

FINANCIAL ANALYSIS

1. The project's financial analysis was carried out in accordance with the Financial Management and Analysis of Project Guidelines of the Asian Development Bank (ADB) (2005). The project's Nikachhu hydropower plant is a 118-megawatt (MW) run-of-river scheme with provisions for peak operations. The annual design energy is for 491.52 gigawatt-hours (GWh) in a very conservative manner based on 90% dependable year with 95% plant availability.¹ The executing agencies for the project are Druk Green Power Corporation (DGPC) and its duly created special-purpose subsidiary company, Tangsibji Hydro Energy (THyE).

A. Methodology and Major Assumptions

2. Financial viability is assessed by comparing the weighted average cost of capital (WACC) with the financial internal rate of return (FIRR) for the aggregate investment. The FIRR's sensitivity to adverse changes in various cost and revenue assumptions is also assessed. The project capital costs include costs for civil works and hydromechanical and electromechanical equipment, transmission line, project preparatory works, administrative expenses, safeguards, interest during construction, and physical contingencies. The operation and maintenance (O&M) cost is assumed at 1% of the total project cost from the first year of commercial operation. Asset depreciation is calculated on a straight-line basis based on prescribed rates of the Bhutan Electricity Authority (BEA) for the financial projection. Income tax is calculated as 30% of the total profits. Additional payments are associated with an annual energy royalty to the government in the form of 12% of the power for the initial 12 years of operation, and 18% for the next 18 years. The financial evaluation is based on the assets' economic life of 30 years.

3. The offtaker is the Power Trading Corporation of India (PTC), which is the largest power trader in Indian power market. The power purchase agreement (PPA) is for 25 years, with 80% of the net salable power (design energy less royalty energy after accounting for losses). The PPA's levelized tariff over the period is about Rs4.25/kilowatt-hour (kWh), starting at Rs3.30/kWh with annual escalations. Twenty percent of the net residual salable power will be arranged on a merchant basis, which will be allowed for power sales in India's competitive power trading market. The recent average spot prices for power trading in India have been higher than the long-term PPA tariff. Considering the present and future power demand–supply gap in India, the power sales of this small amount can be absorbed on the merchant route. This arrangement will also serve as a cushion under the PPA obligation for unforeseeable reductions in power generation and sales. Indian commercial banks regard this option as proactive risk mitigation measures in considering limited recourse project finance to THyE. For the financial analysis, spot prices are assumed to be the same as the tariffs for the entire tenure of the PPA, which is considered conservative.

4. Based on take or pay arrangements in the PPA, PTC must buy at least 335.04 GWh for the first 12 years and 312.20 GWh for the remaining period. The base case for the financial analysis is based on the design energy on 90% dependability, which is quite conservative. The PPA also has a provision for THyE to sell power to PTC beyond the contracted energy at prices higher than the tariff. PTC will bear all losses and taxes beyond the Bhutan border.²

¹ This means 90% probability of the assumed water-flow based on the hydrological data. There would be overflow almost 90% of the operating time.

² The cross-border delivery point would be situated in Alipurduwar, in northeastern India close to the border.

B. Calculation of Financial Internal Rate of Return

5. The financing plan for computing the WACC considers that DGPC will provide equity contributions, and the debt component will be a mix of loans from ADB and Indian commercial banks. THyE will have a debt to equity ratio of 65:35 for the financing. The estimated costs of borrowing and equity capital are adjusted for inflation to determine the WACC in real terms. The WACC for the project is estimated at 1.84% in real terms (7.78% in nominal terms) (Table 1).

Table 1: Weighted Average Cost of Capital in Real and Nominal Terms

Particulars	Amount (\$ million)	Weighting (%)	Nominal Cost (%)	Tax Rate (%)	Tax		Real Cost (%)	WACC (%)	Nominal WACC (%)
					Adjusted Nominal Cost (%)	Inflation Rate (%)			
ADB OCR	70.00	35.3	4.19	30	2.93	1.30	1.61	0.57	1.04
Commercial banks	58.82	29.7	12.25	30	8.58	8.30	0.25	0.08	2.54
Equity ^a	69.36	35.0	12.00	0	12.00	8.30	3.42	1.20	4.20
Total	198.18	100.0						1.84	7.78

ADB = Asian Development Bank, OCR = ordinary capital resources, WACC = weighted average cost of capital.

