Validation Report
August 2017

Bangladesh: Bangladesh–India Electrical Grid Interconnection Project

Reference Number: PVR-515
Project Number: 44192-013
Loan Numbers: 2661 and 3031

Independent Evaluation ADB

Raising development impact through evaluation

ABBREVIATIONS

ADB	–	Asian Development Bank
PGCB	–	Power Grid Company of Bangladesh
BPDB	–	Bangladesh Power Development Board
EIRR	–	economic internal rate of return
FIRR	–	financial internal rate of return
HVDC	–	High-voltage direct current
IED	–	Independent Evaluation Department
km	–	kilometer
kV	–	kilovolt
MW	–	megawatt
PCR	–	project completion report
PMU	–	project management unit
PPA		power purchase agreement
RRP	–	report and recommendation of the President
TA	–	technical assistance
WACC	–	weighted average cost of capital

NOTE

In this report, "$" refers to US dollars.

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PROJECT BASIC DATA

Project Number	44192-013	**PCR Circulation Date**	22 Sep 2016	
Loan Numbers	2661 and 3031	**PCR Validation Date**	Aug 2017	
Project Name	**Bangladesh–India Electrical Grid Interconnection Project**			
Sector and Subsector	Energy	Electricity transmission and distribution		
Strategic Agenda	Regional integration Inclusive economic growth			
Safeguard Categories	Environment		B	
	Involuntary Resettlement		A	
	Indigenous Peoples		C	
Country	Bangladesh		**Approved** ($ million)	**Actual** ($ million)
ADB Financing ($ million)	**ADF:** 0.00	**Total Project Costs**	199.00	183.54
		2661	158.60	
		3031	40.4	
	OCR:	**Loan**	112.00	110.89
	100.00 (Loan 2661)	2661	100.00	99.39
	12.00 (Loan 3031)	(SDR million, equivalent)	(65.99)	(65.99)
		3031	12.00	11.50
		(SDR million, equivalent)	(7.90)	(7.61)
		Borrower	87.00	72.65
		2661	58.6	
		3031	28.4	
		Beneficiaries	0.00	0.00
		Others	0.00	0.00
Cofinancier		**Total Cofinancing**	0.00	0.00
Approval Dates		**Effectiveness Dates**		
2661	31 Aug 2010	2661	11 Jan 2011	8 Mar 2011
3031	25 Sep 2013	3031	18 Nov 2013	9 Dec 2013
Signing Dates		**Closing Dates**		
2661	13 Oct 2010	2661	30 Jun 2013	30Jun 2014
3031	23 Nov 2013	3031	31 Dec 2014	30 Jun 2015
Project Officers		**Location**	**From**	**To**
	A. Guha	ADB headquarters	27 Oct 2010	11 Jun 2011
	L. George	ADB headquarters/ New Delhi	1 Jan 2010	31 Jul 2016
	A. Zhou	ADB headquarters	1 Aug 2016	
IED Review				
Director	N. Subramaniam, IESP			
Team Leader	K. Thukral, Principal Evaluation Specialist, IESP			

ADB = Asian Development Bank; ADF = Asian Development Fund; IED = Independent Evaluation Department; IESP = Independent Evaluation Department, Sector and Project Division; OCR = ordinary capital resources; PCR = project completion report; SDR = special drawing right.

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I. PROJECT DESCRIPTION

A. Rationale

1. The economy of Bangladesh had grown by an annual average of 6% from 2005 to 2009 and this growth rate was expected to continue. However, Bangladesh's electrification ratio remained low, with only 47% of the population having access to electricity in 2009. Moreover, rapid economic growth resulted in electricity demand increasing sharply as the country industrialized. In 2009, dependable power-generating capacity was only 3,800 megawatts (MW), while peak power demand was 5,500 MW, resulting in a peak deficit of 1,700 MW and frequent power cuts and voltage fluctuations. A World Bank study estimated that Bangladesh lost about $1 billion of economic output a year due to power outages and unreliable energy supplies.[1] There was also a need for Bangladesh to diversify energy sources because of concerns over the availability of domestic natural gas over the long term. Natural gas provided fuel for 85% of the power generated.[2]

