

FINANCIAL ANALYSIS

A. Background

1. The financial analysis of the proposed project was carried out in accordance with the guidelines of the Asian Development Bank (ADB) on the appraisal of power sector projects.¹ The analysis covers three investment-oriented components of the project loan, identified in para. 2. The project will contribute \$532 million, comprising

- (i) a regular loan of \$350 million from ADB's ordinary capital resources,
- (ii) a \$7.0 million grant from the Japan Fund for the Joint Crediting Mechanism,
- (iii) a \$0.5 million grant from the Republic of Korea e-Asia and Knowledge Partnership Fund, and
- (iv) a \$174.5 million from the government.

2. Component 1 includes construction of a new 400/132-kilovolt (kV) substation in Gopalganj to operate as a switching station for the new 400 kV transmission line from Aminbazar to Mongla (National Grid-3). Component 2 encompasses (i) the construction of a 126-kilometer (km) 230 kV transmission line from the Barisal (North) substation to Faridpur substation via the new Gopalganj (North) substation, (ii) the construction of two 230 kV bay extensions at existing Barisal (North) substation, (iii) augmentation of the Faridpur substation by adding 230/132 kV transformers, and (iv) augmentation of the Gopalganj substation with 400/132 kV transformers. Component 3 includes (i) construction of two new substations in Bogra (West) and Rohanpur; (ii) construction of a 104 km Bogra (West)–Rohanpur 400 kV transmission line connecting the two new substations; (iii) construction of a 27 km 132 kV transmission line from the proposed Rohanpur substation to the existing Chapainawabganj substation; (iv) extension of the 132 kV bay at the Chapainawabganj substation; and (v) a line-in, line-out connection from the proposed Bogra (West) substation to the Bogra (South)–Barapurkuria 230 kV transmission line. These investments in transmission network expansion and strengthening will enable Bangladesh to (i) overcome current and future network constraints, and (ii) serve the forecast demand growth as well as the current unserved demand with more power plants that are under construction.

B. Methodology and Major Assumptions

3. The financial analysis was carried out by comparing the financial internal rates of return (FIRRs) for each component against the components' real weighted average cost of capital (WACC). The sensitivity of each FIRR as well as overall FIRR to adverse changes in the underlying assumptions was also assessed.

4. The present wheeling charge of Power Grid Company of Bangladesh Limited (PGCB) is Tk0.27 per kilowatt-hour, which is not cost reflective, and which renders all proposed project components not financially viable. Therefore, the electricity transmission tariff fixation methodology (ETTFM), approved by Bangladesh Energy Regulatory Commission (BERC) in May 2016, was used to determine the financial benefits of the investments, assuming that ETTFM will be fully implemented by the end of fiscal year (FY) 2021 (ending June 2021). The ETTFM is based on the cost-plus pricing principle and permits PGCB to earn a revenue equal to the sum of the depreciation of fixed assets, the return on assets covering interest for loans and return on equity, efficient operation and maintenance cost, foreign exchange loss, and applicable taxes. In this analysis, annual submission of tariff revision applications is assumed.

¹ ADB. 2005. *Financial Management and Analysis of Projects*. Manila.

The interest rate of the government's local currency loan denominated in taka is 3% (para. 5) and the onlending rate of foreign loan of \$350 million from ADB is 4%. The lifetime of project assets is 29 years. Income tax was calculated at the prevailing rate of 25%.

C. Weighted Average Cost of Capital

5. The WACC was calculated in post-tax real terms. Sources of debt considered were the \$350 million regular loan from ADB's ordinary capital resources at the 10-year fixed swap rate of 2.646% (plus a contractual spread of 0.5% and a maturity premium of 0.1%), and a \$49.8 million loan in local currency from the government at the prevailing 3% rate.² The equity contribution of \$124.72 million from the government and PGCB was considered to be 10.04% nominal (3.81% real). Table 1 shows the WACC calculation.

Table 1: Weighted Average Cost of Capital

Financial Component	ADB Loan	Government Loan	JFJCM Grant	Government Equity
A. Amount (\$ million)	350.00	49.8	7.00	124.72
B. Weighting (%)	65.89	9.4	1.3	23.5
C. Nominal cost (%)	4.00	3.00	10.04 ^a	10.04 ^a
D. Income tax rate (%)	25.00	25.00	0.00	0.00
E. Tax-adjusted nominal cost (C x [1-D]) (%)	3.00	2.25	10.04	10.04
F. Inflation rate (%)	1.50	6.00	6.00	6.00
G. Real cost $([1+E]/[1+F]-1)$ (%)	1.48	(3.54)	3.81	3.81
H. Minimum rate test (I = 0%) (%)	1.48	0.00	3.81	3.81
I. Weighted component of WACC (%)	0.97	0.00	0.05	0.89
WACC (%)	1.92			

() = negative, ADB = Asian Development Bank, JFJCM = Japan Fund for the Joint Crediting Mechanism, WACC = weighted average cost of capital.

