

**PROGRAM-FOR-RESULTS INFORMATION DOCUMENT (PID)  
APPRAISAL STAGE**

<b>Program Name</b>	<i>Grid Connected Rooftop Solar Program (P155007)</i>
<b>Region</b>	<i>South Asia</i>
<b>Country</b>	<i>India</i>
<b>Sector</b>	<i>Energy and Extractives Global Practice</i>
<b>Lending Instrument</b>	<i>P4R</i>
<b>Program ID</b>	<i>P155007</i>
<b>{If Add. Fin.} Parent Program ID</b>	<i>--</i>
<b>Borrower(s)</b>	<i>State Bank of India</i>
<b>Implementing Agency</b>	<i>State Bank of India</i>
<b>Date PID Prepared</b>	<i>December 20, 2015</i>
<b>Estimated Date of Appraisal Completion</b>	
<b>Estimated Date of Board Approval</b>	<i>March 15, 2016</i>
<b>Appraisal Decision</b>	
<b>Other Decision {Optional}</b>	

**I. Introduction and Context**

**India's power system needs to grow rapidly to fuel the country's 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 5 of the world's fastest growing nations; projections are for 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 the population. With about 275GW of installed capacity (as of November 2015), 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 still not connected to the national electrical grid, and of those that are connected, many face frequent disruptions. Power shortages in FY2015 were equivalent to about 3.6% of total energy and 4.7% of peak capacity requirements.

**The Government of India (GoI) wants a growing share of the country's electricity generation to come from renewable energy.** In its Intended Nationally Determined Contribution (INDC), approved by the Union Cabinet, submitted to the United Nations Framework Convention on Climate Change, and presented to the international community at the 21<sup>st</sup> Conference of Parties in Paris in December 2015, India announced that it aims to increase to 40 percent the share of installed electric power capacity from non-fossil-fuel-based energy resources by 2030. It also pledged to create an additional carbon sink of 2.5-3 billion tonnes of CO<sub>2</sub> equivalent through additional forest and tree cover by 2030.

**A significant part of India's INDC will be delivered through the enhanced ambitions of the**

**updated Jawaharlal Nehru National Solar Mission (JNNSM) of 2010.**<sup>1</sup> In June 2015, the Cabinet approved a “Revision of Cumulative Targets under National Solar Mission from 20,000MW to 100,000MW.”<sup>2</sup> This change was based primarily on two factors: first, the rapid increase of installed ground-mounted solar capacity from 18 MW to nearly 4,000 MW between 2010 and 2015 created the confidence that more could be achieved than the original target of 20,000MW. Secondly, and even more significantly, the price per kWh of solar energy declined spectacularly, by over 60%, in the same period. The great success story of the innovative Indian solar auctions attracted international attention. Through intense competition among bidders, these auctions, conducted at various times by the central government and state governments, succeeded in driving down the price per kWh in India from Indian Rupees (INR) 17.9 per kWh in 2010, to INR 7 in mid-2015, and to below INR 5 by the end of calendar year 2015. Such rapidly falling, competitively discovered prices provided further confidence to the government that in future there would be a much-reduced need for price support in the form of “viability gap funding” (VGF):<sup>3</sup> rapidly falling prices per kWh meant that much larger amounts of solar generation would be “affordable” to the government because future auctions would require only minimal VGF to become competitive with thermal power.

**The enhanced 100,000 MW target of the JNNSM of 2015 now includes an ambitious sub-target of 40,000 MW (40GW) of Rooftop PV, specifically through the GoI-led Grid-Connected Rooftop Solar PV Program (GRPV), which had not specifically appeared in the earlier version of the Solar Mission.** GRPV is the program for which the Government has sought support from the World Bank and other partners. Funding requirements of around US\$40 billion to achieve the Rooftop targets will require investment and participation from numerous sources, which are expected to come in gradually as the technology’s track record is built up, benefits are demonstrated, and confidence grows. In order to kick-start the GRPV, GoI has tapped three financing partners--World Bank, Asian Development Bank (ADB) and the German bilateral financing agency KfW--to each work with one of three selected public sector financing institutions. The World Bank and ADB are each contributing \$500m for Rooftop PV and KfW is contributing 1 billion euro for support to GoI’s Solar Program. This small initial catalytic contribution by the three partners is expected to unlock a large volume of domestic debt and equity investment if benefits can be demonstrated and rooftop PV can be “commoditized”.