2. In 1997, the Asian Development Bank (ADB) initiated a dialogue between Bangladesh and India to look into the possibility of exchanging electricity. This dialogue did not produce results, but in January 2010, a joint communication from the prime ministers of Bangladesh and India was issued. A memorandum of understanding was also signed to initiate cross-border electricity trade between the two countries. The memorandum specified cooperation in the power sector for at least 5 years, with the government of India making available a minimum of 250 MW of power for sale to the Bangladesh Power Development Board (BPDB) by 2012, at a mutually agreed upon price. An additional 250 MW could also be sourced from India's electricity market, subject to approvals. In 2010, the ADB Board of Directors approved a $100 million equivalent loan to finance the construction of the grid interconnection and related substations in Bangladesh for the facilities required to transmit power from Baharampur, India to Bheramara, Bangladesh.[3] The proposed project was to help BPDB reduce the power deficit, improve the power supply, and lower dependence on inefficient, expensive, captive, and rented generation facilities. Stand-alone technical assistance (TA) was provided to engage consultants who will advise BPDB on cross-border power purchase contracts and to undertake BPDB staff capacity building. Consultants will also be engaged to support the resettlement plan and environmental management plan.[4] A second ADB loan of $12 million equivalent was approved in 2013 to meet cost escalations.[5]

3. The project was in line with the recommendation of a sector assessment program evaluation, which recommended that ADB facilitates power transmission connectivity between India and Bangladesh. [6] The project was to support regional cooperation in South Asia and the regional cooperation and integration objectives under Strategy 2020.[7] A TA completion report

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1 World Bank. 2007. *South Asia Growth and Regional Cooperation*. Washington, DC.
2 ADB. 2009. *Energy Outlook for Asia and the Pacific*. Manila.
3 ADB. 2010. *Report and Recommendation of the President to the Board of Directors: Proposed Bangladesh–India Electrical Grid Interconnection Project*. Manila.
4 ADB. 2010. *Technical Assistance to Bangladesh for Bangladesh–India Electrical Grid Interconnection*. Manila.
5 ADB. 2013. *Proposed Loan for Additional Financing People's Republic of Bangladesh: SASEC Bangladesh–India Electrical Grid Interconnection Project (Bangladesh).* Manila.
6 ADB. 2009b. *Sector Assessment Program Evaluation: Bangladesh Energy Sector*. Manila.
7 ADB. 2008. *Strategy 2020: The Long-Term Strategic Framework of the Asian Development Bank, 2008–2020*. Manila.

was prepared in September 2015.[8] A project completion report (PCR) was prepared in September 2016 and is the subject of this validation .[9]

B. Expected Impacts, Outcomes, and Outputs

4. The expected project impact was enhanced regional cooperation in the power sector, contributing to economic development and growth in Bangladesh. The expected project outcome was the successful development and operation of a power transmission link between Bangladesh and India. The expected outputs of the project were (i) a 40 kilometer (km), 400 kilovolt (kV) double-circuit, high-voltage direct current (HVDC) transmission line in Bangladesh; (ii) a 500 MW back-to-back HVDC substation (400 kV/230 kV) at Bheramara; and (iii) a 230 kV double-circuit loop-in loop-out interconnection at Bheramara to link with the transmission network in Bangladesh. In addition, the project was to (i) build capacity and share information on power exchange and planning, development, operation, maintenance, and regulation of the interconnection; and (ii) develop transmission, interconnection, operation, and power exchange agreements between Bangladesh and India.

