FINANCIAL ANALYSIS

A. Introduction

1. The financial analysis was carried out following the Financial Management and Analysis of Projects of the Asian Development Bank (ADB), using 2019 constant prices.[1] Cost streams (i.e., capital investment, operation, and maintenance) reflect the costs of delivering the estimated benefits (i.e., sales of power) by the project, based on a with- or without-project scenario comparison. The period of analysis covers 30 years after the project commissioning, matching the expected project's economic life. A sensitivity analysis examined the financial viability when costs increase, as well as when revenue decreases.

B. Assumptions

2. **Project.** The power generation and transmission project, located in Mansehra District, Khyber Pakhtunkhwa Province, will add about 300 megawatts (MW) of installation capacity as base load power supply through the national grid. The project consists of (i) a 300 MW run-of-river hydropower plant, and (ii) its associated infrastructure (including transmission infrastructure to evacuate power as well as access roads). For the financial analysis, the hydropower generation and its associated infrastructure will be regarded as the project, with annual energy output of 1,184 gigawatt-hours.

3. The implementing agency is the Pakhtunkhwa Energy Development Organization (PEDO). Owned by the Government of Khyber Pakhtunkhwa, PEDO is responsible for managing hydropower generation plants and their associated infrastructure, and developing and implementing new hydropower projects in Khyber Pakhtunkhwa. PEDO has seven hydropower plants in operation, with total available capacity of 161 MW, and all are incorporated in the company's balance sheet. PEDO will own and have full control over the project and be financially responsible for its implementation. Therefore, this financial analysis was carried out from the perspective of PEDO.

4. **Revenue stream.** The revenue source is the electricity sales generated from the project. PEDO will use the power plant as the base load power supply, and its revenue is projected to be stable over the period of operations because of the small variable operating costs that are advantageous to hydropower projects. The national grid system will carry the generated power to serve provincial as well as federal power demands. The plant factor is assumed to be 45%. The supply output considers the plant's own consumption and sediment management (0.5% of gross output). Full operation (i.e., full revenue generation) is expected from 2027, following partial operation after an 84-month construction period. While the project may qualify as a Clean Development Mechanism project, the potential revenue from sales of certified emission rights is not included as part of the revenue stream in the analysis.

5. Under existing arrangements, PEDO submits its tariff petition and adjustments required to the National Electric Power and Regulatory Authority (NEPRA). The project tariff will be determined in two stages: (i) a provisional tariff based on PEDO's feasibility study; and (ii) the final tariff based on the actual project cost, which includes the geotechnical risk during the excavation of tunnels and variation in exchange rates, among other factors. This analysis adopted a conservative assumption for the unit sales price of power, derived from an estimated average tariff of PRs8.6 per kilowatt-hour in 2019 constant prices for the full period of the project life, with

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

no price escalation or adjustments. This assumption is based on recent tariffs approved by NEPRA for hydropower generation projects of a similar scale in Pakistan.[2]

6. **Cost streams.** The project's capital outlay covers 7 years, including a 1-year retention period and an operation and maintenance (O&M) capacity development program after the power plant commissioning. The financial internal rate of return (FIRR) analysis excludes financing costs such as interest during construction and other financial charges. The annual O&M cost has been assumed at 2% of the total project cost (excluding social and environmental safeguard costs). It includes the cost of (i) salaries (for administrative managers and workers); (ii) equipment maintenance, including spare parts replacement; and (iii) asset maintenance. A planned major overhaul is estimated at 2.4% of the project cost and scheduled every 6 years after commercial operations. The cost also includes a water use charge under the water use agreement with the provincial government, as defined under the purchase power agreement and approved under the NEPRA tariff. Depreciation is calculated based on the straight-line method over a 30-year period after the commissioning of the project. Based on the government's power policy and tax incentive scheme for hydropower projects, the project is assumed to be exempt from income, turnover, and withholding taxes on imports.

C. Weighted Average Cost of Capital

7. The project's estimated weighted average cost of capital (WACC) in real terms is 3.1%, considering loans to the government of Pakistan from ADB's ordinary capital resources and the Asian Infrastructure Investment Bank (AIIB), which will be relent to PEDO on the same terms. The ADB loan is from its ordinary capital resources, at the 6-month United States dollar-denominated London interbank offered rate (LIBOR) plus 50 basis points, for a 27-year repayment period including a 7-year grace period. The AIIB loan's annual interest rate was determined following AIIB's sovereign-backed loan pricing for a 29-year repayment period including a 7-year grace period. Table 1 summarizes the cost of funding—weighted and adjusted for inflation—according to the standard WACC derivation method.

