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Combined Project Information Documents / Integrated Safeguards Datasheet (PID/ISDS)

Appraisal Stage | Date Prepared/Updated: 25-Dec-2016 | Report No: PIDISDSA19959



BASIC INFORMATION

A. Basic Project Data

Country Bangladesh	Project ID P159807	Project Name Power System Reliability and Efficiency Improvement Project	Parent Project ID (if any)
Region SOUTH ASIA	Estimated Appraisal Date 27-Dec-2016	Estimated Board Date 22-Feb-2017	Practice Area (Lead) Energy & Extractives
Lending Instrument Investment Project Financing	Borrower(s) Peoples Republic of Bangladesh	Implementing Agency Power Grid Company of Bangladesh (PGCB) Ltd.	

Proposed Development Objective(s)

Improve the reliability and efficiency of the power system in Bangladesh through optimization of dispatch operation.

Components

Technical Assistance
Operational Enhancements
Removal of Transmission Bottlenecks and Improvement of Voltage Quality
Contingency

Financing (in USD Million)

Financing Source	Amount
Borrowing Agency	8.00
Borrower	17.00
International Development Association (IDA)	100.00
Total Project Cost	125.00

Environmental Assessment Category

B - Partial Assessment

Decision

The review did authorize the preparation to continue



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Other Decision (as needed)

B. Introduction and Context

Country Context

Bangladesh's economy has performed well over the past decade. Its Gross Domestic Product (GDP) growth has risen by one percentage point per decade, from an average of 3.7 percent per annum in the 1980s to over 6 percent since 2010. This sustained growth was achieved despite the adverse impacts of the global recession, oil price rise, unrest in the Middle East (an important source of healthy remittance inflow) and natural disasters. Bangladesh has moved up to lower-middle income status in Fiscal Year (FY) 14 from low income group. The country has not only maintained the minimum requirement of the per capita income in the past consecutive three years, but also achieved a phenomenal rise in the Gross National Income (GNI) in the just concluded fiscal year. Its per capita income soared to US\$1,314 at the end of FY15 which was US\$1,190 in FY14 and US\$1,154 in FY13. This economic growth has largely been dependent on a reliable and affordable supply of electricity. Moreover, the national poverty rate fell from 58.8 percent in 1991-92 to 24.8 percent in 2015. However, challenges to poverty reduction and shared prosperity remain as the recent sustained growth has widened infrastructure deficits in electricity, transport and telecommunication.

In particular, Bangladesh's economy could have performed much better if the energy infrastructure had developed in line with the economic demands. The supply of power has not been able to keep pace with the rapid growth of electricity demand, resulting in frequent outages and load shedding. This has major effects on the economy as a majority of manufacturing and service firms in Bangladesh identify that absence of reliable electricity supply is the most important constraint to smooth operation and expansion of their businesses. The 2013-World Bank Enterprise survey report showed that businesses suffered power outages for 840 hours per year on an average, resulting in an output loss equivalent to 3 percent of GDP. In the same vein, Bangladesh was ranked the lowest out of 189 economies on the 'Getting Electricity' indicator in the 2016-'Doing Business Report' prepared by the World Bank.

Finally, the constraint identified above in terms of access and quality of service is also affecting households and translate in a 407 kWh/year electricity consumption per capita, one of the lowest in the world and lower than most of the South Asian countries. About 78 percent of the population has access to electricity with almost full coverage in urban areas but only 70 percent of households have access in rural areas.

Sectoral and Institutional Context

Bangladesh has implemented an ambitious power sector reform program over the last 20 years to improve sector performance and create an enabling environment to attract private and public investment in sectoral development. The country made substantial progress but still needs to tackle major challenges linked to (i) finalization of the institutional reforms to ensure technical and financial sustainability of the sector (ii) timely financing and implementation of the investment needed to match



the demand for electricity and reach universal access and, (iii) improvement of the operational performance and the quality of service.

C. Proposed Development Objective(s)

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Development Objective(s) (From PAD)

Improve the reliability and efficiency of the power system in Bangladesh through optimization of dispatch operation.

Key Results

- ✓ Reduction in interruptions and outages of power supply. (Numbers; Cumulative duration)
- ✓ Fuel savings from (i) load reduction of oil-fired generators to support system frequency and (ii) adherence to merit-order dispatch. (Quantity of fuel saved).