C. Provision of Inputs

5. The loan was approved on 31 August 2010 and became effective on 8 March 2011. The original loan closing date was 30 June 2013, but was extended three times to 31 December 2013, 31 March 2014, and 30 June 2014.The main cause of the delays was the delayed signing of the power purchase agreement (PPA) between BPDB and India's power supplier, which was signed in March 2012. The loan agreement stated that no disbursements could occur until the PPA was signed. A further concern was raised because the signed PPA included a clause that it may be terminated if either country decided not to extend the 5-year cooperation agreements signed in 2010. This disbursement condition was waived by ADB and disbursements commenced in 2012.

6. The estimated project cost at appraisal was $158.6 million. The ADB share amounted to $100.0 million (63% of project cost) while the government's share was $58.6 million (37% of project cost). In 2013, the project cost estimate was revised to $199 million—an estimated cost overrun of $40.4 million arising from (i) inclusion of spare transformers that would improve system reliability and grid integrity, and (ii) tax increases. ADB approved a $12.0 million additional financing loan to cover the foreign exchange part of the cost overrun, while the government financed the remaining $28.4 million. At completion, the project actually cost $183.54 million—$110.89 million in ADB funding and $72.65 million in borrower funding. The $15.46 million reduction from the interim cost estimate reflected changes in commodity prices and currency exchange rates.

7. No consultants were engaged under the loan.[10] However, consultants were engaged under the TA project. This project planned to include five consultants—three international for a total of five person-months, and two national for four person-months. In 2012, the requirements were reassessed and only three consultants were recruited: an international trading specialist, a national environment safeguard specialist, and a national resettlement safeguard specialist.

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[8] ADB. 2015. *Completion Report: Bangladesh–India Electrical Grid Interconnection Project (Bangladesh).* Manila.
[9] ADB. 2016. *Completion Report: Bangladesh–India Electrical Grid Interconnection in Bangladesh*. Manila.
[10] Counterpart funding was used to recruit the Power Grid Corporation of India Limited to provide support for engineering and project management services for the HVDC interconnection.

D. Implementation Arrangements

8. The Power Grid Corporation of Bangladesh (PGCB) was to be the executing and implementing agency for the project. It was to be responsible for supervising, implementing, and monitoring the operational performance of the interconnection in Bangladesh. A steering committee, chaired by the power secretaries of Bangladesh and India, was to be constituted to review the progress and achievements of the project. A working group, chaired by the joint power secretaries of both countries, was to monitor and coordinate the activities of the cooperation agreement, while a technical team was to manage the technical aspects of the interconnection.

9. Implementation arrangements envisaged at appraisal were generally followed. PGCB established a project management unit (PMU), headed by a project director. Senior power sector officials from Bangladesh and India met regularly to coordinate activities. Staff of the PMU, BPDB, and Power Division of PGCB received training in electricity trading through the TA project. The Power Grid Corporation of India Limited, the central transmission utility of India, and the executing agency on India's side of the interconnection provided technical support for the design, monitored implementation, and aligned objectives. The joint working group and joint steering committee monitored project design and implementation, contributing to timely completion.

10. The 2010 loan had 23 covenants and the 2013 loan had 17 covenants. For the 2010 loan, 22 covenants were complied with and one was partially complied. The partially complied covenant was the financial covenants for PGCB. The financial covenants required that (i) the ratio of total operating expenses to total operating revenue should be at or below 85% (ii) a debt–equity ratio should be no more than 70:30, (iii) account receivables not to exceed 2 months' billing, and (iv) debt service coverage ratio to be at 1.2 times or above. The PCR stated that items (i) and (iii) were complied with during 2013–2014, while there was some underperformance in items (ii) and (iv). However, the link provided by the PCR to PGCB's *Annual Report 2014–2015* shows a debt-to-equity ratio of 69:31, which complies with the covenant level of 70:30. The debt service coverage ratio of 1.14 times was below the covenant level of 1.2 times, slightly improved from 1.11 times for 2013–2014.[11] The regulator approved PGCB to increase tariffs in 2015 that resulted in an improvement of all financial parameters.

