Project Information Document (PID)

Concept Stage | Date Prepared/Updated: 26-Jul-2019 | Report No: PIDC27066

BASIC INFORMATION

A. Basic Project Data

Country	Project ID	Parent Project ID (if any)	Project Name
India	P170590		West Bengal Electricity Distribution Grid Modernization Project (P170590)
Region	**Estimated Appraisal Date**	**Estimated Board Date**	**Practice Area (Lead)**
SOUTH ASIA	Jul 01, 2020	Sep 03, 2020	Energy & Extractives
Financing Instrument	**Borrower(s)**	**Implementing Agency**	
Investment Project Financing	Department of Economic Affairs, Ministry of Finance, GoI	West Bengal State Electricity Distribution Company Limited	

Proposed Development Objective(s)

The project's development objective is to improve the operational efficiency and reliability of electricity supply in selected areas of West Bengal.

PROJECT FINANCING DATA (US$, Millions)

SUMMARY

Total Project Cost	400.00
Total Financing	400.00
of which IBRD/IDA	280.00
Financing Gap	0.00

DETAILS

World Bank Group Financing

International Bank for Reconstruction and Development (IBRD)	280.00

Non-World Bank Group Financing

Counterpart Funding	120.00
Borrower/Recipient	120.00

Environmental and Social Risk Classification	Concept Review Decision
Moderate	Track II-The review did authorize the preparation to continue

Other Decision (as needed)

B. Introduction and Context

Country Context

1. **India continues to be the one of the world's fastest-growing economies and is well poised for a transition to a higher and more widely shared level of prosperity by 2047—the centenary of independence.** In the past three decades, per capita incomes have quadrupled, poverty has retreated, illiteracy rates have tumbled, and health conditions have improved. Home to over one-sixth of the world's population, India is the third largest economy measured by purchasing power parity. India's GDP is expected to grow at over 7 percent per annum[1], with aspirations of 8 percent annual growth in the coming years. To achieve its growth aspirations, India needs to overcome certain persistent constraints. First, growth will need to be sustained, but in a more resource efficient manner given the country's low per capita natural resource endowment. Second, growth will need to be inclusive to maximize the potential of the country's human resources and address inequality. Third, the country will need to strengthen the effectiveness of the public sector especially in delivering services and enabling the private sector to thrive and drive economic growth.

2. **West Bengal is India's 2nd most densely populated state, and the fourth most populous with 96 million people.** It has an area of 88,752 sq. km. and is the sixth largest contributor to India's net domestic product. Agriculture accounts for the largest share of the labor force with 39 percent share[2]. In the past five years, the West Bengal Gross State Domestic Product (GSDP) has grown at a CAGR of 6.5 percent, primarily driven by growth in trade, hotels, real estate, finance, insurance, transport, communications and other services. This economic growth has resulted in a growing electricity demand at a CAGR of 4.5 percent during the same period. The electricity supply has kept pace, resulting in the state's energy deficit within a low margin of 0.3 - 0.4 percent over the past five years. The state is endowed with strategic geographical standing - being the corridor to the North East region of the country as well as South East Asia, and has an important role in facilitating and promoting regional power trade. The state is already facilitating electricity trade with Bangladesh.

1 The registered growth is driven primarily by robust private consumption, a resilient services sector, and a revival in some industrial activities.

2 http://documents.worldbank.org/curated/en/706921504251904391/pdf/119341-BRI-P157572-West-Bengal-Jobs.pdf

Sectoral and Institutional Context

3. **India's rapid economic development and growing population requires a power system that can meet demand for higher quality and cleaner electricity services.** Over the past decade, India's economic performance drove average annual growth of peak power demand and energy demand to 5.1 percent and 5.5 percent, respectively.[3] India is the third largest consumer of electricity globally, yet per capita electricity consumption of 1,149 kWh (FY2018) is one-third of the global average. Energy demand is expected to grow rapidly with rising incomes, industrialization of the economy, and urbanization which drives adoption of modern appliance use and cooling demand. India is expected to be the largest source of primary energy growth globally through 2040[4].

4. **The Government of India (GoI) considers India's low per capita electricity consumption a constraint on meeting its inclusive economic development objectives**. Therefore, the supply and reliability of electricity services are a national priority. Through a major national program, electricity access has been expanded to nearly every household, from only 56 percent of households in 2001. While the installed generation capacity stands at 356 GW at the end of April 2019, there is steady growth in the quantity and competitiveness of renewable energy (RE) in the generation mix, especially power from wind and solar. RE, excluding large hydropower, currently represent 21.8 percent of installed generation capacity[5]. India's Nationally Determined Contribution (NDC) aims to install 175 GW of RE capacity by 2022, with the objective of 40 percent of electricity coming from non-fossil sources by 2030[6].