D. Project Description

From the analysis and trials undertaken with PGCB, BPDB and other stakeholders, it appears that the retrofitting of an automated, modernized dispatch function with associated investment in transmission upgrading would ultimately (i) improve system security and reliability (minimizing outages and preventing wider blackouts on a sudden disturbance in network); and, (ii) increase the efficiency or cost effectiveness of system operation by ensuring that it follows merit-order dispatch. The project is conceived as the first stage of a process of modernization of system dispatch in Bangladesh, recognizing that this is a long process that can best be implemented in phases.

The project has three components covering technical assistance and capacity building; investment in immediate operational enhancements; and, investment in transmission upgrades to address bottlenecks in specific high priority lines. The investments to improve operation will target the performance of NLDC in system management (key elements being automation, integration of generators into the system, and moving to merit-order dispatch). Following are the proposed components:

Component 1: Technical Assistance (US\$6 million funded by IDA)

This component will support the primary frequency control trials and training for PGCB/NLDC engineers/operators on modern, state-of-the-art frequency control and dispatch protocols (US\$3 million). The frequency control trials are pre-requisite to and will be followed by implementation of primary frequency control in at-least 15 power generation plants. Experienced power system control specialists will be engaged to perform the following tasks before the trial starts: visit all participating power stations (i.e., the plants which will provide frequency control services) to check the status of their controls, assess the condition of governors and tune them wherever needed (as most are currently not set to provide frequency response), check the SCADA system, and, undertake detailed modeling studies using PSSE software or similar modelling tools to simulate the operation of the system. The inspection will also identify the hardware that will need to be procured to ensure effective implementation of



primary and secondary control. The power system control specialists will help NLDC to prioritize the plants for frequency control purposes and set up a dispatch order for these plants. They will assist NLDC/PGCB staff during the trial process to ensure the trial proceeds smoothly; and they will record frequency response, recalibrate parameters, and prepare a final report on the outcome of the trials. The process will take place over a period of six months and will require a team of experts including offsite power system modelers.

This component will also support a capacity building and institutional review (US\$3 million) to (i) acquaint NLDC staff with modern control theory, practical aspects of regulating frequency in real-time through governor response as well as secondary control, and (ii) build power system dynamic modeling capability using PSSE. It will also include an in-depth review of the institutional and policy barriers that have, both, limited NLDC control over generators and that have resulted in lack of merit order in dispatch. The study is expected to identify the critical path for implementing merit order dispatch and make recommendations for transitioning to AGC and a fully modernized dispatch system over time, which the Bank could potentially support through a follow-up operation. Finally, it will build awareness and capacity on the basics of system dispatch through training to be provided to stakeholders beyond PGCB/NLDC, i.e., BPDB, the Power Division of MPEMR and, if possible, the regulator, BEREC.

Component 2: Operational Enhancements (US\$20 million, IDA US\$10 million).

The NLDC in Dhaka is currently not integrated with the SCADA system of the power generation plants in the grid and is unable to send/receive signals for changing output; nor does it receive real time demand forecasts from the distribution companies. The lack of cooperation between generators (to give NLDC control of their governors) and the demand side (to provide more reliable inputs for demand forecast) means that NLDC has little choice but to balance the system using guesswork and through instructions to generators over the phone.

This component will fund three sub-activities:

- (i) *Sub-component 2.1: Integration of generators to the NLDC's SCADA/EMS system (US\$10 million).* As part of the TA component above, power system experts will assess the hardware and software required to be procured for integration. This component will finance the procurement of the hardware identified above that will eventually be needed for the plants to be fully effective in providing both primary and secondary control. It will include Remote Terminal Units, enhancement of the plant SCADA system, replacement of generator controls, Automatic Voltage Regulators, power system stabilizers, etc.;
- (ii) *Sub-component 2.2: Upgrading/modernization of the NLDC SCADA/EMS software (US\$5 million).* It will cover procurement of software for real-time economic dispatch control, operator load flow, AGC and modeling power system dynamics, including licenses for five years so that NLDC staff are able to fully utilize the SCADA/EMS system. The software will enable the monitoring of generators for frequency control and dispatch.
- (iii) *Sub-component 2.3: Optimization software for dispatch (US\$5 million).* The dispatch optimization software will include week-ahead, day-ahead and hourly simulation capabilities to run fuel and transmission constrained dispatch optimization in an off-line mode and online (integrated with the SCADA/EMS) system. This sub-component will include a minimum of one license for five years with at least three user-keys, preparation of a dataset and analysis, and training on the dispatch system.