11. Although the PCR provided no details on project impacts on environment, involuntary resettlement, and indigenous peoples, the TA completion report confirmed that the project was implemented in accordance with the ADB Safeguard Policy Statement requirements, and provided recommendations to the PGCB on further activities.[12] The TA completion report also noted that the recommendations were followed up during project review missions and were implemented by PGCB. Environmental and social covenants were complied with. Impacts, such as dust and noise, were mostly temporary and were managed through good engineering, design, and health and safety measures. PGCB reported quarterly to ADB on environmental and social safeguard monitoring status, as required. The government and PGCB complied with the ADB 1998 Anticorruption Policy to make procurement more transparent. The government and PGCB also strengthened anticorruption measures, including stronger supervision by ADB, public disclosure, and performance auditing.

[11] Power Grid Company of Bangladesh. 2015. *Annual Report, 2014–2015: Power Grid Company of Bangladesh*. www.pgcb.org.bd

[12] ADB. 2015. *Technical Assistance Completion Report: Bangladesh–India Electrical Grid Interconnection Project.* Manila.

II. EVALUATION OF PERFORMANCE AND RATINGS

A. Relevance of Design and Formulation

12. The PCR rated the project *relevant*. Power demand in Bangladesh was rapidly increasing, and the peak power deficit was nearly 1,700 MW in 2009. To meet its goal of providing electricity for all by 2021, the Government of Bangladesh planned to increase generating capacity and arrange for additional supplies, such as the linking of the Bangladesh and India transmission grids to enable the import of up to 500 MW from India by 2013.The project was relevant from India's side given the following: (i) the relatively high power export tariffs compared to domestic transmission tariffs; and (ii) rapidly rising power generation capacity of more than 15,000 MW per year during the 5-year period 2012–2017. This enabled the Government of India to allocate 250 MW from its discretionary share of generation from central power generation corporations for export, and for West Bengal to allocate another 250 MW for export.

13. The report and recommendation of the President (RRP) had noted that least-cost analysis demonstrated the attractiveness of power imports. The strengthening of regional interconnections was also expected to develop energy trade in the South Asian regional electricity grid. Interlinking electricity transmission networks also increase the operational efficiency and reliability of existing national grids and encourage the development of new renewable power resources, which can be traded among the interconnected countries. ADB worked with PGCB to design the interconnection to ensure efficient and effective power trading between Bangladesh and India. The project was consistent with the ADB Country Partnership Strategy for Bangladesh,[13] which aimed to address critical constraints to broad-based economic growth, reduce poverty, promote sustainable economic development through regional cooperation, and promote regional power trading within South Asia.

14. This validation notes that based on technical and operational considerations, the project was configured as an asynchronous HVDC interconnection—the first HVDC system in Bangladesh—to facilitate an initial supply of 500 MW, and with a provision of expanding power imports to 1,000 MW at a later date.[14] With the objective of improving power reliability, and ensuring system stability and grid integrity, readily available spare transformers were realized during project implementation, and included as part of this project. This validation also notes that the project was in line with the 2009 sector assessment of the Bangladesh energy sector, which recommended that ADB should facilitate power transmission connectivity between India and Bangladesh (footnote 3, para.6; and footnote 6, para. 125).

15. This validation agrees that the project contributed to easing the critical constraints to a broad-based economic growth of Bangladesh caused by insufficient power supply and was consistent with the government's and ADB's development priorities in the country. This validation also rates the project *relevant*.

B. Effectiveness in Achieving Project Outcomes and Outputs

16. The PCR rated the project *effective* in achieving its outcome as the transmission link between Bangladesh and India was successfully constructed and operations began in October

[13] ADB. 2011. *Country Partnership Strategy: Bangladesh, 2011–2015*. Manila.

[14] As per the PCR, Bangladesh is expanding the existing substation to enable an additional 500 MW import from India, and as a second cross-border link, to transfer the 500 MW from the Indian state of Assam.