5. **Reliable electricity supply remains a major barrier to development of industry and business.** In 2014, GoI announced an 24x7 Power for All (PFA) program, in partnership with states, to ensure uninterrupted power for all homes, industries and commercial establishments. To grow the economy and create jobs, particularly through a strong manufacturing sector, one of the most important tasks is to ensure affordable, reliable electricity. A World Bank Enterprise Survey conducted in 2016 found that almost half of business managers in South Asia identified lack of reliable electricity as a major constraint to their firm's operation and growth. In fact, they ranked blackout as a bigger barrier than other issues such as regulations and taxes, corruption and human capital. In 2016, in manufacturing and services sector combined, the total loss in annual output attributable to power shortages was $22.7 billion in India. Poor quality of supply tends to damage household appliances and machinery of the manufacturing industry. While significant progress has been made in providing electricity access across the country, providing quality and reliable uninterrupted power supply remains a challenge. A significant number of grid-connected consumers still face unreliable electricity supply, and, those who can afford it, use expensive, inefficient and polluting back-up generation.

6. **GoI has undertaken programs to strengthen electricity transmission and distribution (T&D) infrastructure in states, seeing this as a bottleneck for improving reliability.** Central sector funds are provided under three key schemes: Integrated Power Development Scheme (IPDS) – for urban areas; Deendayal Upadhyaya Gram Jyoti Yojana (DDUGJY)- for rural areas; and Sahaj Bijli Har Ghar Yojana (Saubhagya), to support downstream electricity connections to all unconnected households.

7. **While well-performing utilities across the globe have transitioned to automated platforms, the chronic insolvency of India's public distribution companies (Discoms) prevents them from taking advantage of ICT**

3 Calculated for 2007-2017. Central Electricity Authority (CEA) (May 2017). "Growth of Electricity Sector in India from 1947-2017".

4 IEA (2018). World Energy Outlook. p.35.

5 CEA (April 2019).

6 UNFCCC (2015) "India's Intended Nationally Determined Contribution: Working towards climate justice". https://www4.unfccc.int/sites/ndcstaging/Pages/Home.aspx.

technologies that can significantly improve service and efficiency. The complex and evolving nature of such technologies, upfront costs as well as lack of right skill mix inhibits financially insecure discoms from taking advantage of the value proposition of ICT technologies, in spite of knowledge and skills being available within the country. In 2015, GoI announced a program for financial and operational turnaround of the Discoms called Ujjwal Discom Assurance Yojna (UDAY), which seeks to restructure Discoms' debts, requiring State governments to take responsibility for part of this debt in return for improvements in service delivery and commercial performance by the Discoms.

8. **West Bengal undertook restructuring of the power sector in 2007.** Under the restructuring, the West Bengal State Electricity Board (WBSEB)'s distribution and hydel generation businesses were transferred to the newly incorporated West Bengal State Electricity Distribution Company Limited (WBSEDCL) while the transmission and load despatch businesses were transferred to the newly incorporated West Bengal State Electricity Transmission Company Limited (WBSETCL). West Bengal Power Development Corporation Ltd. (WBPDCL) existed previously and is responsible for thermal power generation in the State. WBSEDCL covers nearly the entire state, except Kolkata and other very small pockets covered by private distribution licensees. All these utilities are regulated by West Bengal State Electricity Regulatory Commission (WBSERC).

9. **While West Bengal has extended grid connectivity to 99 percent of villages across the state, the large consumer base of low paying and low consumption households is straining discom finances**. The number of consumers served by WBSEDCL has more than doubled in the last six years to almost 18 million consumers. WBSEDCL supplies electricity to ~85 percent consumers in West Bengal and contributes to ~56 percent retail sale in terms of million units (MUs) sold in the state. WBSEDCL's consumer mix is characterized by very high proportion of low paying domestic consumers (~90 percent of WBSEDCL's total consumer strength), contributing to only ~40 percent of WBSEDCL's total retail sale in MUs.