^a The nominal cost of equity contribution and grant is based on the 20-year Bangladesh treasury bill auction rate (8.54%) and upward 1.5% to reflect project risk.

Source: ADB estimates.

D. Financial Internal Rate of Return

6. Incremental pre-tax cash flows attributable to each component were estimated based on the assumptions (para. 4). The aggregate cash flow is given in Table 2 and FIRR results for each component are given in Table 3. The aggregate FIRR (3.46%) is higher than the WACC (1.92%), suggesting that the overall project is viable.

Table 2: Financial Analysis for the Overall Project

(Tk million)

Fiscal Year	Capital Cost	Revenue	Expenditure	Income Tax	Net Cash Flow (After Tax)
2019	(5,826)				(5,826)
2020	(8,154)				(8,154)
2021	(16,418)				(16,418)
2022	(7,180)	1,878	(103)	(213)	(5,618)
2023	(3,936)	1,840	(103)	(205)	(2,404)
2024		3,265	(207)	(87)	2,970
2025		3,210	(207)	(89)	2,914
2026		3,155	(207)	(90)	2,858
2027		3,101	(207)	(91)	2,802

² ADB (Treasury Department). 2018. Indicative Lending Rates for Loans under the LIBOR-Based Loan Facility Foreign Exchange Rates and Cap/Collar Premiums for Floating Rate Loans. 16 January.

Fiscal Year	Capital Cost	Revenue	Expenditure	Income Tax	Net Cash Flow (After Tax)
2028		3,046	(207)	(92)	2,746
2029		2,991	(207)	(94)	2,690
2030		2,936	(207)	(95)	2,634
2031		2,881	(207)	(96)	2,578
2032		2,826	(207)	(97)	2,522
2033		2,772	(207)	(99)	2,466
2034		2,717	(207)	(100)	2,410
2035		2,662	(207)	(101)	2,354
2036		2,607	(207)	(102)	2,297
2037		2,552	(207)	(104)	2,241
2038		2,498	(207)	(105)	2,185
2039		2,443	(207)	(106)	2,129
2040		2,388	(207)	(107)	2,073
2041		2,333	(207)	(109)	2,017
2042		2,278	(207)	(110)	1,961
2043		2,223	(207)	(111)	1,905
2044		2,161	(207)	(105)	1,849
2045		2,091	(207)	(91)	1,793
2046		2,021	(207)	(77)	1,737
2047		1,951	(207)	(63)	1,681
2048		1,881	(207)	(49)	1,625
2049		1,811	(207)	(35)	1,569
2050		1,741	(207)	(21)	1,513
2051		875	(104)	(10)	760
2052		842	(104)	(4)	734
NPV at WACC					8,195
FIRR					3.46%

() = negative, blank = does not apply, FIRR = financial internal rate of return, NPV = net present value, WACC = weighted average cost of capital.

Note: All items are expressed in constant 2017 prices.

Source: Asian Development Bank estimates.

Table 3: Weighted Average Cost of Capital and Financial Internal Rate of Return (%)

Component	WACC	FIRR
1	2.024	4.329
2	1.969	3.526
3	1.864	3.052
Overall	1.920	3.460

FIRR = financial internal rate of return, WACC = weighted average cost of capital.

Source: Asian Development Bank estimates.

E. Risk Assessment

7. Key external risks affecting the project are tariff not covering costs and the load growth lower than forecasted resulting low usage of transmission assets. Project specific risks include decrease in revenue, increase in project cost, and delays in project completion. According to the ETTFM, BERC approves reasonable costs only to be recovered through the wheeling charge.

F. Sensitivity Analysis

8. Analyses were carried out to examine the sensitivity of the FIRRs to adverse changes in assumed values of the key variables: a 10% reduction in revenue, a 10% increase in project cost and a 1-year delay in project completion. The results indicate that all three components are robust against the adverse changes considered (Table 4).

Table 4: Sensitivity Analysis

Sensitivity Parameter	FIRR of Component			Overall FIRR
	FIRR of Component			
	1	2	3	
Base case	4.32	3.52	3.05	3.46
10% decrease in revenue	3.22	2.50	2.13	2.60
10% increase in project cost	3.46	2.71	2.31	2.84
1-year delay in project implementation	4.07	3.28	2.81	3.26

FIRR = financial internal rate of return.

Source: Asian Development Bank estimates.