2013. Actual project physical outputs were (i) one 500 MW HVDC back-to-back station at Bheramara; (ii) a 27.3 km of 400 kV, double-circuit transmission line; and (iii) a 4.5 km of 230 kV double-circuit transmission line with a switching station at Bheramara. As originally envisaged, 500 MW of power began flowing from India to Bangladesh. Although the development and operation of this transmission link between the two countries did not eliminate Bangladesh's energy shortage, it reduced it significantly. The cost of imported power is less than that supplied by the rental power plants, thus, reducing government expenditure on power purchases. The TA project supported the design and development of the power interconnection and the project's nonphysical components.

17. The project was environment category B, involuntary resettlement category A, and indigenous peoples category C—in accordance with the safeguard policies of ADB.[15] During implementation, there were no unanticipated environmental, social, or resettlement issues. The project created no significant air, water, noise, or soil pollution. The adverse environmental impacts envisaged were temporary, predictable, minimal, and reversible and were mitigated through standard construction engineering practices and adherence with the environmental management plan. Consultation with project stakeholders was continuous throughout preconstruction, construction, and operation phases. Grievance redress committees were established and affected and displaced persons were informed that they had a right to grievance redress. During implementation, a training program was arranged to develop the skills of affected persons who lost their land. Some 150 affected persons were trained with new employment skills. At the substation site, displaced personnel were compensated through cheque deposits at the start of the project. Private landowners at the substation site were also compensated, with top up payments.[16] At appraisal, the project expected to acquire 0.22 hectares of land from private owners, expected to result in the displacement of 12 dwelling units and one shop, and 1,634 households were expected to lose crops and trees. Based on the final routing and right-of-way, a significantly lesser number of households (875) were affected along the transmission line route. The PCR also stated that project implementation experienced "a large number of labor strikes (*hartals*)."[17] The PCR noted that the project director and the PMU were able to address these matters. In other parts of the PCR, the project's compliance with all ADB safeguards requirements is confirmed. For the purposes of this validation, the PCR's advice on project compliance is accepted.

18. This validation adds that by March 2012, BPDB signed (i) an interconnection agreement with India's central power transmission utility; and (ii) a 25-year PPA with a government power trading company in India, for the import of 250 MW of power from India. This was followed by a bidding process that led BPDB to contract an additional 250 MW from India on a competitive basis. These activities were supported through the TA project, including capacity building in (i) planning, development, operation, and maintenance of power interconnection and power trading; and (ii) implementation of safeguards according to the 2009 ADB Safeguard Policy Statement. Details of TA outputs were summarized in a TA completion report (footnote 8).

19. This validation also rates the project *effective*.

[15] ADB. 2009. *ADB Safeguards Policy Statement (2009)*. Manila.

[16] This is indicated in the safeguard monitoring reports and quarterly progress reports.

[17] These were national or regional strikes and not attributable to the project or its safeguard aspects. These strikes were particularly severe during 2013–2014 when transformers and other heavy equipment had to be transported to the project site, and required multiple modes and logistics coordination.

C. Efficiency of Resource Use

20. The PCR rated the project *efficient*. The economic internal rate of return (EIRR) at project completion was estimated at 26.9%, about the same as the 27% estimated at appraisal. The EIRR exceeded the economic threshold rate of 12%. A sensitivity analysis based on a scenario where the PPA tariff rose by 20% indicated that the EIRR would be 15.8%. The PCR concluded that the project was financially and economically *efficient*. The PCR also rated project implementation *efficient*, given that the project was efficient in awarding contracts, completing projects, monitoring and reporting, and improving the capacity of the BPDB staff.

21. This validation considers the PCR's calculation of the EIRR to have several shortcomings. The PCR did not state whether the calculation was in nominal or constant prices. If constant prices, the base year was not specified. The PCR did not state the numeraire that was used and the value of the standard conversion factor or the shadow exchange rate factor. It was not clear in the PCR whether any shadow pricing of benefits and costs was undertaken, how interest and taxes or duties were treated, and if the range of project benefits were considered. The PCR also did not discuss how labor costs were shadow priced or whether land and resettlement costs were included in the capital cost. It did not discuss how the PPA tariff was treated in the analysis or how it was forecast into the future.