^a Equity's nominal cost (12%) is based on the Bhutan Electricity Authority's guidelines.

Source: Asian Development Bank estimates.

6. The project's FIRR is 5.94% on an after-tax basis in real terms (9.28% in nominal terms). These rates compare favorably with the estimated WACCs in both real and nominal terms, substantiating the project's financial viability.

C. Risk Assessment and Sensitivity Analysis

7. **Construction risks.** Major financial risks include (i) increased capital expenditure, (ii) delays in project implementation, and (iii) lack of access to necessary counterpart funds. While time and cost overruns are among the biggest financial risks of any hydropower project, these risks are reduced because (i) the cost estimates are based on the most recent market and bidding data; (ii) comprehensive geological and hydrological investigations were undertaken during project preparation; and (iii) the cost estimates include sufficient contingencies, 22% of the base cost. For financing, ADB and Indian commercial banks will cofinance the project in a collaborative partnership, and DGPC will initially fund the equity requirements on its own and may raise part of the equity from any private joint venture partner later.

8. **Operating risks.** During operation, major risks include (i) failure or disruption of power offtake arrangements, and (ii) negative effects on generation of unexpected hydrological variations. The long-term 25-year PPA includes risk mitigation measures including a take-or-pay arrangement, appropriate penalty clauses, and an offtake payment security mechanism. The merchant sale (only 20% of net salable power) provides a cushion for penalties against unforeseeable reductions or delays in power generation, while probably generating additional revenue under the Indian power trading market. The PPA also provides adequate payment security in the form of an irrevocable letter of credit to be opened by PTC with a 12-month term. To address the hydrological risks that could reduce the generation output, the project design is based on 22 years of hydrological data and analysis of climate change models that show that future water discharge is likely to increase in the long term rather than decline. The risk of any significant reduction in water discharge is considered low. The base-case assessment of the financials is based on design energy (energy based on 90% dependability/P-90 generation level of assumption and plant availability of 95%), which is quite conservative, and more water discharge is likely. While an unexpected increase of O&M costs would have a downward impact on the return, hydropower projects usually have lower and more predictable O&M costs.

9. **Sensitivity analysis.** The stress test assesses the sensitivity of the FIRR to (i) a 5% increase in project cost, (ii) a 10% increase in O&M costs, (iii) a 5% reduction in energy generation, (iv) a delay in commissioning by 6 months, and (v) a combination of these four scenarios (Table 2). The sensitivity analysis indicates that the project is most sensitive to a reduction in generation. Even in the worst case, which is the combination of all four scenarios, the lowest FIRR exceeds the WACC. These results substantiate the project's financial viability.

Table 2: Sensitivity Analysis

Scenario	Variation (%)	FIRR (%) (Real terms)	FIRR (%) (Nominal terms)	Average DSCR (Nominal terms)	Minimum DSCR
Base Case		5.94	9.28	2.8	1.3
Increase in project cost	5	5.50	8.84	2.6	1.3
Increase in OM Cost	10	5.83	9.17	2.7	1.3
Reduction in generation	(5)	5.48	8.82	2.6	1.3
Delay in commissioning	6 months	5.43	8.94	2.7	1.3
Combined effect (2 to 5)		4.30	7.98	2.4	1.2

() = negative, DSCR = debt service coverage ratio, FIRR = financial internal rate of return, O&M = operation and maintenance.

Source: Asian Development Bank estimates.

10. The sensitivity of the FIRR to climate change modeling, which could lead to additional benefits, was assessed.³ Model analyses show that water discharge is likely to increase in the Nikachhu watershed due to climate change. The models project that water flow will increase by an average of 1%–3% for non-monsoon months and 5%–8% for monsoon months. This would result in increased hydropower generation by the Nikachhu hydropower plant due to greater water inflow. Increased water flow resulting from climate change would result in an increase in generation and an FIRR in real terms of 5.97% and in nominal terms of 9.34%, and an average debt service coverage ratio of 2.9 and minimum debt service coverage ratio of 1.3.