10. **West Bengal's priority has now shifted from basic access to improved quality of supply and ensuring the financial sustainability of the state discom.** Although the state has adequate power capacity, challenges remain in commensurate strengthening of the intra-state transmission and distribution network to widely disperse quality power supply amongst the large consumer base, especially in rural Bengal. The doubling of the consumer base has led to multiple operational and financial challenges that must be addressed:

    a. **Reducing AT&C losses:** As the distribution network extended rapidly over a large area with addition of huge number of low voltage consumers, there was a steady increase in losses with Aggregate Technical and Commercial (AT&C) loss levels reaching around 30 percent in FY2015. WBSEDCL has been taking several initiatives to reduce the losses but these continue to remain high at around 27 percent in FY2018.

    b. **Improving quality and reliability of power:** Owing to the vast spread of low voltage distribution network including remote areas, the utility is facing a challenge in maintaining quality and reliable supply and the network suffers from frequent outages with DTR failure rate varies between 4 to 10 percent across different districts.

    c. **Integrating advanced operation technologies (OT) and automation of internal business operations:** WBSEDCL is faced with challenges around upgrading its Information Communication Technology (ICT) and Operational Technology (OT) systems to automate network operations to facilitate integration of renewable energy and handle the growing impact of large number of prosumers, Electric Vehicles (EVs) and other Distributed Energy Resources (DER) applications. Automation of operations is also important

for WBSEDCL to monitor reliability of supply, identify and restore network disruptions and track consumer complaints efficiently, thus leading to improved customer satisfaction.

d. **Re-skilling to build workforce capacity:** With the expansion of the power system in the state, and a rapidly changing business environment, the maintenance and operation of the distribution network has become more technology driven. The utility employees are used to conventional, manually operated networks and business operations. They now need to learn integrated ICT-Power System skills and the utility needs to invest quickly in work-force skilling in a major way.

e. **Securing financial sustainability:** While WBSEDCL is one of the very few publicly owned Discoms in India that have generated profits over several years in the past, its financial performance has deteriorated in last couple of years due to delayed tariff revisions and accumulation of a considerable amount of receivables (regulatory assets) because of non-pass through of full costs in the tariff for a few years and the same being financed through short term debt. The financial pressure on WBSEDCL shall continue to increase because of a higher mix of low value consumers and increasing interest burden**.**

Relationship to CPF

11. **The Project is consistent with the WBG Country Partnership Framework (CPF) FY2018-2022 discussed at the Board on September 20, 2018 (Report No. 126667-IN), particularly the focus on promoting resource-efficient growth through increasing access to sustainable energy.** Further the project is also aligned with the implementation strategy of "engaging a Federal India" and "strengthening public-sector institutions" as outlined in the CPF. The CPF specifically focus the World Bank's efforts on supporting state-owned T&D utility reforms and institutional strengthening to ensure increased access to reliable power in alignment with the GoI's 24x7 PFA Program. This project, through its focus on modernization of electricity distribution grid infrastructure and supporting the institutional development of the state distribution utility, will facilitate increase in access to reliable electricity supply to the citizens in the state of West Bengal.

12. **A key focus under World Bank's engagement in Power sector in India is state level support to electricity distribution sector for implementing the 24x7 PFA plans**. As a part of the same, the Bank's engagement aims to focus on work across a spectrum of states with varying performance levels of electricity distribution sector and encourage cross fertilization and sharing of knowledge among the different states to help them improve their level of performance recognizing that a "One size fits all" approach will not work and a combination/ platform of approaches/ solutions need to be developed and implemented. This is sought to be complemented under the planned new NLTA to support Niti Aayog on development of national level State Energy Index that aims to provide a benchmark of comparative performance across states. This also fits in very well with the "Lighthouse India" approach under the latest CPF for India.

C. Proposed Development Objective(s)

The project's development objective is to improve the operational efficiency and reliability of electricity supply in selected areas of West Bengal.

Key Results (From PCN)

13. PDO level results indicators proposed for the Project are (a) Reduction in Aggregate Technical and Commercial (AT&C) losses in select districts (percentage); (b) Reduction in distribution transformer failure rate in select districts (percentage); (c) Improvement in SAIDI (System Average Interruption Duration Index) and SAIFI (System Average Interruption Frequency Index) in select districts.

D. Concept Description

14. The proposed project will support the implementation of the 24x7 PFA plan in the state of West Bengal and support WBSEDCL in transitioning towards a leading public sector utility in India by providing financial and technical support for investments to modernize its electricity distribution network and institutional development resulting in improved operational efficiency in the sector and reliable supply to the consumers.