22. Some economic benefits were based on resource costs savings but the counterfactual chosen (generation based on imported coal) is a conservative alternative from a benefit–cost analysis perspective, given the long gestation period for additional coal-generating capacity and the urgency to address power supply constraints. The most likely counterfactual would be load shedding and the use of auto-generation, in cases of large enterprises. Therefore, project economic benefits should have been based on willingness to pay and/or consumers' surplus and resource cost savings related to auto-generation. It is noted, however, that since the EIRR is above the 12% threshold with the counterfactual selected (coal-fired generation), this validation acknowledges that it will exceed the 12% threshold also for the suggested counterfactual (diesel-based auto-generation).

23. The PCR also did not discuss how the project fit within the generation plans of the government (para. 14) although it is identified in the power sector master plans prepared in 2010 and 2015.[18] Nonetheless, given the likely large benefits from reduction in load shedding and displacement of auto-generation, it is clear that the EIRR would be high, and remain above the 12% threshold level (para. 22). Therefore, this validation rates the project *efficient*.

24. The PCR also included a discussion of the financial internal rate of return (FIRR) in the efficiency rating. The FIRR is a measure of sustainability and is discussed in this validation's sustainability rating.

D. Preliminary Assessment of Sustainability

25. The PCR rated the project *likely sustainable*. It stated that low-cost electricity imports are likely to sustain Bangladesh's economic growth. India earns revenue by selling surplus electricity to Bangladesh. The mutual benefits (from power export tariffs being higher than domestic tariffs in India, but lower than the marginal cost of generation in Bangladesh) enabled both countries to discuss other cross-border opportunities to strengthen economic cooperation. These include the 160 MW power sales to Bangladesh from Tripura, India's northeastern state.

[18] See http://www.bpdb.gov.bd/download/PSMP/PSMP2010.pdf

26. The FIRR at project completion was estimated at 4.7%, which was lower than at project preparation (6%) but higher than at approval for additional financing (4%). The weighted average cost of capital (WACC) at these three stages were estimated at 2.9%, 1.8%, and 2.9%, respectively.

27. This validation is unable to confirm the FIRR calculations in the PCR. The stated reason in the PCR for the increase in FIRR at completion—which is "reduced government financing"—is not clear, given the shortcomings in the FIRR calculation. The cost side of the FIRR calculation does not seem to have included the cost of imported power, which would have been a significant expense. It did not discuss how taxes were treated in the calculation. The significant increase in operation and maintenance and taxes beginning in 2026 suggests that taxes will begin being paid in 2026, but the advice to that effect is not included. The PCR provided no details on how WACC was calculated and did not state whether the calculation was in nominal or constant prices; and if constant prices, the base year was not specified. There was no discussion of the financial performance of PGCB in the last 5 years and the expected financial performance in the near term. The operations department of PGCB provided summary information of its financial performance during FY2011 to FY2015, which showed the need for a tariff increase that the regulator approved in 2015—and which resulted in a significant improvement in PGCB's financial performance in FY2016. With the new regulation that permits PGCB to seek a tariff increase periodically, it is expected that its financial situation will not deteriorate in the foreseeable future.

28. Nonetheless, given the limited natural resource base, it is highly likely that Bangladesh would need to import fuel and/or electricity in the foreseeable future.[19] And given the relatively lower cost of electricity imports, it is highly likely that India would be paid for the electricity bought by Bangladesh—whether by PGCB or the government directly. Therefore, the project will likely be in operation for the full term of its life. Since the project has established institutional mechanisms for a regional power market, in addition to the project's importance to Bangladesh's economic development, this validation rates the project *likely sustainable*.

