

FINANCIAL ANALYSIS

A. Methodology and Major Assumptions

1. The financial evaluation of the proposed investments was carried out in accordance with the *Financial Management and Analysis of Projects* of the Asian Development Bank (ADB).¹ All financial costs and benefits have been expressed in constant 2011 price levels. Cost streams used for the determination of the financial internal rate of return (FIRR) reflect the costs of delivering the estimated benefits.
2. The weighted average cost of capital (WACC) of the Nepal Electricity Authority (NEA) was calculated for the proposed subprojects and compared with the FIRR of each subproject, to ascertain the financial viability. The sensitivity of the FIRR to adverse movements in the underlying assumptions was also assessed.
3. Financial viability was examined by comparing the incremental costs and benefits of the with- and without-project scenarios. For parts A and B, the incremental benefits arise through the increased electricity sales corresponding to load growth and loss reduction in the project areas. For part C, the incremental benefits arise from additional generation possible through rehabilitation of two hydropower stations.
4. It is assumed that all subprojects will have a 30-year economic life. The residual value of the original investment, as applicable at the end of the evaluation period, has been factored in the financial analysis. It has been assumed that all subprojects within a component have similar implementation schedules except for the transmission component—subproject A2 (400 kilovolt Tamakoshi–Kathmandu Transmission Line) has a longer implementation period than other subprojects in this component.
5. The expected average selling tariff at the time of project completion has been adopted for financial analysis. A 50% increase over the NEA's selling tariff, (as recommended by the Ministry of Energy's committee constituted to propose financial restructuring measures for the NEA) has been adopted for evaluation purposes. Table 1 provides average electricity tariffs in Nepal.

Table 1: Average Nepal Electricity Authority Tariffs

Consumer Category	Average Tariff Yield, FY2011 (Rs/kWh)
Residential	6.65
Commercial	9.30
Industry	6.26
Other	6.73
Sales to India	7.80
Overall Yield	6.72

kWh = kilowatt hour

Source: Asian Development Bank

6. The capital cost of investment is about \$122 million, after excluding the price contingencies. The investment cost includes the cost of equipment and civil works. Land acquisition, resettlement, and capacity building costs are also included. The following are additional costs for the project: (i) the associated cost of energy supply, calculated based on the

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

NEA's actual cost of service delivery for FY2011; (ii) operation and maintenance costs, estimated at 1.5% of the capital cost per year; and (iii) insurance costs.

B. Calculation of the Weighted Average Cost of Capital

7. To compute the WACC, it was assumed that the financing sources would consist of the NEA and government equity contributions and foreign sources by way of the proposed Asian Development Fund loan and grant as well as a grant from the Government of Norway. The NEA's standard project funding structure is 80%–85% foreign loan—currently at an interest rate of 5%–8%.

8. The NEA's estimated cost of equity is 10.0%. The WACC is calculated on a post-tax basis, but because the NEA does not pay tax and is unlikely to do so in the foreseeable future, the interest tax shield has been ignored in determining the WACC. As shown in Table 2, the WACC for each component has been calculated as 0.75%.

Table 2: Weighted Average Cost of Capital

Item	ADB Loan	ADB Grant	Domestic Loan	Equity	Total
Amount (NRs million)	4,024	3,168	455	1,578	9,225
Weighting (%)	44	34	5	17	
Nominal Cost (%)	1.50	0	8	10	
Tax Rate (%)	0	0	0	0	
Tax Adjusted Nominal Cost (%)	1.50	0	8	10	
Inflation Rate (%)	0.5	0.5	8	8	
Real Cost (%)	1.0	(0.5)	0	1.85	
WACC (%)	0.75				

() = negative, ADB = Asian Development Bank, WACC = weighted average cost of capital.

Source: Asian Development Bank estimates.

C. Project Financial Viability

9. Results of the financial assessment of each part of the project are summarized in Table 3.

3. Detailed costs and benefits of the project are in

Table 4. The FIRR was evaluated to be 7.0% for part A, 25% for part B, and 6.4% for part C. The FIRR for the entire project was evaluated to be 11%, which compares well with the WACC of 0.75%.

Table 3: Project Financial Internal Rate of Return (%)

Project Component	FIRR
Part A: Transmission System Development	7.0
A1 Mahendranagar–Kohalpur 132 kV second circuit stringing	7.0
A2 Tamakoshi–Kathmandu 400 kV transmission line	7.4
A3 Expansion of Chapali grid substation	7.9
Part B: Energy Access Improvement	25.0
Part C: Small Hydropower Plant Rehabilitation	6.4
Overall Project (parts A, B, and C)	11

kV = kilovolt

Source: Asian development Bank

Table 4: Financial Analysis of the Project (All Parts Included)
(NRs million)

