

FINANCIAL ANALYSIS

A. Methodology and Major Assumptions

1. Financial analysis of the Electricity Grid Modernization Project was updated to include the additional financing components. Analysis was carried out in accordance with Asian Development Bank (ADB) guidelines on the financial management and analysis of projects.¹ The analysis examines the financial viability of the proposed investment in the transmission and distribution networks owned and operated by the executing agency, Nepal Electricity Authority (NEA). Financial viability was evaluated by comparing the financial internal rate of return (FIRR) against the weighted average cost of capital (WACC).

2. The original project will finance (i) automation of about 34 existing grid substations throughout the country, (ii) construction of 25 kilometers (km) of 220-kilovolt (kV) and 88 kilometer (km) of 132 kV transmission lines, (iii) installation of automated 220 kV grid substations with total capacity of 400 megavolt-amperes (MVA), (iv) upgrading of 144 km of existing 132 kV and 66 kV transmission lines with high-temperature low-sag conductors, (v) construction of a centralized command and control center for electricity distribution in Kathmandu, (vi) installation of 350,000 smart meters for electricity customers in the Kathmandu Valley, and (vii) construction of 30 km of 33 kV distribution lines and 4 automated 33/11 kV substations. The additional financing covers the following subprojects that were excluded from the original project because of budget constraints: construction of an additional (i) 16 km of 132 kV transmission lines from Kohalpur to Nepalgunj and from Chovar to Lagankhel, and (ii) 477 MVA of substation capacity in Dumkibas, Lagankhel, Mulpani, and Nepalgunj. The additional financing will also include implementation of an enterprise resource planning solution and revenue management system for NEA.

3. The Government of Nepal passed the Electricity Regulatory Commission Act in 2017, paving the way for the formation of the Electricity Regulatory Commission (ERC) to determine cost-reflective end-use electricity tariffs for the country (among other measures). The ERC issued its first 1-year tariff order in June 2020, using the annual revenue requirement (ARR) approach, and based on its analysis of NEA's financial performance over the past 3 years (fiscal year [FY] 2017–FY2019) and NEA's forecasts of revenue and expenses for the next year.² The ARR is determined by the ERC based on its view of reasonable and efficient capital costs, power purchase costs, operation and maintenance (O&M) costs, overhead costs, depreciation, interest on loans, and return on equity (ROE). The principle underpinning these revenue regulations is that NEA should recover efficient costs and earn at least its cost of capital on its investments. In its first tariff order, the ERC allowed recovery of almost all of NEA's forecast expenses, despite NEA not providing the ERC with a fully detailed tariff petition. However, the ERC did disallow the majority of NEA's ROE claim, on the basis that NEA appeared to claim a return against its entire capital base, at a rate of 8.52%, and not just the equity component. The ERC determined that NEA's average tariff should decrease by about 10% overall.

4. The approach to tariff setting adopted by the ERC allows for project financial analysis to also be undertaken using the ARR approach, i.e., the financial benefit to NEA arising from the project is the incremental regulated revenue that it earns from construction and operation of the new facilities, rather than from incremental sales of electricity. For the purposes of this financial

¹ Asian Development Bank. 2019. *Financial Analysis and Evaluation: Technical Guidance Note*. Manila.

² Government of Nepal, Electricity Regulatory Commission (ERC). 2020. *Determination of Electricity Tariff Rate of Consumers of Nepal Electricity Authority (Including Consumers under Community Wholesale Consumer Category)*. Kathmandu. The tariff order was issued on 15 June 2020 for determination of electricity tariffs for FY2021.

analysis, it was assumed that the ERC would allow NEA to recover O&M costs, capitalized overhead costs, depreciation, interest on loans, foreign exchange losses, and an ROE at 14.0%.³ The ARR approach to tariff setting, and to this financial analysis, means that the analysis is not linked to NEA's demand forecast. Further, because the additional financing components essentially just increase the size of the regulated asset base against which NEA can earn a return, the FIRR was calculated only for the overall project including the additional financing components, and not the additional financing components on a stand-alone basis.

