through shared large-scale infrastructure. Under inclusion, the project offers the opportunity to increase access to electricity by increasing the availability of electricity generation in the system.

II. Proposed Development Objective(s)

Proposed Development Objective(s) (From PCN)

The proposed development objective is “to develop solar park internal infrastructure in order to mobilize investment for setting up of utility-scale solar energy generation in the country”.

Key Results (From PCN)

The following indicators will be used to track progress in achieving the project development objectives:

i. Investment mobilized in solar projects in solar parks under the project ($ Million)
ii. Installed solar generation capacity (MW) and Solar power generated (MWh)
iii. Strengthening and institutional capacity building of SECI

III. Preliminary Description

Concept Description

Component 1 - Solar Park Infrastructure (Estimated Cost - US$ 195 million). This will cover financing for shared infrastructure such as security, access roads, water supply and drainage, telecommunications, and most importantly, the construction of pooling stations (with 220/66/33 kV or as may be suitable switchyard and respective transformers) inside the solar parks and transmission lines connecting these internal pooling stations to 400/220 kV sub-station (to be located by POWERGRID or State Transmission Utility at the periphery of the solar park for evacuation of power to either National Grid or the state grid). Solar project developers will be responsible for the interconnection of each plot in the solar park with pooling stations through suitable voltage underground or overhead cable.

The first set of solar parks to be financed under this proposed project are those at Pavagada in the Tumkur district of Karnataka (the land is adequate to support total solar generation capacity of up to 2000 MW) and at Rewa in Madhya Pradesh (land needed to support a total solar generation of 750MW has been identified). Additional parks may also be identified in these states during the course of project preparation. Further, solar parks are also being identified in other states, especially Andhra Pradesh (AP) and Telangana.

(b) Component 2Technical Assistance (Estimated Cost - US$ 5 million). The technical assistance will be towards the following activities:

(i) Institutional Strengthening of SECI and JVs: SECI was formed in 2011 as the main entity responsible for the management and implementation of the JNNSM Phase II. As part of this mandate, SECI is to invest in JV Companies for solar power plants and solar site developments. But given the challenge of the massive solar deployment in India by 2022, SECI’s organization and institutional practices need to be strengthened. Similarly, State Nodal Agencies and JVs, which have just been formed, are also not fully equipped to take on the challenges of meeting their mandate. The Technical Assistance component will aim to enhance core competencies of these organizations across functions such as human resource, project management and monitoring, procurement and contract management, operations and maintenance, financial management and implementation of enterprise wide IT based on the comprehensive business plan/capacity building and institutional strengthening plans to be carried out during the preparation of the project.

(ii) Project implementation support to SECI and JVs: This component will provide project management support in implementation of the investment components indicated above. This will entail setting up of project management unit (PMU) within MNRE or SECI to facilitate coordination between different agencies and to supplement project implementation wherever

necessary. The specific interventions will be designed and agreed with respective implementing agencies during project preparation.

Safeguards Aspects of the Project: The environmental and social impacts of this project will be mostly restricted to the solar parks area and its immediate surroundings. The transmission lines that will evacuate the power out of the park and into the National Grid, are also integral to the project and are being handled through another project supported by the Bank for the initial set of parks being funded under the Project. While government plans to utilize state-owned unproductive land for solar parks to the extent possible, resettlement of communities settled on government land may be required in one or more of the four states that have been assigned to the World Bank for support to solar park development. A detailed safeguards baseline/assessment study will be carried out to assess the magnitude of such aspects and mitigation plan will be charted out accordingly. Appropriate baseline/assessment studies will also be carried out for additional states and sites that will be included in the project.

IV. Safeguard Policies that might apply

Safeguard Policies Triggered by the Project	Yes	No	TBD
Environmental Assessment OP/BP 4.01	×		
Natural Habitats OP/BP 4.04			×
Forests OP/BP 4.36			×
Pest Management OP 4.09		×	
Physical Cultural Resources OP/BP 4.11			×
Indigenous Peoples OP/BP 4.10	×		
Involuntary Resettlement OP/BP 4.12	×		
Safety of Dams OP/BP 4.37		×	
Projects on International Waterways OP/BP 7.50		×	
Projects in Disputed Areas OP/BP 7.60		×	

V. Financing (in USD Million)

Total Project Cost:	400.00	Total Bank Financing:	200.00
Financing Gap:	0.00		

Financing Source	Amount
Borrower	200.00
International Bank for Reconstruction and Development	200.00
Total	400.00

VI. Contact point

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