**Rooftop PV has the potential to transform the energy sector, involving tens of millions of electricity customers in taking responsibility for cleanly generating electricity to cover at least an important part of their own consumption.** Limitations on suitable rooftop space mean that most customers are unlikely to meet their full requirements through self-generation of solar

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<sup>1</sup> The JNNSM was originally launched on January 11, 2010, by the Prime Minister. The Mission had set the ambitious target of deploying 20,000 MW (20 GW) of grid-connected solar power by 2022. The aim was to reduce the cost of solar power generation in the country—through (i) long-term policy; (ii) large-scale deployment goals; (iii) aggressive research and development; and (iv) domestic production of critical raw materials, components, and products—and as a result, to achieve grid tariff parity by 2022. The Mission also aimed to create an enabling policy framework to achieve this objective and make India a global leader in solar energy.

<sup>2</sup> <http://pib.nic.in/newsite/PrintRelease.aspx?relid=122566>

<sup>3</sup> VGF is a form of capital cost buy-down per unit given by the central government, which is used as a bid variable in one version of the Indian solar auction. Whoever seeks the least VGF per unit for a given amount of generation wins the bid.

PV, and will continue to buy some of their electricity from the discom (which is why they remain grid-connected even after investing in the rooftop system).

**Climate finance.** GoI is keen to pursue access to concessional climate finance resources to accelerate the affordability and rollout of its renewable energy investments. GoI has successfully sought and obtained approval from the CTF for cofinancing of US\$125m for this proposed GRPV program supported by the World Bank. It has also applied for a GEF grant, specifically to (i) support an innovative risk mitigation mechanism to allow for funding rooftop PV to small and medium enterprise (SME) commercial and industrial customers, and (ii) to support a critical mass of states in obtaining higher rankings on a future “Ease of Doing Rooftops Business” Index.

**Electricity generated from GRPV is becoming increasingly cost-competitive with electricity from the grid in many parts of India**—particularly for commercial and industrial customers, who pay a higher tariff for electricity because of the cross-subsidy surcharge imposed on them. GRPV has already achieved price parity with the grid for this class of customers in a number of states. Residential customers will qualify for a 30% capital subsidy, and despite their initially lower grid tariff rates, it is expected that in combination with the subsidy, they will also find that their rooftop PV electricity is competitive with their grid tariffs in many cases.

**The absence of debt for rooftop PV has been a constraint.** The only widely used business model has been the “direct sale” model, in which the customers have to pay the solar system integrator or installer for the rooftop PV system in full, up front. Gujarat has pioneered the rooftop rental model in India: solar developers pay rent to a residential rooftop for the right to place their panels on the roof, and then sell all of their output directly to the discom. (This is the gross metering model—there is no netting off with the rooftop user’s consumption, as all solar energy produced is sold directly to the utility.<sup>4</sup>) Consumer awareness is low in terms of business models and other options—for example, how not to pay for the capital cost up front by entering into a build-own-operate-maintain (BOOM) or build-own-operate-transfer (BOOT) contract—and no one wants to be the first mover and take on all the risks. GoI would like to roll out a number of new business models for GRPV and significantly increase the pace of deployments to meet its official target. This will require some dedicated attention to the investment climate for rooftop PV, in addition to the introduction of a debt fund that allows for flexibility and support to a range of business models.

**The proposed World Bank-supported Rooftop PV Project will be delivered in partnership with State Bank of India (SBI) and has been designed at MNRE’s request to support the Government’s rooftop program by increasing the availability of debt financing for GRPV in India.**<sup>5</sup> All categories of customers will be eligible to receive financing for GRPV under the proposed operation, provided they meet SBI’s creditworthiness criteria and pass the test of

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<sup>4</sup> Gross metering applies two entirely separate billing processes. The consumer is paid in full for what it generates and supplies to the grid. It is charged separately for what it draws from the grid. The supply and consumption tariffs may be different.

<sup>5</sup> In addition to the World Bank, MNRE has requested KfW and ADB to help set up financing facilities for GRPV at the Indian Renewable Energy Development Agency (IREDA) and Punjab National Bank, respectively.

credibility for execution of their proposed project. The demand for financing is expected to be the greatest from commercial and industrial rooftop customers who are not eligible for the 30 percent CFA offered under MNRE's program. They are most likely to be using large diesel generators. The payback periods of rooftop PV investments will be the shortest for commercial and industrial customers, given their high electricity tariff rates. The Bank operation responds to findings of market surveys carried out by the MNRE in six Indian cities,<sup>6</sup> as well a series of consultations carried out by the World Bank<sup>7</sup>, which indicate that there is substantial pent-up demand for financing GRPV systems in the country.

