



## Periodic Financing Request Report

Project Number: 42378-017  
MFF Number: 0073  
November 2015

### People's Republic of Bangladesh: Power System Expansion and Efficiency Improvement Investment Program (Tranche 3)

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Asian Development Bank

## **CURRENCY EQUIVALENTS**

(as of 23 November 2015)

Currency unit	–	taka (Tk)
Tk1.00	=	\$0.01272
\$1.00	=	Tk78.63

## **ABBREVIATIONS**

ADB	–	Asian Development Bank
AIS	–	air-insulated substation
APSCL	–	Ashuganj Power Station Company Limited
BERC	–	Bangladesh Energy Regulatory Commission
BREB	–	Bangladesh Rural Electrification Board
CCPP	–	combined-cycle power plant
EIRR	–	economic internal rate of return
EIA	–	environmental impact assessment
EIB	–	European Investment Bank
EMP	–	environmental management plan
FFA	–	framework financing agreement
GIS	–	gas-insulated substation
IDB	–	Islamic Development Bank
IEE	–	initial environmental examination
LIBOR	–	London interbank offered rate
MFF	–	multitranches financing facility
NOx	–	nitrogen oxides
PAM	–	project administration manual
PGCB	–	Power Grid Company of Bangladesh
PMU	–	project management unit

## **WEIGHTS AND MEASURES**

GWh	–	gigawatt-hour (1,000 megawatt-hours)
km	–	kilometer
kV	–	kilovolt
kWh	–	kilowatt-hour
MVA	–	megavolt-ampere
MW	–	megawatt (1,000 kilowatts)

## **NOTE**

- (i) In this report, "\$" refers to US dollars.

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## TRANCHE AT A GLANCE

1. Basic Data		Project Number: 42378-017	
Project Name	Power System Expansion and Efficiency Improvement Investment Program - Tranche 3	Department /Division	SARD/SAEN
Country	Bangladesh	Executing Agency	Ashuganj Power Station Company Ltd. (APSCL), Bangladesh Rural Electrification Board (BREB), Power Grid Company of Bangladesh, Ltd. (PGCB)
Borrower	People's Republic of Bangladesh		
2. Sector	Subsector(s)	ADB Financing (\$ million)	
✓ Energy	Electricity transmission and distribution		90.00
	Energy efficiency and conservation		115.00
		Total	205.00
3. Strategic Agenda	Subcomponents	Climate Change Information	
Inclusive economic growth (IEG)	Pillar 1: Economic opportunities, including jobs, created and expanded	Adaptation (\$ million)	10.00
Environmentally sustainable growth (ESG)	Global and regional transboundary environmental concerns	Mitigation (\$ million)	50.00
	Natural resources conservation	CO <sub>2</sub> reduction (tons per annum)	800,000
		Climate Change impact on the Project	Medium
4. Drivers of Change	Components	Gender Equity and Mainstreaming	
Knowledge solutions (KNS)	Application and use of new knowledge solutions in key operational areas	No gender elements (NGE) ✓	
Partnerships (PAR)	International finance institutions (IFI)		
	Official cofinancing		
5. Poverty Targeting		Location Impact	
Project directly targets poverty	No	Rural	Medium
		Urban	Medium
6. Risk Categorization: Complex			
7. Safeguard Categorization Environment: A Involuntary Resettlement: B Indigenous Peoples: C			
8. Financing			
Modality and Sources		Amount (\$ million)	
ADB		205.00	
Sovereign MFF-Tranche (Loan): Ordinary capital resources		205.00	
Cofinancing		220.00	
Islamic Development Bank		220.00	
Counterpart		105.00	
Government		105.00	
Total		530.00	
9. Effective Development Cooperation			
Use of country procurement systems		No	
Use of country public financial management systems		Yes	

## TRANCHE AT A GLANCE

Date of Receipt by ADB of PFR: 5 August 2015

Tranche Number: 3

10. Country Operations Business Plan

CPS

<http://www.adb.org/documents/bangladesh-country-partnership-strategy-2011-2015>

COBP

<http://www.adb.org/documents/bangladesh-country-operations-business-plan-2015-2017>

11. Tranche Summary

Tranche 3 will cover investments in generation system expansion and efficiency improvement, transmission system enhancement, and demand side energy efficiency improvement.

Impact and Outcome:

The impact will be better access to reliable electricity supply in Bangladesh. The outcome will be increased efficiency and capacity of the power system in Bangladesh.

Outputs:

(i) Power generation system expanded and upgraded through replacement of an aging steam and gas turbine power plant of 220 megawatt (MW) capacity with a more efficient 400 MW gas-fired Combined Cycle Power Plant (CCPP) at Ashuganj Power Station complex, (ii) transmission system expanded and upgraded through upgrade or construction of 132kv transmission lines and substations in Chittagong Division, and (iii) demand side energy efficiency improved through replacement of meters with approximately 700,000 pre-payment meters in Dhaka Division.