5. Further benefits will accrue from the expected improvement in quality of supply that the investment will bring, and a reduction in the frequency and duration of medium- and low-voltage outages. The ERC is likely to introduce incentive-based regulation to ensure that NEA is providing its customers with an acceptable quality of supply. However, no such regulation exists, so these benefits have been ignored for the purposes of this financial analysis and only the asset-based incremental revenue has been included.

6. Loss reduction is also expected to be significant as a consequence of the investment in transmission line reconductoring (i.e., upgrading the transmission line conductor) and the Kathmandu distribution command and control center. However, because the ERC has indicated that it will allow NEA to recover power purchases at cost, the project FIRR is decoupled from network losses. In the future, the ERC has signaled that it may introduce network loss trajectories into its tariff-setting process, but for the purposes of this analysis, power purchases have been treated as a cost pass-through and have therefore been ignored.

7. Cost streams used to determine the FIRR included land acquisition and development, civil works, equipment, incremental O&M costs, engineering consulting and project management costs, taxes and duties, and physical contingencies. Price contingencies and financial charges during construction were excluded. Because corporate tax is a pass-through for tariff-setting purposes, it has been ignored for the purposes of financial analysis.

B. Weighted Average Cost of Capital

8. The WACC was recalculated for the overall investment (including the additional financing components) in real terms. The government is expected to relend to NEA on a back-to-back basis, with foreign exchange risk passed to NEA.⁴ The government adds a 0.25% service charge to the interest rate of the final loan (but not to the rate used to calculate interest during construction). Risk-free rates and market risk premiums are not widely reported for Nepal, but the rates for other countries in the region are 7.5% for India, 12.6% for Pakistan, and 10.0% for Sri Lanka.⁵ Asset betas for electricity supply businesses typically range from 0.25 to 0.40, giving an equity beta of about 1 at a gearing level of 60% (NEA's debt-to-capital ratio). This suggests a required ROE of 17.5%, which is slightly higher than the rate that was used to calculate ROE in the ARR calculation

³ In its first tariff petition, NEA claimed a total ROE of NRs10.8 billion against total equity capital of NRs126.8 billion. In its determination, the ERC adopted NEA's implied ROE rate of 8.52% but applied that rate to 30% of NEA's gross fixed assets only. The ERC noted that a rate of 8.52% was not locked in for future tariff determinations. Given the expectation that the ERC will adopt a limit to the amount of equity in NEA's notional capital base (as it has done in other jurisdictions, including India), NEA is expected to petition for a higher ROE rate. For instance, in India, a post-tax ROE of 14% is allowed for generation and transmission companies; for distribution companies an ROE of 16% is allowed for assets employed for retail supply of electricity, and an ROE of 14% is allowed for assets employed in electricity distribution.

⁴ NEA repays in local currency at the prevailing exchange rate of the day (NEA is not allowed to deal in foreign currency). However, foreign exchange losses are a pass-through for tariff-setting purposes.

⁵ P. Fernandez, M. Martinez, and I. Fernández Acín. 2019. *Market Risk Premium and Risk-Free Rate Used for 69 Countries in 2019: A Survey*. Barcelona: IESE Business School.

discussed in para. 4. The overall WACC for the project is estimated at 2.3% (Table 1), compared to 2.2% at appraisal.

Table 1: Weighted Average Cost of Capital

Item ^a	Amount (\$ million)	Weight (%)	Pre-Tax	Tax Rate (%)	Post-Tax	Weighted Cost (%)
			Nominal Cost (%)		Real Cost (%)	
ADB concessional OCR loan	216.0	80.0	1.8	25.0	0.0	0.0
Equity	54.0	20.0	17.5	0.0	11.3	2.3
Total	270.0	100.0				2.3

ADB = Asian Development Bank, OCR = ordinary capital resources.
Source: ADB estimates.

C. Financial Internal Rate of Return and Sensitivity Analysis

9. Incremental cash flows attributable to the investment over a 30-year period (2022–2051) were estimated based on the assumptions outlined in paras. 4–8. The aggregate cash flow (Table 2) yields an FIRR of 2.9% (compared to 2.8% at appraisal with the additional financing components excluded), which is above the WACC of 2.3%, indicating that the investment is financially viable, as expected given the rate-of-return regulation to which NEA is now subjected (even with NEA's required ROE higher than the ROE allowed by the ERC in its tariff determinations).