III. OTHER PERFORMANCE ASSESSMENTS

A. Preliminary Assessment of Development Impact

29. The PCR stated that the development impact of the project is *satisfactory*. The project's intended impact was to enhance regional cooperation in the power sector, contributing to economic development growth in Bangladesh. The PCR indicated that the project eased Bangladesh's growing power crisis by making an additional 500 MW of power available since 2013. Hence, the project contributed to meeting the needs of existing and new consumers and supported the National Energy Policy's goal of achieving electricity for all by 2021. The project generated employment for local people (including women) both directly and indirectly as a continuing power supply enhanced production in existing industries and facilitated the creation of new businesses. The project, thus, helped reduce poverty by creating employment in agriculture, garments, and other industries. The project contributed to achieving the impacts identified in the design and monitoring framework. This validation concurs that the project impact is *satisfactory*.

[19] As per the 2015 power sector master plan with projections to 2040, Bangladesh will depend on an increasing share of imported coal, imported gas, and imported power to meet its power requirements. Imports are anticipated to remain competitive vis-à-vis fuel import options, and more power import projects are being planned and/or implemented.

B. Performance of the Borrower and Executing Agency

30. The PCR rated the performance of the borrower and the executing and implementing agencies *satisfactory*. It indicated that a PMU was established to oversee its implementation. The PCR noted that the design and construction of the project presented several difficulties, such as (i) a first of-its-kind HVDC back-to-back station, (ii) site preparation requiring dredging and right-of-way clearance, and (iii) cooperation between Bangladesh and India. The project was successful because of the good coordination between Bangladesh and India and the strong performance by the government and PGCB. The government provided adequate counterpart funds. PGCB worked effectively with the consultants, contractors, and ADB. The PCR noted that the performance of the PMU was exemplary given that it kept the project on schedule in the face of labor strikes.[20] It also coordinated cross-border stringing, addressed issues related to safeguards, and overcame other barriers for the project to succeed. This validation is of the view that the performance of borrower and the executing and implementing agencies is *satisfactory*.

C. Performance of the Asian Development Bank and Cofinanciers

31. The PCR rated the performance of ADB *satisfactory*. It indicated that ADB was effective in formulating the project with the government and PGCB, providing suggestions, and processing the loans. ADB project staff monitored project activities and advised the executing agency staff for the timely completion of the project. The ADB Bangladesh Resident Mission provided timely support during project implementation to ensure effective interaction among ADB, the government, PGCB, consultants, and contractors. ADB's timely approval of contract awards and disbursement, close monitoring of the progress of works, and timely intervention to resolve implementation issues contributed greatly to project completion. ADB fielded one fact-finding mission and eight review missions. This validation rates ADB performance *satisfactory*.

IV. OVERALL ASSESSMENT, LESSONS, AND RECOMMENDATIONS

A. Overall Assessment and Ratings

32. The PCR rated the project *successful* overall. A summary of ratings by the PCR and this validation is provided in the table. The project was successful in increasing the availability and sustainability of Bangladesh's power supply and increasing cross-border power trade between Bangladesh and India. A power trading company from India entered into a PPA with BPDB for the supply of 250 MW in 2012. The first competitively tendered cross-border PPA for 250 MW was also signed in 2013, and was supported by a TA project from ADB. The Bangladesh–India Electrical Grid Interconnection Project performed satisfactorily since 2013. In 2015, 500 MW of power was sold and several power traders in India submitted bids to sell an additional 250 MW to Bangladesh starting in 2016 when the contract for 250 MW ends. The project was assessed *relevant*, *effective*, *efficient,* and *likely sustainable*. This validation concurs with all the evaluation ratings in the PCR and also rates the project *successful*.

[20] The PMU ensured incident-free and timely delivery of transformers and other heavy equipment using multiple modes of transport (inland barges, rail, and road) to the project site.

Overall Ratings

Validation Criteria	PCR	IED Review	Reason for Disagreement and/or Comments
Relevance	Relevant	Relevant	
Effectiveness	Effective	Effective	
Efficiency	Efficient	Efficient	
Sustainability	Likely sustainable	Likely sustainable	
Overall assessment	Successful	Successful	
Preliminary assessment of impact	Satisfactory	Satisfactory	
Borrower and executing agency	Satisfactory	Satisfactory	
Performance of ADB	Satisfactory	Satisfactory	
Quality of PCR		Satisfactory	

ADB = Asian Development Bank, IED = Independent Evaluation Department, PCR = project completion report.
Note: From May 2012, IED views the PCR rating terminology of "partly" or "less" as equivalent to "less than" and uses this terminology for its own rating categories to improve clarity.
Source: ADB Independent Evaluation Department.