Implementation Arrangements:

Ashuganj Power Station Company Ltd. (APSCL), Bangladesh Rural Electrification Board (BREB) and Power Grid Company of Bangladesh, Ltd. (PGCB) will be the executing agencies.

Project Readiness:

Output 1: Development Project Proposal (DPP) was approved on 22 September 2015. The draft Environmental Impact Assessment (EIA) was disclosed in June 2015 and the updated EIA on 28 October 2015. The subproject will be located in the EA's existing premises of the power station. The revised draft bidding documents (incorporating ADB's comments) was submitted in July 2015 and is expected to be issued in Q4 2015.

Output 2: DPP was approved in October 2013. The draft Resettlement Plan (RP) was disclosed in June 2015 while the draft IEE was disclosed on 14 September 2015, and updated IEE was disclosed on 5 October 2015. The required lands for the subproject have been acquired. The EA will submit the draft bidding documents in Q4 2015.

Output 3: Approval of the proposal for output 3 is expected in the fourth quarter of 2015. EIA/IEE exemption is being sought from the Department of Environment and the Ministry of Environment and Forests. The EA submitted its draft bidding documents in June 2015 and revised bidding document in August 2015. The bidding document is expected to be issued in Q4 2015.

12. Significant Developments in the MFF and Previous Tranches

Loan 2966 (Tranche 1) for \$185 million was approved in December 2012 and became effective in June 2013. All the contracts under Tranche 1 have been awarded. As of 15 November 2015, the total awarded contract amount was \$173 million (94%), and \$69 million (37%) were disbursed. Of the 26 covenants, 11 have been met, 13 are being met, and 2 are not yet due.

Loan 3087 (Tranche 2) for \$310 million was approved in December 2013, and became effective in March 2014. As of 15 November 2015, 9 of the 14 contract packages had been awarded, and 5 were at an advanced stage of procurement and are expected to be awarded by December 2015. Total awarded contracts amount to \$148 million (48%), and disbursement is \$11 million (4%). Of the 18 covenants, 6 have been met, and 12 are being met.

13. Milestones

Estimated Approval

7 December 2015

Estimated Effectiveness

29 February 2016

Estimated Completion<sup>a</sup>

30 June 2021

14. Linked Documents

	Required Document	Disclosure Date
(i) Environment	EIA - Environmental Impact Assessment	
Weblink:	<a href="http://www.adb.org/projects/documents/ashuganj-400mw-ccpp-east-updated-eia">http://www.adb.org/projects/documents/ashuganj-400mw-ccpp-east-updated-eia</a> <a href="http://www.adb.org/projects/documents/ashuganj-400mw-ccpp-east-eia">http://www.adb.org/projects/documents/ashuganj-400mw-ccpp-east-eia</a>	<div>28 October 2015</div> <div>3 June 2015</div>
(ii) Involuntary resettlement	RP - Resettlement Plan	
Weblink:	<a href="http://www.adb.org/projects/documents/power-system-expansion-and-energy-efficiency-improvement-investment-t3-rp">http://www.adb.org/projects/documents/power-system-expansion-and-energy-efficiency-improvement-investment-t3-rp</a>	29 June 2015
(iii) Indigenous peoples		
Weblink:		

<sup>a</sup> For Tranches, this refers to the financial closing date.

## I. BACKGROUND

1. A framework financing agreement (FFA) for the Bangladesh Power System Expansion and Efficiency Improvement Investment Program was signed between the Asian Development Bank (ADB) and Bangladesh on 7 October 2012. On 28 November 2012, ADB's Board of Directors approved the provision of a multitranche financing facility (MFF) to Bangladesh, with an aggregate facility amount of up to \$700 million.<sup>1</sup>

2. The expected impact of the MFF is increased energy sector contribution to low-carbon economic growth in Bangladesh, and the expected outcome is increased access to clean and reliable electricity supply in Bangladesh. The MFF supports power sector investments in the country's generation, transmission, and distribution systems for capacity expansion and efficiency improvement. It will (i) add new generation capacity while achieving higher efficiency in power generation, (ii) build new transmission facilities to make the delivery of electricity from power plants to load centers more efficient and reliable, (iii) improve distribution facilities to reduce both technical and nontechnical losses, and (iv) install solar-powered irrigation pumps. The MFF also supports capacity building that focuses on preparation and implementation of subsequent tranches as well as training of power utility staff in system planning, energy auditing, and financial management. The training activities will be funded by the European Investment Bank (EIB).