G. Summary of Financial Management and Power Grid Company of Bangladesh Limited Financial Projections

9. The highlights of the historical performance of PGCB from FY2013 to FY2017 are in Table 5. Revenue increased from Tk7,870 million in FY2013 to about Tk14,368 million in FY2017. Profit after tax fell from Tk1,010 million to Tk416 million from FY2013 to FY2015 and then increased to Tk6,939 million by the end of FY2017. The debt–equity ratio was 2.3 at the end of FY2017. The debt service coverage ratio dropped from 1.7 in FY2010 to 1.1 in FY2014, impacted by tariffs that were not cost reflective and the low utilization factor of the transmission investments of PGCB. However, the debt service coverage ratio improved to 2.6 in FY2017.

Table 5: Historical Financial Performance of Power Grid Company of Bangladesh Limited

	FY2013	FY2014	FY2015	FY2016	FY2017
Revenue (Tk million)	7,870	8,672	9,378	12,722	14,368
Total assets (Tk million)	108,662	116,276	122,013	137,971	158,069
Total equity (Tk million)	29,357	29,318	31,396	35,439	41,384
Profit after tax (Tk million)	1,010	(29)	416	5,495	6,939
Return on equity (%)	3.4	(0.1)	1.3	3.5	4.8
Current ratio	1.6	0.8	0.7	3.1	2.8
DSCR	1.7	1.1	1.1	2.3	2.6
Debt–equity ratio	2.3	2.4	2.3	2.3	2.3

() = negative, DSCR = debt service coverage ratio, FY = fiscal year.

Source: Asian Development Bank estimates.

10. PGCB developed indicative 15-year financial projections with assistance from ADB due diligence team. However, the projections reflect only one possible outcome, as power sector regulation in Bangladesh is still immature. PGCB's financial performance may vary depending on the tariff level, which is agreed by BEREC and the government, to allow PGCB to recover its costs. Implementation of the ETTFM will result in an increased wheeling charge and timely implementation of the Power System Master Plan 2016.³ The financial performance of PGCB is projected to be healthy during the forecast period (Table 6).

Table 6: Power Grid Company of Bangladesh Limited Financial Projections, FY2018–2033

³ Government of Bangladesh; Ministry of Power, Energy and Mineral Resources. 2016. *Power System Master Plan 2016*. Dhaka.

Item	2018	2020	2023	2028	2033
Commercial					
Wheeling charge (Tk/kWh)	0.3327	0.4043	0.5228	0.6303	0.6228
Average cost per unit wheeled (excluding ROE and interest) (Tk/kWh)	0.1957	0.2311	0.2882	0.3505	0.3659
Financial					
Revenue (Tk million)	19,664	30,615	53,405	99,310	139,653
Operating expenses (Tk million)	11,077	16,436	27,114	50,981	79,184
Gross margin (Tk million)	8,588	14,179	26,292	48,329	60,469
Overhead (Tk million)	762	1,097	1,763	3,639	6,930
Interest due (Tk million)	4,237	6,543	11,634	19,879	25,079
Depreciation and amortization (Tk million)	6,516	9,872	16,565	29,211	37,720
Net profit before tax (Tk million)	4,559	7,844	14,866	28,658	35,598
Capital expenditure (Tk million)	33,672	48,943	83,536	45,773	56,860
Operating cash flow (Tk million)	8,593	14,838	26,378	51,339	67,012
Net cash flow (Tk million)	(973)	569	864	14,468	19,115
Long-term borrowings (Tk million)	117,945	178,301	311,933	495,453	623,158
Trade creditors (Tk million)	646	929	1,494	3,082	5,871
Return on average net fixed assets (%)	6.45%	6.69%	6.90%	6.85%	6.55%
Debt service coverage ratio	2.47	2.55	2.51	2.83	2.90
Current ratio	1.5	1.2	0.9	1.4	1.7
Debt (long-term)/(Debt [long-term]+Equity) (%)	72	72	71	72	63
Receivable days	68.92	68.92	68.92	68.92	68.92

() = negative, kWh = kilowatt-hour, ROE = return on equity.

Source: Asian Development Bank estimates.

H. Conclusion

11. A predefined rate of return on investments is typically ensured by regulated businesses, and the ETTFM approved by BERC ensures PGCB earns a return equal to its WACC on its investments in useful assets, which BERC finds reasonable. Therefore, capital investments in transmission network assets to overcome network constraints are certainly financially viable. Historically, in the absence of an approved tariff methodology, PGCB has not been able to revise the wheeling charge on a regular basis to reflect increasing costs. However, with the approval of the ETTFM in 2016, a framework now exists that provides a methodology to revise the wheeling charge periodically. This analysis assumed that PGCB will file tariff revision submissions following the ETTFM on a regular basis, and BERC will evaluate PGCB submissions and revise the wheeling charge as necessary. Adoption of the approved methodology ensures that all three components are financially viable compared with the project's WACC of 1.90%. However, it is important to ensure that the ETTFM is fully implemented by the end of FY2021, and that PGCB submits tariff filings to BERC on an annual basis.