Component 3: Removal of Transmission Bottlenecks and Improvement of Voltage Quality (US\$88 million, IDA US\$73 million).

The component will cover the needed network reinforcement including:

- (i) The upgrade (by re-conductoring with higher capacity conductors) of selected congested 132 kV and 230 kV lines (US\$25 million) to address existing bottlenecks and enhance system transfer capability;
- (ii) Dynamic Line Rating (DLR) to improve utilization of limited transmission capacity on 400 km of three critical transmission lines identified by PGCB (US\$3 million); and,
- (iii) Static VAR Compensator (SVC) installation in three sub-station locations to enhance voltage stability by swiftly providing dynamic reactive power (US\$60 million).

The DLR and SVC investments will be prioritized for highest impact during the project, and additional system-wide investments may be rolled out in the future, beyond phase 1.

E. Implementation

Institutional and Implementation Arrangements

PGCB will be the implementing agency and will set up a dedicated Project Management Unit (PMU). PGCB has the experience of working with two World Bank-funded projects. It has completed the power evacuation component of Siddhirganj Power project and has been working in Rural Electricity Transmission and Distribution project. PGCB has demonstrated good performance in implementing both the projects specially, in procurement, safeguards and construction management. PGCB has experience in undertaking environmental and social impact assessment and implementing resettlement in compliance with Bank guidelines and policies. They have an approved organogram of an Environmental and Social Unit. PGCB has agreed to staff it.

PGCB has assigned a Project Director to lead the PMU. The PMU staffing will include:

- Dedicated Design & Supervision Engineers.
- Procurement Experts. The mission has suggested PGCB to establish and strengthen a Corporate Procurement Team. Two procurement consultants (one global and one local) already available in another project of the Bank that has built PGCB's procurement capacity of PGCB may be available.
- Financial Management Experts (Strengthening will be done).
- Safeguard Experts: A dedicated ESU (environment and social unit) is already established and permanent positions approved. It was agreed that one (1) Environmental, and one (1) Social Expert will be recruited from the market no later than end of December 2016.

GOB has established a Grid Stability Committee in November 2015 to ensure quality of electricity in the national grid and maintain supply stability. It is composed of BPDB, NLDC, IPPs and Generation Companies. Its mandate, among others, is to maintain system frequency with free governor mode operation (FGMO) and conduct necessary trials. The complexity of the project will require the close cooperation between generators, BPDB, and PGCB. Ongoing cooperation between those parties around



the trial exercise shows already a commitment to work together. A Memorandum of Understanding (MOU) will be formalized between BPDB and the other stakeholders to ensure the continuous cooperation.

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F. Project location and Salient physical characteristics relevant to the safeguard analysis (if known)

The proposed project will cover NLDC, Dhaka with Transmission network all over the country. The exact line routes and location of the SVCs are yet to be identified. An Environmental and Social Management Framework (ESMF) has been adopted by the PGCB. The ESMF lays out the requirements and procedure for the environmental and social impact assessment which will be followed once the line routes and SVC locations are identified. The ESMF also describes the process for alternative selection, examples of environmental and social assessment for transmission lines and SVCs and environmental and social baselines.

G. Environmental and Social Safeguards Specialists on the Team

SAFEGUARD POLICIES THAT MIGHT APPLY

Safeguard Policies	Triggered?	Explanation (Optional)
Environmental Assessment OP/BP 4.01	Yes	Transmission and distribution schemes are generally considered as environmentally clean and non-polluting in nature. Their impacts on environment are normally restricted to rights of way (ROW). New construction/upgradation of SVCs may require rehabilitation of the old substations and the key related environmental management issue would be the collection and disposal of old transformers and capacitors. In view of subprojects nature, the overall project is classified as a Category 'B' and the safeguard policy OP/BP 4.01 has been triggered to ensure that the sub project design and implementation will be focused on reducing adverse impacts and enhancing positive impacts. The environmental and social management framework (ESMF) has defined the procedure for environmental and social screening/assessment for each subproject (exact routes and locations of the transmission/distribution lines and substations). Before approval