3. According to the government's Vision 2021 and its Power System Master Plan 2010,<sup>2</sup> Bangladesh plans to achieve universal access to grid-connected electricity by 2021 with a total installed generation capacity of 16,000 megawatts (MW) by 2016; 20,000 MW by 2020; and 40,000 MW by 2030. These are ambitious targets and to achieve them, significant investments in power infrastructure will be needed. Further, the structural reform of the Bangladesh Power Development Board needs to be continued to make it a holding company and to fully operationalize generation and distribution entities. The Bangladesh Energy Regulatory Commission (BERC) needs to be further empowered to strengthen the regulatory environment. BERC's electricity tariff regulations need to be enforced to ensure cost recovery. Considering the current heavy dependence on domestic natural gas, it is also essential to rationalize the energy mix in the sector to enhance the country's energy security.<sup>3</sup>

4. Following joint efforts by the government, ADB, and development partners, notable improvements have been made in Bangladesh's power sector over the last 5 years. Electrification rates have increased from 50% in 2011 to 62% in 2014, along with a rise in per capita electricity consumption from 170 kilowatt-hours (kWh) to 321 kWh, which is still low compared with other South Asian countries.<sup>4</sup> In the same period, the installed generating capacity increased from 4,890 MW to 11,200 MW against current peak demand of 8,200 MW, and transmission and distribution losses also fell sharply to 13%. In 2015, the World Energy Forum ranked Bangladesh 125th out of 144 countries on quality and constancy of electricity supply, compared with 135th out of 142 countries in 2011.<sup>5</sup> BERC's electricity transmission tariff

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<sup>1</sup> ADB. 2012. *Report and Recommendation of the President to the Board of Directors: Multitranche Financing Facility to Bangladesh for the Power System Expansion and Efficiency Improvement Program*. Manila.

<sup>2</sup> The Power System Master Plan 2015 is being formulated to revisit previous optimistic targets and reflect new developments in the sector.

<sup>3</sup> Natural gas accounted for about 81% of power generation in 2011. The balance came from diesel (8%), fuel oil (6%), coal (2%) and hydropower (3%).

<sup>4</sup> In 2012, electrification rates were 75% for India, 89% for Sri Lanka, and almost 100% for both Bhutan and the Maldives. Nepal's were 65%. Electricity consumption per capita was 527 kWh in India and 760 kWh in Sri Lanka, and more than 2,500 kWh in Bhutan and over 1,500 kWh in the Maldives. It was 119 kWh in Nepal.

<sup>5</sup> World Economic Forum. 2011. *The Global Competitiveness Report, 2011–2012*. Geneva; World Economic Forum. 2015. *The Global Competitiveness Report, 2015–2016*. Geneva.

regulations will be officially announced soon, and distribution tariff regulations are expected to be approved in the coming months.<sup>6</sup> However, a lack of investment, poor operation and maintenance practices, and old and obsolete equipment have derated the installed capacity to less than 10,000 MW, of which over 2,500 MW is provided by rental power plants on short-term contracts using furnace oil, diesel, and fuel oil. This compares with electricity demand growth in Bangladesh of 6.3% per year during 2011–2014, and this demand will continue to increase in a booming economy. Thus, the lack of adequate power supply to meet exponentially growing demand remains a key constraint on rapid economic development.

5. The Sixth Five Year Plan (2011–2015) and the Power System Master Plan 2010 identified \$12 billion of investments for 2011–2015 and a further \$58 billion of investments for 2016–2030. ADB received the periodic financing request for Tranche 3 (for \$205 million) on 5 August 2015 (Appendix 1). The government proposes counterpart financing of \$105 million. The investments under Tranche 3 will cover part of the government's investment plan. The proposed tranche meets the selection criteria set forth in Schedule 4 of the FFA. It will focus on investments in generation system expansion and efficiency improvement, transmission system enhancement, and improvement in demand-side energy efficiency.

## II. ASSESSMENT OF MFF IMPLEMENTATION

6. On 12 December 2012, ADB's Management approved Tranche 1 of the MFF in the amount of \$185 million to (i) upgrade the Khulna gas-fired power plant (150 MW peaking capacity) to a 225 MW combined-cycle power plant (CCPP); (ii) construct a 132-kilovolt (kV) transmission system; and (iii) support project implementation and the preparation of subsequent tranches. The loan and project agreements for Tranche 1 were signed on 3 April 2013 and the loan became effective on 25 June 2013. It will close on 31 December 2018. The executing agencies are Northwest Power Generation Company, Power Grid Company of Bangladesh (PGCB), and the power division of the Ministry of Power, Energy and Mineral Resources. All the contracts under Tranche 1 have been awarded. As of 15 November 2015, the total awarded contract amount was \$173 million (94%), and \$69 million (37%) were disbursed.

7. On 9 December 2013, ADB's Management approved Tranche 2 of the MFF in the amount of \$310 million for the (i) expansion of the transmission systems; and (ii) augmentation of the distribution systems in Dhaka City. The loan and project agreements for Tranche 2 were signed on 11 February 2014 and the loan became effective on 14 March 2014. It will close on 30 June 2019. The executing agencies are PGCB, Dhaka Power Distribution Company, and Dhaka Electric Supply Company. As of 15 November 2015, 9 of the 14 contract packages had been awarded, and 5 were at an advanced stage of procurement and are expected to be awarded by December 2015. Total awarded contracts amount to \$148 million (48%), and disbursement is \$11 million (4%).