Table 2: Aggregate Financial Internal Rate of Return Calculation
(NRs million)

Year ^a	Benefits		Costs		Net Cash Flow
	Incremental ARR	Other Income	Project Capital	O&M	
2022	49	0	3,490	0	(3,441)
2023	211	0	8,294	0	(8,087)
2024	448	0	9,224	0	(8,796)
2025	625	0	4,472	0	(3,893)
2026	971	47	1,717	142	(918)
2027	2,246	48	733	375	1,092
2051	1,336	77	0	465	831
				Terminal value:	1,383
				FIRR (Post-tax nominal):	2.9%
				FNPV:	2,136

() = negative, ARR = annual revenue requirement, FIRR = financial internal rate of return, FNPV = financial net present value, O&M = operation and maintenance.

^a Selected years shown for brevity.

Source: Asian Development Bank estimates.

10. In general, the nature of the rate-of-return regulation to which NEA is now subject means that project returns are not sensitive to cost overruns. However, price regulation is new to Nepal, and the ERC and NEA will take some time to fully establish the boundaries of the price-setting process. The main risks in this context are that the ERC does not allow full pass-through of project costs and/or does not allow NEA to earn an adequate ROE invested. Analysis was carried out to examine the sensitivity of the FIRR to these risks. Table 3 shows the results of the sensitivity

analysis. In general, the project would still be viable with some disallowance of capital and operating costs and ROE on the part of the ERC.

Table 3: Sensitivity Analysis

Sensitivity Parameter	Variation	FIRR (%)	FNPV (NRs billion)	Switching Value (FIRR) (%)
Base case		2.9	2.1	
1 Project capital costs	+10%	2.1	(0.5)	8.3
2 Project O&M costs	+10%	2.7	1.3	25.2
3 ROE allowance ^a	-39%	1.8	(1.4)	(23.8)

() = negative, FIRR = financial internal rate of return, FNPV = financial internal rate of return, O&M = operation and maintenance, ROE = return on equity.

^a The base case assumes an ROE of 14%. This sensitivity assumes that the Electricity Regulatory Commission's 2020 ROE allowance of 8.52% is adopted in all future years.

Source: Asian Development Bank estimates.

D. Conclusions

11. Financial analysis demonstrates that, under the form of regulation to which NEA is subject, the project (including the additional financing components) generates acceptable and robust financial returns for NEA. Adverse tariff determinations by the ERC, and in particular disallowance of project costs, remain a risk and emphasize the importance of NEA submitting timely and accurate tariff petitions to the ERC.

E. Nepal Electricity Authority Financial Performance and Projections

12. Previous (2014 and 2016) ADB assessments of NEA's financial performance highlighted NEA's persistently poor financial performance and low debt-repaying capacity; NEA's accumulated losses had increased to Nepalese Rupees (NRs) 35 billion by the end of FY2016 (ended 15 July 2016), and NEA was unlikely to ever repay its loans from the government. The need for significant financial restructuring and increases to end-use tariffs was identified as critical to put NEA on firm financial footing and allow it to operate independently, and to fully discharge its responsibilities as a network owner and operator. Encouragingly, significant positive changes in the financial and operational performance of NEA are now observable. With the help of (i) a tariff increase in FY2017, (ii) a program to target commercial electricity losses, (iii) significantly reduced load-shedding in its distribution area, and (iv) a government-backed financial restructuring plan, NEA was able to post a net profit of NRs1.5 billion in FY2017, marking the first time since FY2007 that a profit had been recorded. The profit increased to NRs2.9 billion in FY2018, NRs9.8 billion in FY2019, and NRs12.2 billion (provisional) in FY2020.