Table 1: Weighted Average Cost of Capital

(%)

		Financing Component			
	Description	**ADB OCR Loan**	**AIIB Loan**	**PEDO Equity**	**Total**
A	Weighting	39.7	37.1	23.2	100.0
B	Nominal cost	2.9	3.7	17.4	
C	Tax rate	15.0	15.0	0.0	
D	Tax-adjusted nominal cost (B x [1 – C])	2.5	3.1	17.4	
E	Inflation rate	1.5	1.5	7.5	
F	Real cost ([1 + D] / [1 + E] – 1)	0.9	1.6	9.2	
G	Weighted cost (F x A)	0.4	0.6	2.1	3.1
	WACC (real)				**3.1**

ADB = Asian Development Bank, AIIB = Asian Infrastructure Investment Bank, OCR = ordinary capital resources, PEDO = Pakhtunkhwa Energy Development Organization, WACC = weighted average cost of capital.
Source: Asian Development Bank estimates.

[2] National Electric Power Regulatory Authority. 2018. *Decision of the Authority in the matter of Approval of Tariff for Master Hydro Power (Private) Ltd. for its 99 MW Hydroelectric Power Plant at District Chitral, KPK(Case # NEPRA/TRF-451/MHPPL-2018)*. Islamabad.

D. Financial Internal Rate of Return

8. The financial analysis indicates that the project can generate sufficient revenue to meet all costs (including O&M, depreciation, and debt servicing) while providing an FIRR of 5.3%, which is higher than the project WACC of 3.1%—supporting the project's viability (Table 2).

Table 2: Financial Internal Rate of Return Estimates

Year	Capital Expenditure	Operating Outflows	Revenue	Net Benefits
2020	(24,655.5)	-	-	(24,655.5)
2021	(5,689.7)	-	-	(5,689.7)
2022	(9,482.9)	-	-	(9,482.9)
2023	(11,379.5)	-	-	(11,379.5)
2024	(21,810.6)	-	-	(21,810.6)
2025	(11,379.5)	-	-	(11,379.5)
2026	(10,431.2)	(957.7)	5,073.6	(6,315.3)
2027	-	(2,382.8)	10,147.1	7,764.3
2028	-	(2,402.0)	10,147.1	7,745.1
2029	-	(2,421.3)	10,147.1	7,725.8
2030	-	(2,440.5)	10,147.1	7,706.6
2031	-	(4,422.5)	10,147.1	5,724.6
2032	-	(2,479.0)	10,147.1	7,668.1
2033	-	(2,498.2)	10,147.1	7,648.9
2034	-	(2,517.5)	10,147.1	7,629.6
2035	-	(2,536.7)	10,147.1	7,610.4
2036	-	(2,556.0)	10,147.1	7,591.1
2037	-	(4,538.0)	10,147.1	5,609.1
2038	-	(2,594.5)	10,147.1	7,552.6
2039	-	(2,613.7)	10,147.1	7,533.4
2040	-	(2,632.9)	10,147.1	7,514.2
2041	-	(2,652.2)	10,147.1	7,494.9
2042	-	(2,671.4)	10,147.1	7,475.7
2043	-	(4,653.4)	10,147.1	5,493.7
2044	-	(2,709.9)	10,147.1	7,437.2
2045	-	(2,719.5)	10,147.1	7,427.6
2046	-	(2,719.5)	10,147.1	7,427.6
2047	-	(2,719.5)	10,147.1	7,427.6
2048	-	(2,719.5)	10,147.1	7,427.6
2049	-	(4,682.3)	10,147.1	5,464.8
2050	-	(2,719.5)	10,147.1	7,427.6
2051	-	(2,719.5)	10,147.1	7,427.6
2052	-	(2,719.5)	10,147.1	7,427.6
2053	-	(2,719.5)	10,147.1	7,427.6
2054	-	(2,719.5)	10,147.1	7,427.6
2055	-	(4,682.3)	10,147.1	5,464.8
2056	-	(2,719.5)	10,147.1	7,427.6
			FIRR	**5.3%**
			FNPV@WACC (PRs million)	**31,981**

( ) = negative, FIRR = financial internal rate of return, FNPV = financial net present value, WACC = weighted average cost of capital.
Source: Asian Development Bank estimates.

E. Sensitivity Analysis

9. A sensitivity test was conducted for the project to assess the sensitivity of the FIRR to (i) a 20% increase in project costs, (ii) a 10% decrease in revenues, and (iii) a 20% increase in O&M costs. Table 4 shows the effects of these changes on the FIRR. The sensitivity analysis indicates that the project is most sensitive to a capital increase. However, even in the worst-case scenario,

the lowest FIRR is 4%, still comparing favorably with the WACC and substantiating the project's financial robustness.

Table 4: Sensitivity Analysis

Item	FIRR (%)
Base case	**5.3**
20% increase in capital cost	4.0
20% increase in O&M	4.7
10% decrease revenue	4.2

FIRR = financial internal rate of return, O&M = operation and maintenance.
Source: Asian Development Bank staff estimates.