8. The government and executing agencies for tranches 1 and 2 are compliant with most of the FFA undertakings and with the loan covenants set forth in the respective loan agreements. Certain undertakings and covenants are not yet due, and the work for compliance with some other undertakings and covenants is ongoing. Appendix 1 shows the detailed current status of compliance with the FFA undertakings and loan covenants.

9. One original output of the MFF, the installation of solar-powered irrigation pumps, will be funded through separate assistance planned for 2016 under the Scaling Up Renewable Energy

<sup>6</sup> BERC announced a transmission tariff increase from about Tk0.23/kWh to about Tk0.28/kWh in September 2015. BERC also finalized the electricity transmission tariff regulations, expected to be notified within 2015.



Programs in low-income countries, to be cofinanced with a grant from the Strategic Climate Fund.<sup>7</sup>

### III. PERIODIC FINANCING REQUEST

#### A. Impact and Outcome

10. The proposed Tranche 3 will contribute to the overall impact of the MFF, i.e., increased energy sector contribution to low-carbon economic growth in Bangladesh. The impact of Tranche 3 will be better access to reliable electricity supply in Bangladesh. The outcome of Tranche 3 will be increased efficiency and capacity of the power system in Bangladesh. The design and monitoring framework of Tranche 3 is in Appendix 2.

#### B. Outputs

11. Tranche 3 consists of three outputs:

**Output 1: Power generation system expanded and upgraded.** This comprises replacement of an aging steam and gas turbine power plant of 220 MW capacity with a more efficient 400 MW gas-fired CCPP at the Ashuganj power station complex.

**Output 2: Transmission system expanded and upgraded.** This means

- (i) upgrading approximately 65 kilometer (km) of 132 kV double-circuit Comilla (South)–Chandpur transmission line with advanced low-loss conductors;
- (ii) constructing approximately 7 km of 132 kV double-circuit Madunaghat–Kalurghat underground transmission line;
- (iii) constructing a 132/33 kV air-insulated substation (AIS) at Kachua (Chandpur) and a 132/33 kV gas-insulated substation (GIS) at Kalurghat (Chittagong); and
- (iv) upgrading an existing 132/33 kV substation at Madunaghat (Chittagong) and a 132/33 kV substation at Comilla (South) from AIS to GIS.

**Output 3: Demand-side energy efficiency improved.** This comprises replacement of existing meters with approximately 700,000 prepayment meters in Dhaka Division.

12. Output 1 involves one turnkey package for the Ashuganj 400 MW CCPP (East) and one consulting services package to help the executing agency implement the turnkey package. Output 2 involves one turnkey package for 132 kV transmission lines and substations in Chittagong Division. Output 3 involves one supply package of prepayment meters in Dhaka Division. The updated contribution to the ADB results framework is in Appendix 3.

#### C. Investment and Financing Plans

13. Tranche 3 is estimated to cost \$530 million, which includes cofinancing by the Islamic Development Bank (IDB) and the government (Table 1). Detailed cost estimates by expenditure category and by financier are included in the project administration manual (PAM) for Tranche 3 (Appendix 4).

<sup>7</sup> Strategic Climate Fund. <http://www.climateinvestmentfunds.org/cif/node/3>

**Table 1: Tranche Investment Plan**  
(\$ million)

Item	Amount <sup>a</sup>
<b>A. Base Cost<sup>b</sup></b>	
1. Power generation system expanded and upgraded	339.23
2. Transmission system expanded and upgraded	57.71
3. Demand side energy efficiency improved	54.29
<b>Subtotal (A)</b>	<b>451.23</b>
<b>B. Contingencies<sup>c</sup></b>	<b>45.16</b>
<b>C. Financing Charges During Implementation<sup>d</sup></b>	<b>33.61</b>
<b>Total (A+B+C)</b>	<b>530.00</b>

<sup>a</sup> Includes taxes and duties of \$61.43 million to be financed by the government through cash contribution.

<sup>b</sup> In mid-2015 prices.

<sup>c</sup> Physical contingencies computed at 5% for works and equipment. Price contingencies computed using Asian Development Bank (ADB) forecasts of international and domestic inflation. This includes a provision for potential exchange rate fluctuation under the assumption of a purchasing power parity exchange rate.

<sup>d</sup> Includes interest and commitment charges. Interest during construction for ADB loan(s) has been computed at the 5-year fixed-swap London interbank offered rate plus a spread of 0.6% inclusive of maturity premium of 0.1%. Commitment charges for an ADB loan are 0.15% per year to be charged on the undisbursed loan amount.

Source: Asian Development Bank assessment.

14. The government has requested a loan of \$205 million from ADB's ordinary capital resources to help finance the project. The loan will have a 25-year term, including a grace period of 5 years, and an annual interest rate determined in accordance with ADB's London interbank offered rate (LIBOR)-based lending facility, a commitment charge of 0.15%, a maturity premium of 0.1%, and such other terms and conditions as agreed in the draft loan and project agreements (Appendix 5 and 6).