15. The proposed World Bank engagement will focus on interventions to improve the institutional capacity of WBSEDCL through an integrated approach built on the four pillars of people, processes, technologies and governance. The proposed project will help WBSEDCL move closer to its vision of a fully automated and modern utility by supporting technologies to enable automation of internal business processes and network operations, and complete integration of the Information Technology (IT)/ Operational Technology (OT) processes in the medium term. This would be complemented by interventions to improve staff skills and governance systems. While the technology interventions will be supported through both investment and TA components, the TA component will also focus on the capabilities of utility staff, processes for assessing, adopting and implementing technical solutions, and improving governance.

16. The project is proposed to have the following components:

17. Component 1: Distribution System Strengthening (indicative cost of US$334 million, of which tentative IBRD share is US$233.5 million). This component will support strengthening and augmentation of the distribution network (33kV and below) with the objective to reduce distribution system losses, increase the capacity of the distribution network to meet the growing load demand, improve system reliability, and improve the quality of supply to end consumers. The investments that will be made under this component include:

a. Sub-component 1A: High Voltage Distribution System (HVDS) and Aerial Bunched (AB) Cabling: Due to a poor HT:LT ratio, the AT&C losses in some large districts continue to be very high. Under this sub-component, in around 14 high loss-making districts, parts of the existing low voltage network will be converted to high voltage (11kV) network, and the existing large distribution transformers (DTR) will be replaced with smaller transformers, located closer to load centers. This will reduce both technical and commercial losses and also bring down network disruptions.

b. Sub-component 1B: Distribution network augmentation: This subcomponent will support investments in distribution network augmentation as under:

   i. GIS Substations: This includes investments in 33/11 kV Gas Insulated (GIS) substations to augment and strengthen the distribution infrastructure in densely populated urban areas in select 14 districts. These investments will reduce losses and improve reliability and quality of supply to consumers.

   ii. Underground Cables: To improve system reliability and network and climate resilience, this sub-component will include investment in underground cables to replace the overhead network in

selected towns such as Asansol and Kharagpur. This system, together with its communication devices, is also planned to be integrated with the SCADA system.

18. **Component 2: Smart Grid Development in Urban Areas and Innovative Technologies (indicative cost of US$64 million, of which tentative IBRD share is US$45 million).** The investments proposed under this component include:
    a. Sub-component 2A: Distribution Automation and Smart Meters: This subcomponent will support investments in smart grids, including developing utility wide IT and communication infrastructure.
        i. ICT systems: This sub-component will include investments to upgrade the communication technology and improving the existing commercial and enterprise IT solutions.
        ii. Smart Meters: This sub-component will include creation of IT backbone for rolling out AMI & SCADA system under WBSEDCL. This will include implementation of smart meters in select towns (like Kharagpur, Asansol etc.) to reduce AT&C losses, improve revenue realization, improve peak load management, support time of day use and demand side management.
        iii. Modern Operation technologies: This sub-component will include deployment of distribution automation technologies and integration of various communicable control devices at 20 select towns with distribution SCADA.
    b. Sub-component 2B: Innovative schemes for Distribution strengthening: This subcomponent will be developed as project preparation work advances and may include work on disruptive technologies liked Battery energy storage systems (BESS), Distributed Energy Systems (DERs) etc.

19. **Component 3: Technical assistance for institutional development and capacity building of WBSEDCL (tentative IBRD share is US$1.5 million).** The activities to be supported under this component will be identified as project preparation progresses and is expected to include activities around people, process and technology aspects. Few examples include Project Management Consultants (PMC) to assist in supervising and monitoring sub-projects under Components 1 and 2 of the project; integration of environmental and safety aspects in project planning and construction; and asset mapping; skills development for the utility through training, workshops, knowledge exchange visits etc.

Legal Operational Policies	Triggered?
Projects on International Waterways OP 7.50	No
Projects in Disputed Areas OP 7.60	No

Summary of Screening of Environmental and Social Risks and Impacts

The project could have some impacts on the biophysical environment due to the project activities. These would include pollution issues during implementation, safety of workers and other users of the locations, disturbance / damage to biodiversity/wildlife, close-by habitations depending on the location/alignment of the project activities, etc. However, since the current alignment is likely to be followed for the most extensive work under the project, and the foot print of the other activities is likely to be small (E.g. GIS substations, underground cabling within city limits), the risks can be managed through the implementation of ESA as well integration of EHS provisions into respective contracts for execution

of the project.

Note To view the Environmental and Social Risks and Impacts, please refer to the Concept Stage ESRS Document**.**

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