13. As part of the financial analysis, financial projections for FY2021–FY2028 were developed for NEA based on regulations and principles set forth by the ERC in its first tariff order for NEA. The projections rely heavily on the assumption that the ERC will continue to set tariffs based on standard regulatory practice (i.e., full cost pass-through) and allow a post-tax ROE of 14% from FY2022 onward.⁶ The financial projections are summarized in Table 4. Under these assumptions, NEA's financial performance and position would continue to improve; net profit is projected to increase over the forecast period from about NRs15.6 billion in FY2021 to NRs28.7 billion by

⁶ However, equity eligible for earning a return was capped at 30% of the gross fixed assets for the FY, in line with principles adopted in the ERC's 2020 tariff order.

FY2028, and the debt service coverage ratio is projected to exceed the covenanted 1.2 from FY2022 onward. The projections are somewhat dependent on the ERC's treatment of existing loans between NEA and the government, some of which are undocumented and have been disallowed by the ERC (and therefore excluded from the revenue projections in Table 4). The projections are also dependent on the extent to which the ERC allows ROE to increase, although the rate of 8.52% allowed in the FY2020 determination is very low and would be difficult for the ERC to defend.

Table 4: Summarized Financial Projections of NEA, Fiscal Year 2021–Fiscal Year 2027

Item	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023	FY2028
	Actuals			Projections			
Commercial							
Electricity sales (GWh)	5,560	6,338	6,529	8,833	9,870	10,644	14,551
Average revenue per unit sold (NPRs/kWh)	10.0	10.5	10.5	10.5	10.5	10.7	14.0
Average cost per unit sold (NPRs/kWh)	10.0	9.8	9.5	9.2	8.9	9.1	11.4
Income statement							
Revenue (NPRs million)	61,974	71,273	73,059	98,052	1,08,507	1,18,319	2,08,905
Operating expenses (NPRs million)	46,766	52,134	50,126	67,204	71,562	78,794	1,31,920
Operating profit (NPRs million)	15,208	19,139	22,933	30,848	36,945	39,525	76,985
Overhead (NPRs million)	4,601	5,271	6,575	7,487	8,542	9,716	15,805
Depreciation (NPRs million)	4,210	4,852	5,349	6,879	7,551	8,748	17,822
Finance costs (including non-operating heads) (NPRs million)	3,499	3,995	3,712	5,209	6,925	9,037	18,344
Finance income (including impairment charges) (NPRs million)	0	(4,810)	(4,862)	(4,333)	(3,653)	(3,653)	(3,653)
Net profit before tax (NPRs million)	2,897	9,832	12,158	15,606	17,581	15,677	28,667
Cash flow statement							
Operating cash flow (NPRs million)	5,091	8,389	958	50,352	26,855	40,576	66,113
Net cash flow (NPRs million)	9,671	4,382	1,900	13,515	16,166	27,799	44,389
Balance Sheet							
Current assets (NPRs million)	64,039	78,380	92,145	1,04,164	1,24,912	1,49,468	3,46,172
Interest and royalty arrears (NPRs million)	37,393	38,657	0	0	0	0	0
Current liabilities (NPRs million)	84,778	69,067	67,051	92,498	95,484	1,02,961	1,56,516
Noncurrent assets (NPRs million)	2,20,533	2,77,402	3,24,555	3,62,087	4,11,659	4,57,243	6,45,898
Long-term liabilities (NPRs million)	1,20,261	1,54,805	1,92,958	1,92,843	2,31,554	2,68,120	4,40,251
Capital and reserves (NPRs million)	79,533	1,31,910	1,56,691	1,80,910	2,09,533	2,35,630	3,95,303
Ratios							
Return on average net fixed assets (%)	10	12	12	15	16	15	14
Current ratio	0.76	1.13	1.37	1.13	1.31	1.45	2.21
Debt–service coverage ratio	1.69	1.54	1.53	1.96	2.06	1.85	2.69
Debt–equity ratio	53:47	47:53	51:49	50:50	53:47	56:44	64:36
Average receivable days	96	111	153	118	102	89	81

() = negative, FY = fiscal year, GWh = gigawatt-hour, kWh = kilowatt-hour, NPRs = Nepalese Rupees.

Note: The FY of the Government of Nepal and its agencies ends on 15 July. "FY" before a calendar year denotes the year in which the fiscal year ends, e.g., FY2022 ends on 15 July 2022.

Sources: Nepal Electricity Authority and Asian Development Bank estimates.