15. The project's financing plan is in Table 2.

**Table 2: Financing Plan**

Source	Amount (\$ million)	Share of Total (%)
Asian Development Bank	205.00	38.68
Islamic Development Bank	220.00	41.51
Government of Bangladesh	105.00	19.81
<b>Total</b>	<b>530.00</b>	<b>100.00</b>

Source: Asian Development Bank assessment.

16. ADB will provide \$205 million to finance outputs 1, 2, and 3. IDB will provide \$220 million to cofinance output 1. The cofinancing will be provided on terms and conditions agreed between the government and IDB, and acceptable to ADB. The minutes recording discussions on cofinancing were finalized by ADB and IDB during the consultation mission in June 2015, and the minutes of the meeting were signed on 7 July 2015. ADB and IDB will develop a memorandum of understanding after the approval of the project by ADB and IDB, following the approach adopted for the Ashuganj 450 MW CCPP (North) that ADB funded in 2011 with cofinancing from IDB.<sup>8</sup> IDB will administer its fund. The executing agencies and the government will provide counterpart funding for each output.

<sup>8</sup> ADB. 2011. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the People's Republic of Bangladesh for the Power System Efficiency Improvement Project*. Manila.

## D. Implementation Arrangements

17. The executing agencies are Ashuganj Power Station Company Limited (APSCL) for output 1; PGCB for output 2; and Bangladesh Rural Electrification Board (BREB) for output 3. The power division of the Ministry of Power, Energy and Mineral Resources provides overall coordination and liaises with ADB on policy, the MFF, and overall project-related issues. Each executing agency has established a project management unit (PMU) to implement the respective tranche component. The PMUs' day-to-day project management includes procurement, construction supervision, inspection and testing of equipment, payments to contractors, and monitoring of and reporting on progress.

18. The project will be implemented over 5 years, including procurement and construction activities. The physical completion is expected by 31 December 2020. Loan closing will be on 30 June 2021, or on a date agreed between the government and ADB.

19. Consultants to be financed by ADB will be recruited in accordance with ADB's Guidelines on the Use of Consultants (2013, as amended from time to time). All procurements to be funded by ADB will follow its Procurement Guidelines (2015, as amended from time to time). For procurement under output 1, to be cofinanced by IDB, the list of eligible countries will be expanded to allow participation by firms and entities from countries eligible under both ADB's Procurement Guidelines and IDB's Procurement Guidelines (2009).

20. The implementation arrangements are summarized in Table 3 and described in detail in the PAM (Appendix 4).

**Table 3: Implementation Arrangements**

Aspects	Arrangements		
Implementation period	January 2016–December 2020		
Estimated completion date	31 December 2020 (loan closing on 30 June 2021)		
Management			
(i) Oversight body	Power Division, MPEMR		
(ii) Executing agencies	APSCL, PGCB, BREB		
(iii) Implementation units	Project management units established in each executing agency with 6–8 professional staff each and other support staff.		
Procurement	International competitive bidding	3 packages	\$374.94 million <sup>a</sup>
Consulting services	QCBS (90:10)	162 person-months	\$3.0 million
Advance contracting	Advance contracting to be undertaken includes preparation of bidding documents, as well as inviting and receiving bids for contracts.		
Disbursement	The loan proceeds will be disbursed in accordance with ADB's <i>Loan Disbursement Handbook</i> (2015, as amended from time to time) and detailed arrangements agreed on between the government and ADB.		

ADB = Asian Development Bank, APSCL = Ashuganj Power Station Company Limited, BREB = Bangladesh Rural Electrification Board, MPEMR = Ministry of Power, Energy and Mineral Resources, PGCB = Power Grid Corporation of Bangladesh, QCBS = quality- and cost-based selection.

<sup>a</sup> Including \$185.17 million to be cofinanced by Islamic Development Bank for output 1.

Source: Asian Development Bank.

## E. Project Readiness

21. PMUs were established and fully staffed in all three executing agencies. Development project proposals for outputs 1 and 2 were approved by the government on 22 September 2015 and 8 October 2013. Approval of the proposal for output 3 is expected in the fourth quarter of 2015.

22. The draft environmental impact assessment (EIA) for output 1 was disclosed on ADB's website on 3 June 2015 and the updated EIA on 28 October 2015. The draft initial environmental examination (IEE) for output 2 was disclosed on 14 September 2015, and the updated IEE on 5 October 2015. Given the minimum environmental footprint of output 3, which involves replacing meters, it is categorized as environmental C. BREB is seeking IEE exemption from the Department of Environment for output 3, and the Ministry of Power, Energy and Mineral Resources has requested the same from the Ministry of Environment and Forests.

23. The resettlement plan for the tranche was disclosed on 29 June 2015. The subprojects of output 1 will be within the executing agency's existing power station premises. Output 3 involves replacement of existing consumer meters and therefore no land acquisition. The land required for output 2 has been acquired.