Year	Capital Expenditure	Operating Revenues	Operating Expenses	Depreciation	Working Capital Investment	Residual Value	Operating Cash Adjustments	Net (Free Cash Flows)
2012	(109.00)	0.00	0.00	0.00	0.00	0.00	0.00	(109.00)
2013	(1,981.00)	0.00	0.00	0.00	0.00	0.00	0.00	(1,981.00)
2014	(4,695.00)	0.00	0.00	0.00	0.00	0.00	0.00	(4,695.00)
2016	(663.00)	1,324.00	(1,220.00)	135.00	(30.00)	0.00	105.00	(453.00)
2017	0.00	4,588.00	(4,168.00)	277.00	(1,067.00)	0.00	(790.00)	(370.00)
2018	0.00	6,099.00	(5,417.00)	277.00	(303.00)	0.00	(26.00)	656.00
2019	0.00	6,619.00	(5,829.00)	277.00	(55.00)	0.00	222.00	1,011.00
2020	0.00	7,022.00	(6,139.00)	277.00	(169.00)	0.00	108.00	991.00
2021	0.00	7,453.00	(6,469.00)	277.00	(67.00)	0.00	210.00	1,193.00
2022	0.00	7,713.00	(6,652.00)	277.00	(34.00)	0.00	243.00	1,304.00
2023	0.00	7,946.00	(6,807.00)	277.00	(149.00)	0.00	127.00	1,266.00
2024	0.00	8,197.00	(6,973.00)	277.00	(27.00)	0.00	250.00	1,474.00
2025	0.00	8,465.00	(7,151.00)	277.00	(28.00)	0.00	248.00	1,562.00
2026	0.00	8,753.00	(7,342.00)	277.00	(171.00)	0.00	106.00	1,517.00
2027	0.00	9,063.00	(7,547.00)	277.00	(34.00)	0.00	242.00	1,758.00
2028	0.00	9,382.00	(7,758.00)	277.00	(36.00)	0.00	241.00	1,866.00
2029	0.00	9,662.00	(7,980.00)	277.00	(227.00)	0.00	49.00	1,732.00
2030	0.00	9,951.00	(8,209.00)	277.00	(74.00)	0.00	203.00	1,944.00
2031	0.00	10,248.00	(8,445.00)	277.00	(76.00)	0.00	200.00	2,003.00
2032	0.00	10,554.00	(8,688.00)	277.00	(266.00)	0.00	11.00	1,877.00
2033	0.00	10,869.00	(8,939.00)	277.00	(87.00)	0.00	190.00	2,121.00
2034	0.00	11,194.00	(9,197.00)	277.00	(89.00)	0.00	187.00	2,185.00
2035	0.00	11,529.00	(9,462.00)	277.00	(311.00)	0.00	(34.00)	2,033.00
2036	0.00	11,873.00	(9,736.00)	277.00	(101.00)	0.00	175.00	2,313.00
2037	0.00	12,228.00	(10,018.00)	277.00	(353.00)	0.00	(76.00)	2,135.00
2038	0.00	12,594.00	(10,308.00)	277.00	(115.00)	0.00	162.00	2,447.00
2039	0.00	12,970.00	(10,607.00)	277.00	(400.00)	0.00	(124.00)	2,240.00
2040	0.00	13,358.00	(10,915.00)	277.00	(131.00)	0.00	146.00	2,589.00
2041	0.00	13,757.00	(11,232.00)	277.00	(454.00)	0.00	(178.00)	2,348.00
2042	0.00	14,169.00	(11,558.00)	277.00	(149.00)	0.00	128.00	2,739.00
2043	0.00	14,592.00	(11,895.00)	277.00	(516.00)	1,484.00	1,245.00	3,942.00
Net present value at WACC								33,177.00
Financial Internal Rate of Return								11.30%

() = negative, WACC = weighted average cost of capital.

Source: Asian Development Bank

D. Risk Assessment and Sensitivity Analysis

10. **External risks.** Regulatory or tariff revision risk for the subprojects is minimal, as a minimum tariff increase has been assumed in the financial analysis. The current tariff has not been increased since May 2001 and the government has assured that any declines in nominal tariff will be directly compensated.

11. Electricity demand risk is minimal since the country is already experiencing daily load shedding. Geopolitical and political risks are present for all projects in Nepal. However, the nature of the investments and the overall shortage of power in Nepal mitigate this risk. Therefore, the overall risk to the financial sustainability of the NEA is deemed to be minimal, with the project seen as a necessary step to improving the supply situation, especially through improved interconnection with India, thus improving the NEA's financial situation.

12. **Project-specific risks.** Financial risks at subproject level include (i) an increase in the price of civil works and equipment, (ii) delays in project implementation, and (iii) failure to have access to necessary counterpart funds. These risks are considered low because (i) the cost estimates have been cross-checked against recent tenders received, and advanced procurement will lessen the time between loan effectiveness and disbursement.

13. **Sensitivity analysis.** Separate analyses were carried out to examine the sensitivity of projected financial returns to adverse changes in key variables. The variables considered for the sensitivity analyses were (i) a 10% increase in capital costs, (ii) a 10% increase in operating and maintenance costs, (iii) a 10% decrease in benefits, and (iv) a 1-year implementation delay with a 20% increase in costs. Table 5 demonstrates that the results are robust for each component and for the overall project, with the sensitivities exceeding the WACC. Components are most sensitive to cost overruns and delays.

Table 5: Sensitivity Analysis of the Financial Internal Rate of Return (%)

Sensitivity Parameter	FIRR			Aggregate
	Transmission	Energy Access Improvement	SHP Rehabilitation	
Base Case	7.0	25.0	6.3	11.3
Capital +10%	6.3	23.9	6.4	10.5
Operating +10%	1.7	23.4	6.1	7.9
Benefits -10%	6.8	23.7	5.3	10.7
All of the above	1.2	21.1	5.2	6.8
1-year delay and 20% capital cost increase	5.8	22.6	5.9	10.0
Weighted average cost of capital	0.73	0.79	0.97	0.75

FIRR = financial internal rate of return, SHP = small hydropower

Source: Asian Development Bank