		of each subproject, environmental and social screening and assessment will be carried out with environmental management plan (EMP) and resettlement action plan (RAP) that will include subproject specific mitigation and monitoring measures. In addition, Environment Code of Practice (ECoP) have been prepared and included in the ESMF. EMP and ECoP with cost will be incorporated in the tender documents of work contracts. The cost of implementation will be calculated and will be incorporated in the tender document. Site specific EMP and RAP will be prepared for any line routes and SVC locations before the bid process in accordance with the ESMF.
Natural Habitats OP/BP 4.04	No	There is no natural habitat formed largely by native plant and animal species in or surrounding the alignment of the transmission line to be upgraded under the project. No possibility for affecting any natural habitat.
Forests OP/BP 4.36	No	There is no forest area in or around the subprojects area and no possibility for affecting the Forest due to the upgrading of Existing transmission line or installation of SVCs. As such, the policy has not triggered.
Pest Management OP 4.09	No	The project is not expected to finance any synthetic chemical pesticides activities and the policy has not triggered.
Physical Cultural Resources OP/BP 4.11	No	Since the activity is limited to the improvement of technical efficiency and upgradation of existing transmission line, no impact on landscape with archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance is expected.
Indigenous Peoples OP/BP 4.10	No	There is no indigenous people in the vicinity of the transmission line and sub-station subprojects.
Involuntary Resettlement OP/BP 4.12	Yes	The project includes upgrades to a limited number of transmission lines and SVCs. Although exact line routs and locations of SVCs are not known no significant social impacts are anticipated. However, some minor and temporary resettlement impacts may occur. PGCB has adopted a social management framework (SMF) with the project ESMF for guidance in carrying out social impact assessment of subprojects, and prepare and implement RAPs.
Safety of Dams OP/BP 4.37	No	



Projects on International Waterways OP/BP 7.50	No
Projects in Disputed Areas OP/BP 7.60	No

KEY SAFEGUARD POLICY ISSUES AND THEIR MANAGEMENT

A. Summary of Key Safeguard Issues

1. Describe any safeguard issues and impacts associated with the proposed project. Identify and describe any potential large scale, significant and/or irreversible impacts:

The Project is expected to finance to upgrade (re-conductoring) of selected congested 132 kV lines to 230 kV to enhance system transfer capability (\$ 25 million) and Static VAR Compensator (SVC) trials in identified locations to enhance voltage stability by improved reactive power management (\$60 million).

The project is classified as a Category B project and the Environment Assessment (OP/BP 4.01) safeguard policy has been triggered to ensure that the project investment are environmentally sound, sustainable and thus help to improve decision making. No large-scale infrastructure investment or major expansion will be implemented under the proposed project. The environmental impacts of the project are expected to be mostly construction related and limited within the project boundaries. These impacts can be mitigated through implementation of appropriate environmental code of practice and environmental management plan.

Since the line routes, exact locations of SVCs, size and extent of the sub-projects remains unknown at the project appraisal stage, a framework approach has been adopted for the Project. An Environmental and Social Management Framework (ESMF) has been prepared based on preliminary studies of few possible locations of proposed substations and surveys of proposed routes of new /rehabilitation of transmission/distribution lines.

2. Describe any potential indirect and/or long term impacts due to anticipated future activities in the project area:

The locations specific interventions to be financed under the Project will be finalized during the project implementation phase and as such the exact locations, size and extent and the degree of impact of the subprojects to be funded under the projects are not known at this stage. However, the project requires careful health and safety measures during implementation and operation phases as the activities involve transmission of electricity. It is expected that the Project activities are not expected to cause any long term or irreversible environmental impact. The long-term indirect impact is the development of rural areas with better electricity connection. This may convert some agricultural and/or nonproductive land into commercial/industrial purposes.