24. APSCL submitted the draft bidding documents to ADB on 14 June 2015, and the revised draft bidding documents incorporating ADB's comments on 14 July 2015. It will issue the bidding documents in the fourth quarter of 2015. BREB submitted its draft bidding documents on 8 June 2015, and the revised bidding documents on 27 August 2015. It will issue the bidding documents in the fourth quarter of 2015. PGCB will submit its draft bidding documents in the fourth quarter of 2015.

## **F. Advance Contracting**

25. ADB approved advance contracting for procurement of goods and turnkey contracts (including preparation of bidding documents; inviting, receiving, and evaluating bids for project contracts) on 1 July 2015. It was advertised on ADB's website on 6 July 2015.

## **IV. DUE DILIGENCE**

### **A. Technical**

26. Technical due diligence has been undertaken on all subprojects. They were designed to increase efficiency and generation capacity to meet system requirements and to ensure that the available power can be delivered reliably to the consumers. The planning and design principles are appropriate. Cost estimates are reasonable and unit costs compare favorably with similar recent projects in Bangladesh. The plant, and the transmission and metering equipment are standard in Bangladesh, so the executing agencies are familiar with their operation and maintenance.

27. APSCL's subproject, the Ashuganj 400 MW CCPP (East), will replace aging gas-fired steam and gas turbine power plants of 220 MW equivalent and 32%–35% efficiency with a state-of-the-art 400 MW gas-fired CCPP, with an efficiency of 57% without increasing total gas use. APSCL has managed the implementation of several similar gas-fired CCPP projects, including the ADB-funded Ashuganj 450 MW CCPP (North), which is proceeding well and will be commissioned in 2017. The Ashuganj 400 MW CCPP (East) replicates the successful methods of an ongoing project.

28. PGCB's subprojects comprise two 132 kV double-circuit transmission lines, and each requires upgrading an existing substation and constructing a new substation. One of the two transmission lines involves reconductoring of an existing 65 km line from Comilla (South) to Kachua and Chandpur with advanced low-loss conductors. The other involves 7 km of new 132kV double-circuit underground transmission line from Madunaghat to Kalurghat. The two existing 132/33 kV AISs at Madunaghat and Comilla (South) will be upgraded to GISs with an additional capacity of 109 megavolt-ampere (MVA). A new 132/33 kV GIS with 150 MVA

capacity will be constructed at Kalurghat, and a new AIS with 82 MVA capacity at Kachua. PGCB is also the executing agency of Tranche 1 and Tranche 2, and those projects are progressing well.

29. BREB proposes to replace about 700,000 analog meters with prepayment meters in 10 *Palli Bidyut Samities* (rural electric societies) of the Dhaka Division.<sup>9</sup> BREB has already initiated a pilot of 5,000 prepayment meters. Pilots conducted by other distribution utilities to install similar metering systems have indicated good customer response and trouble-free operation. In addition to receiving the revenue from electricity sales upfront, the prepayment meter reduces metering costs, metering errors, and meter tampering.

## **B. Economic and Financial**

30. The economic viability of investing into Tranche 3 outputs has been confirmed through a cost-benefit analysis conducted in line with ADB's Guidelines for the Economic Analysis of Projects<sup>10</sup> (Appendix 7). The economic internal rates of return (EIRR) are 22.5% for the generation, 16.2% for the transmission, and 26.6% for the distribution components. The overall EIRR is 22.3%. The sensitivity analysis shows that the EIRR remains above the 12% threshold even under changing parameters such as capital, operation and maintenance, and fuel costs. Output 1 will increase generation efficiency from 32% to 57% and add generation capacity of 180 MW. Output 1 will also reduce the intensity of pollutant emissions as well as greenhouse gas emissions from back-up diesel generation and coal-fired generation by around 700,000 tons of carbon dioxide equivalent per year. Output 2 will increase the capacity of the Chittagong Division substation by 341 MVA. Output 3 will help reduce the commercial losses of BREB's distribution system in Dhaka Division by about 0.5%.

31. The financial analysis (Appendix 8) has been carried out in accordance with ADB's Financial Management and Analysis of Projects.<sup>11</sup> All financial costs and benefits have been expressed in constant June 2015 prices. The real overall post-tax financial internal rate of return is 3.4% against a weighted average cost of capital of 1.5%. The sensitivity analysis shows that the rate of return estimates are robust and remain higher than the weighted average cost of capital even under widely varying assumptions. The audited financial statements of APSCL and BREB indicate sound financial health and profitability. As for PGCB, financial sustainability remains a concern even though a transmission tariff increase of about 20% was announced in September 2015. This will be dealt with through a financial restructuring plan for PGCB supported by ADB,<sup>12</sup> and timely notification of BERC's electricity transmission tariff regulations.