**In addition, the proposed project will also focus on state-level investment climate issues through the introduction of an index measuring the “ease of doing rooftop PV business” for GRPV customers.** The project will provide Technical Assistance (TA) to the main stakeholders that are “building blocks” in the implementation of GRPV in the country, who do not make investment decisions themselves but nevertheless form a critical part of the investment climate for rooftop PV: discoms, State Nodal Agencies (SNAs), accredited rooftop PV certifiers (who are in short supply), state power departments, and State Electricity Regulatory Commissions (SERCs), among others. Support to these stakeholders is expected to enable faster and smoother implementation of net-metering or gross-metering policies, as well as to increase consumer education and awareness about GRPV and minimum technical standards. All of this is seen as an essential “doing business” complement to the creation of a GRPV debt fund. State-level officials in charge of the power sector, who will face the prospect of being ranked for Ease of Doing Rooftop Business in 2017, have expressed a great deal of eagerness to obtain such support and personally ensure that the TA funds are well spent.

**Program beneficiaries** include (i) GRPV customers who will benefit from electricity generated by GRPV systems under a variety of business models; (ii) discoms that will benefit from electricity passed on to their network through net metering or gross metering, and through the TA carried out under the program; (iii) SNAs and SERCs, which will benefit from TA and capacity-building activities in the program; (iv) the residents of states where GRPV systems are implemented who benefit from improved consumer education and consumer awareness as well as reduced air pollution and the resulting improved health impacts; (v) SBI and its branches across the country, which will benefit through strengthened institutional capacity; (vi) third-party aggregators, developers, and vendors of GRPV systems, through access to debt that allows their business to grow faster; (g) all economic agents engaged in the GRPV supply and delivery chain, particularly subcontractors for installation and other services, as well as O&M service providers; and (h) the global community, which will benefit from avoided GHG emissions.

## **Institutional Arrangement for Implementation**

**Component 1: SBI will be the borrower and implementing agency for the PforR component (Component 1) of this operation.** IBRD and climate funds will be on-lent through SBI to qualified

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<sup>6</sup> Bangalore, Bhubaneswar, Chandigarh, Delhi, Gandhinagar, and Pune.

<sup>7</sup> Six stakeholder meetings were carried out with a wide range of potential market participants from June to December 2015.

intermediaries (qualified in terms of technical capacity, relevant experience, and creditworthiness as per SBI's standards). This access to working capital will allow qualified private sector developers and aggregators to buy the required inventory and aggressively acquire customers, and push for large scale deployment of roof top solar PV systems among customers using different business models. End-customers who wish to directly make the capex investment and own the asset, as long as they qualify under SBI's credit standards, will also be eligible to participate in the program.

SBI will be responsible for identifying, appraising, and financing eligible investments that meet the criteria in an Operational Manual (OM) prepared and owned by SBI. The detailed eligibility criteria, technical performance requirements and appraisal guidelines are outlined in the OM, and agreed between SBI and the World Bank. SBI is India's oldest and largest financial services company. It has more than 16,000 branches in the country and 190 foreign offices in 36 countries. It has an active customer base of 270 million. While the bank is majority owned by the GoI, shares of SBI are traded on the Bombay Stock Exchange and National Stock Exchange of India. Its Global Depositary Receipts are listed on the London Stock Exchange. SBI's size and reach make it an ideal partner to roll out MNRE's scheme for grid-connected solar rooftop PV program.

**Component 2: Technical and Institutional Support to State Agencies.** SBI will manage this part of the program under the oversight of the MNRE and an inter-ministerial Steering Committee.

### **Environmental and Social Screening**

An initial environmental and social screening was carried and concluded that the program includes only Category B and C investments. The proposed Program is expected to lead to a reduction in negative externalities associated with local pollution and GHG emissions and have mainly positive environmental impacts. The safety of GRPV installers is a potential concern but this can be mitigated through a well-designed training program and performance requirements that will be mentioned in the OM as practices to be followed by eligible installers. An environmental and social systems assessment (ESSA) was conducted to assess the adequacy of the environment and social systems of SBI during Program preparation. An Executive Summary of ESSA is disclosed on the World Bank and MNRE websites. The Program will build on the experience of other Bank projects to mainstream environmentally and socially friendly practices in the Program.

### **Tentative financing**

Source:	(\$m.)
Borrower/Recipient	2
IBRD	500
CTF	125
GEF	25
Others (Private and Public equity and State level incentives)	150
Total	800

### **Contact point**

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