3. Describe any project alternatives (if relevant) considered to help avoid or minimize adverse impacts.

As mentioned earlier, the details of subprojects and their actual locations are not known at this stage. The ESMF has the provisions for subproject specific alternative analysis. In general, for any sub-project, the analysis of alternative should focus on: Alternative location (for SVCs) or route (for power line); Alternative design and technology; Costs of alternatives; and No subproject scenario. The NLDC/PGCB authority will carry out screening at all proposed alternative routes of the power line based on the screening form. Then the environment and social details of these alternatives will be analyzed as per guidance provided in the ESMF. Important considerations include avoiding homestead areas, as much as possible; avoiding crossing of rivers/forests/natural habitats/hills/bamboo groves/cash-in trees, as much as



possible. If the homestead areas (or other sensitive infrastructure) are not avoidable in any of the options, the NLDC/PGCB will consult with the owner/respective authority and collect their no objection for the construction of transmission and distribution lines in written. On the other hand, use of a government-owned land for construction of substation would significantly reduce adverse socioeconomic impacts. If that is not possible, efforts should be made to avoid ecologically or socially critical areas for construction of substation.

4. Describe measures taken by the borrower to address safeguard policy issues. Provide an assessment of borrower capacity to plan and implement the measures described.

PGCB has prior experience in implementing the IDA funded projects and it has implemented the “Siddhirganj and Maniknagar 230kV Transmission Line Project” under IDA financed Siddhirganj Power Project. Also they are implementing the subprojects under Rural Electricity Transmission and Distribution Project of the World Bank. PGCB created an Environment and Social Management Unit (ESMU) in their regular organogram. The PGCB have kept the provision of short and long-term training courses of their concerned officials on environmental management for the institutional capacity building. ESMU is expected to be set-up after all necessary clearances by January 31, 2017. The ESMF has elaborated the supervision and monitoring requirements of the EMP and ECoP. The quarterly progress on environmental implementation will be reported in detail along with the Project Progress Report.

5. Identify the key stakeholders and describe the mechanisms for consultation and disclosure on safeguard policies, with an emphasis on potentially affected people.

The ESMF presented a guideline for carrying out consultation, including guidelines on nature (FGD/ informal meetings) and number of consultations, location, and type of participants. Several field level consultations with the key stakeholders including the PGCB and NLDC field level staffs, and communities have been carried out during the preparation of the ESMF. As a part of disclosure, summary of the ESMF report has been translated into Bangla and disseminated locally. Copies of the report (both in English and Bengali) will be sent to concerned offices of PGCB and NLDC and will be made available to the public. In accordance with WB access to information policy, the ESMF report has also been uploaded in the website of PGCB/NLDC and in the Bank InfoShop. The draft ESMF will be presented in a national workshop in mid-January, 2017.

B. Disclosure Requirements

Environmental Assessment/Audit/Management Plan/Other

Date of receipt by the Bank 01-Dec-2016	Date of submission to InfoShop 26-Dec-2016	For category A projects, date of distributing the Executive Summary of the EA to the Executive Directors
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"In country" Disclosure

Bangladesh
26-Dec-2016

Comments



Resettlement Action Plan/Framework/Policy Process

Date of receipt by the Bank

01-Dec-2016

Date of submission to InfoShop

26-Dec-2016

"In country" Disclosure

C. Compliance Monitoring Indicators at the Corporate Level (to be filled in when the ISDS is finalized by the project decision meeting)

OP/BP/GP 4.01 - Environment Assessment

Does the project require a stand-alone EA (including EMP) report?

Yes

If yes, then did the Regional Environment Unit or Practice Manager (PM) review and approve the EA report?

Yes

Are the cost and the accountabilities for the EMP incorporated in the credit/loan?

Yes

OP/BP 4.12 - Involuntary Resettlement

Has a resettlement plan/abbreviated plan/policy framework/process framework (as appropriate) been prepared?

Yes

If yes, then did the Regional unit responsible for safeguards or Practice Manager review the plan?

Yes

The World Bank Policy on Disclosure of Information

Have relevant safeguard policies documents been sent to the World Bank's Infoshop?

Yes

Have relevant documents been disclosed in-country in a public place in a form and language that are understandable and accessible to project-affected groups and local NGOs?

Yes



All Safeguard Policies

Have satisfactory calendar, budget and clear institutional responsibilities been prepared for the implementation of measures related to safeguard policies?

Yes

Have costs related to safeguard policy measures been included in the project cost?

Yes

Does the Monitoring and Evaluation system of the project include the monitoring of safeguard impacts and measures related to safeguard policies?

Yes

Have satisfactory implementation arrangements been agreed with the borrower and the same been adequately reflected in the project legal documents?

Yes

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APPROVAL

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