## **C. Governance**

32. ADB-initiated power sector reforms that led to significant improvements in sector governance will continue to be pursued through regular policy dialogue and appropriate time-bound covenants in the loan agreement. A financial management assessment (Supplementary Appendix A) was conducted for all the executing agencies, indicating a substantial project risk overall, primarily because of BREB's lack of recent experience in ADB-funded projects and audit observations long unresolved by PGCB. Risk-mitigating measures have been identified and are

<sup>9</sup> BREB established the rural electric societies under the universal principle of cooperative, democratic decentralization and ownership of consumers. BREB serves about 2.3 million customers in Dhaka Division, and 12 million customers across the country's rural areas.

<sup>10</sup> ADB. 1997. *Guidelines for the Economic Analysis of Projects*. Manila.

<sup>11</sup> ADB. 2005. *Financial Management and Analysis of Projects*. Manila.

<sup>12</sup> ADB. 2015. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the People's Republic of Bangladesh for the SASEC Second Bangladesh-India Electrical Grid Interconnection Project*. Manila.

described in the PAM, subject to which the overall financial management arrangements for the project are considered satisfactory. All the executing agencies have sufficient experience in local and foreign procurement, including ADB standard bidding procedures. ADB's Anticorruption Policy (1998, as amended to date) was explained to and discussed with the government and the executing agencies. The pertinent policy requirements and supplementary measures are described in the PAM.

#### **D. Poverty, Social, and Gender Dimensions**

33. The updated summary of poverty reduction and social strategy is in Appendix 9. Reliable and adequate electricity supply promotes business expansion, increases employment, and improves living conditions, all of which contributes to poverty reduction. Reliable and good-quality electricity supply is necessary for meeting the basic human needs of health and education. Poor and vulnerable consumers as well as public institutions such as hospitals and schools are often particularly disadvantaged by inadequate power supply, load shedding, and poor product quality. Tranche 3 will help solve these issues by enabling more reliable and better-quality supply of electricity. Given the nature of the outputs, Tranche 3 is classified as having no gender elements. The loan agreement includes standard assurances by contractors on core labor standards (including equal pay for equal types of work) and awareness programs on HIV/AIDS and sexually transmitted diseases.

#### **E. Safeguards**

34. The EIA for output 1 (Appendix 10), the IEE for output 2 and 3 (Appendix 11), and the resettlement plan (Appendix 12) were prepared in compliance with both the environmental assessment and review framework, and the resettlement framework agreed for the investment program in September 2012. Pursuant to the indigenous peoples planning framework for the investment program, an indigenous peoples plan is not required. Each executing agency will implement the respective EIA, IEE, and resettlement plan, and will submit semiannual reports on the implementation of the environmental management plan (EMP) and the resettlement plan.

35. **Environmental safeguards.** Tranche 3 is classified as environmental category A for output 1, B for output 2, and C for output 3. Overall, Tranche 3 is classified as environmental category A. Even if output 1 is classified A, it is not expected to cause significant adverse environmental impacts. Output 1 focuses on improving generation efficiency, which will reduce pollutant intensity and offset pollution emissions growth without consuming additional gas by using a more efficient power plant. Potential environmental impacts are mostly predictable and reversible. Sensitive ecosystems will not be impacted. Impacts such as emission of nitrogen oxides (NOx) and discharge of cooling water during operation will be mitigated by building the best available technology into the power plant design, such as low-NOx burners and a NOx reduction system. Potential environmental impacts of output 2 will occur during construction and are temporary, predictable, and reversible. No impacts will occur on forests, sanctuaries, protected areas, or historical and cultural monuments. Output 3 will have minimal environmental impacts. The replaced meters that are still functional will be re-used in other locations. Any final disposal will occur at approved waste management facilities in Bangladesh.

36. In line with ADB's Safeguard Policy Statement (2009), the environmental assessment and review framework for the MFF, and Bangladesh environmental regulations, the draft EIA as well as the EMP for output 1 were prepared and disclosed on ADB's website on 3 June 2015. The revised EIA incorporating ADB's comments was submitted to ADB and the Department of Environment on 5 August 2015, and approved by Department of Environment on 6 October 2015. The updated EIA incorporating ADB's further comments was disclosed on 28 October 2015 prior to circulation to the ADB Board. The draft IEE-EMP for output 2 was disclosed on

ADB's website on 14 September 2015, and the updated IEE on 5 October 2015. The Ministry of Power has requested IEE exemption for output 3 from the Ministry of Environment and Forests. Any update in the EIA and IEE resulting from a change in project scope will be similarly disclosed.

37. Public consultations were held with local communities, including fisherfolk. They welcomed the project because it improves the reliability of power supply. Community concerns were identified in the EIA, and mitigation measures were incorporated in the EMP. The PMU of each executing agency has dedicated staff responsible for monitoring environmental issues and implementing the EMP. A grievance redress mechanism will be established.