B. Lessons

33. The PCR identified two lessons. First, when regionalism is emerging as an important pillar in global and regional economic development, regional cooperation still needs strong champions; in this case, it was the prime ministers of Bangladesh and India. Second, with diverse energy resources within South Asia and an established cross-border interconnection, cross-border grid interconnection can optimize energy usage for both suppliers and users. Going forward, there is a need for greater harmonization in future planning and operations.

34. This validation supports these two lessons. On the second lesson, this validation would add that energy use and supply optimization can only be accomplished effectively if Bangladesh plans generation capacity optimally. This is an ongoing effort, and the government has been supported by the Japan International Cooperation Agency (JICA) to develop and update the power sector master plans.[21]

C. Recommendations for Follow-Up

35. The PCR suggested four recommendations. First, that a regular monitoring should take place during implementation of the project's second phase financed by ADB, where the back-to-back substation was expanded to 1,000 MW in capacity. Second, the PCR stated that PGCB complied with all loan covenants. Third, that ADB should finance more projects to increase South Asian power trade. Fourth, that ADB should review its instructions on how to account for project costs so that it receives adequate, accurate, and regular information on how its funds and counterpart funds have been applied. On the whole, this validation finds the recommendations appropriate and has no other recommendation to offer.

[21] More options are now being considered. For example, the power sector master plan of 2015 considers a combination of imported power plus generation capacity based on imported coal and liquefied natural gas. The latter option was not considered in the 2010 master plan.

36. The second recommendation, however, is more of a finding. The government and PGCB are responsible for the compliance with all loan covenants under the project's second phase when the HVDC back-to-back substation is to be expanded to 1,000 MW. However, some financial covenants have not been complied with (para. 10)—although this validation recognizes that with a new regulation that permits PGCB to seek tariff increases periodically, PGCB's financial performance has improved following the tariff increase in 2015.

37. Although this validation supports the fourth recommendation, it notes that the PCR did not discuss it in the text.

V. OTHER CONSIDERATIONS AND FOLLOW-UP

A. Monitoring and Reporting

38. No requirement for a project performance management system was found in the RRP or in the project's loan agreement. The establishment of the project management office and the completion of the project within the agreed time frame indicate that the project was monitored closely. Budgets were tracked and identified the need for additional financing, which was arranged in a timely manner. The safeguards monitoring was handled in accordance with ADB requirements.

B. Comments on Project Completion Report Quality

39. The PCR quality is *satisfactory*, although the analysis and assessment of the efficiency and sustainability criteria could have been better. The reestimation of the EIRR lacks shadow pricing of benefits and costs. The counterfactual was unrealistic and led to a misidentification of economic project benefits. However, it did demonstrate that the EIRR will exceed the 12% threshold with a more realistic counterfactual. In the FIRR calculation, the cost of power was not included in the calculation and the treatment of taxes was not discussed. Nonetheless, with the tariff increase in 2015 and the regulatory arrangement to allow periodic tariff increases, the FIRR would exceed the WACC and the financial performance of PGCB would not deteriorate. Lessons and recommendations in the PCR were satisfactory, and the explanation of the project's progress and results were sufficient to support the ratings.

C. Data Sources for Validation

40. Data sources included the RRPs, PCR, technical assistance completion report, minutes of staff review meetings and management review meetings, and mission reports.

D. Recommendation for Independent Evaluation Department Follow-Up

41. The PCR recommended that a project performance evaluation report be undertaken in December 2017, 2 years after the project was completed. IED could consider that recommendation if further evaluation would contribute to a larger study.