38. **Social safeguards.** In line with the Safeguard Policy Statement, Tranche 3 is classified as category B for involuntary resettlement and category C for indigenous peoples. The resettlement plan describes the extent of involuntary resettlement impacts and spells out provisions of compensation and assistance to the affected persons. The resettlement plan adequately assesses the land acquisition and resettlement impacts of the proposed tranche, and the measures developed to manage the identified impacts are adequate. The resettlement plan was endorsed by the executing agencies, and disclosed on ADB's website on 29 June 2015. Output 1 takes place within APSCL's power station premises, and no land needs to be acquired. No land acquisition is involved in output 3. Under output 2, land needs to be acquired for only one substation. PGCB has bought private land amounting to 2.02 hectares from 17 title holders. No physical displacement of people will occur under any subproject of Tranche 3. Meaningful consultations with project stakeholders and the public in general, as well as information disclosure took place through ADB's website. If any changes or additional land requirements or involuntary resettlement impacts are identified, an updated resettlement plan will be prepared. The PMU of PGCB has experience in implementing the resettlement plans under tranches 1 and 2, and in previous ADB projects. None of the subprojects will impact communities of indigenous populations or ethnic minorities, nor interfere with their territories, livelihoods, customary properties, or their natural or cultural resources.

## F. Climate Change Impact

39. A climate change risk assessment was conducted and led to a rating of *medium climate risk*. The main risks to the project are a potential increase in flood levels, rise in temperatures, and increased wind speeds of tropical cyclones. The risks will be mitigated through a best-practice engineering design. A summary of the climate change risk assessment and management measures is in Supplementary Appendix B.

## G. Risks and Mitigating Measures

40. Major risks and mitigating measures are described in detail in the risk assessment and risk management plan (Appendix 13). Adequate mitigation measures were incorporated in the project design. The major risks and mitigation measures relating to Tranche 3 are summarized in Table 4. Overall, the benefits and impacts are expected to outweigh the costs.

**Table 4: Summary of Risks and Mitigating Measures**

<b>Risks</b>	<b>Management Plan or Measures</b>
Gas supply decreases, reducing annual power generation output	No additional gas is needed beyond current allocations. Further, ADB will continue its support to improve gas supply through its interventions in the sector, i.e., increasing domestic gas production and importing liquefied natural gas.
Increase in the price of raw materials resulting in an	Capital expenditure estimates are benchmarked to recent projects in Bangladesh, and contingency funding reflects movements in international

<b>Risks</b>	<b>Management Plan or Measures</b>
increase of project costs	prices.
Government and/or executing agency funds may not be available on time	Assurances of timely availability of counterpart funds will be included in the loan documentation.
Delay in funding from IDB	Good performance of ongoing Ashuganj 450 MW CCPP (North), jointly funded by ADB and IDB, will facilitate early approval of Ashuganj 400 MW CCPP (East) by IDB.
BREB may not be familiar with ADB procurement since it has not implemented ADB-funded projects in the recent past	Bidding documents of procurement of goods is adopted which is simpler comparing to bidding documents of Plant. Procurement consultants are provided by Tranche 3 preparation consultants to assist BREB to finalize bidding documents and evaluate the bids.
Wheeling charge rate does not increase adequately to meet the revenue requirements of PGCB	Enforcement of BERC's electricity transmission tariff is a loan covenant of tranches 1 and 2, and notification is expected in 2015. Further, ADB-financed consulting support will be provided to PGCB to develop and implement a financial restructuring plan, through SASEC Second Bangladesh–India Electrical Grid Interconnection Project (footnote 12).

ADB = Asian Development Bank, BERC = Bangladesh Energy Regulatory Commission, BREB = Bangladesh Rural Electrification Board, CCPP = combined-cycle power plant, IDB = Islamic Development Bank, MW = megawatt, PGCB = Power Grid Company of Bangladesh, SASEC = South Asia Subregional Economic Cooperation.  
Source: Asian Development Bank.

## **H. Risk Categorization**

41. Tranche 3 is categorized as complex since the loan amount exceeds \$200 million. It is classified as category A for environmental impacts. However, the proposed investments are regular interventions to improve the power sector, which the executing agencies are familiar with. They have significant capacity for and experience in executing donor-funded projects, including those funded by ADB.

## **V. ASSURANCES**

42. The government and the executing agencies have assured ADB that implementation of the investment program shall conform to all applicable ADB policies, including those concerning anticorruption measures, safeguards, gender, procurement, consulting services, and disbursement as described in detail in the PAM and loan documents.

43. The government and the executing agencies have given ADB certain undertakings for the investment program, which are set forth in the loan agreement and project agreement.

## **VI. RECOMMENDATION**

44. On the basis of the approval by ADB's Board of Directors for the provision of loans under the multitranche financing facility in an aggregate principal amount not exceeding \$700,000,000 to the People's Republic of Bangladesh for the Power System Expansion and Efficiency Improvement Investment Program, it is recommended that the President approve the proposed tranche as described in para. 14 and such other terms and conditions as are substantially in accordance with those set forth in the draft loan and project agreements for the proposed tranche.