D. Financial Performance of Tangsibji Hydro Energy

11. The projected financial performance of THyE is in Table 3. THyE will earn full annual revenue in 2020. The projection assumes that THyE's revenue will increase steadily due to the small variable operating costs advantageous to hydropower projects. The projected financial performance will maintain an adequate debt service coverage ratio of a minimum of 1.3 and an average of 2.8. This indicates that THyE will generate enough cash to service debt obligations fully. The projection also shows a steady decline in the debt–equity ratio from 1.6 in 2020 to 0.3 in 2030 as loan principals are gradually repaid.

E. Financial Performance of Druk Green Power Corporation

12. DGPC's historical financial performance is summarized in Table 4. The sale of electricity is its major source of revenue. Although revenue for 2010–2012 was reduced mainly due to decreased power exports from more domestic consumption and fluctuations in energy generation, revenue for fiscal year 2013 has increased significantly. During 2013, the export tariff of Chhukha hydropower plant (336 MW) was revised from Nu2.00/kWh to Nu2.25/kWh applicable from 1 January 2013 to 31 December 2016, which attributed to additional revenue of about Nu4.5 billion. BEA approved an increase in the domestic sales tariff to the Bhutan Power Corporation for additional energy from Nu1.20/kWh to Nu1.39/kWh, which also increased DGPC's revenue from domestic power sales.

³ Climate Change Impact Assessment (accessible from the list of linked documents in Appendix 2 of the report and recommendation of the President).

Table 3: Tangsibji Hydro Energy, Projected Financial Performance

Item	2020	2022	2024	2026	2028	2030
Total Revenue (A) (Nu million)	1,401.33	1,456.25	1,599.28	1,741.69	1,904.13	2,061.98
Operating expenses (B) (Nu million)	124.27	138.51	155.24	173.03	193.92	216.15
Interest (C) (Nu million)	626.00	574.18	506.91	411.06	278.45	139.04
Tax (D) (Nu million)	63.82	91.93	149.64	216.78	298.79	381.66
Repayments (E) (Nu million)	183.52	347.89	460.82	601.99	743.15	171.43
Cash surplus (= A – B – C – D – E)	403.72	303.75	326.67	338.83	389.82	1,153.71
Profit after tax (Nu million)	194.60	260.00	394.80	549.20	740.30	933.50
Debt service coverage ratio	1.5	1.3	1.4	1.3	1.4	5.1
Debt–equity ratio	1.6	1.4	1.0	0.7	0.4	0.3
Return on equity (%)	4.7	6.2	9.5	13.2	17.8	22.4
Return on capital employed (%)	7.2	7.6	8.7	9.9	11.1	11.4

Source: Asian Development Bank estimates.

Table 4: Druk Green Power Corporation, Financial Performance, 2009–2013

Item	2009	2010	2011	2012	2013
Total revenue (Nu billion)	10.89	11.81	10.95	11.14	13.05
Profit after tax (Nu billion)	4.57	4.49	3.93	4.18	5.25
Average cost of supply (Nu/kWh)	0.91	1.00	1.00	1.02	1.02
Average tariff (Nu/kWh)	1.56	1.60	1.54	1.61	1.66
Debt service coverage ratio	5.4	3.4	3.2	3.6	2.6
Debt–equity ratio	0.6	0.6	0.5	0.4	0.3
Return on equity (%)	12.4	12.0	10.4	10.9	13.5
Return on assets (%)	7.8	7.1	6.4	6.8	8.6

kWh = kilowatt-hour.

Source: Druk Green Power Corporation.

13. Given the cost-plus nature of the tariff regime that provides an assured post-tax return on assets, DGPC's financial position remains healthy and robust. The debt–equity ratio declined from 0.6 in 2009 to 0.3 in 2013 as DGPC paid off a significant portion of its loans. The debt service coverage ratio remained at more than 2.5 during 2009–2013, indicating that DGPC generates enough cash for its debt services. In March 2014, ICRA, the Indian credit-rating agency, assigned DGPC an issuer rating of IrBBB+ (investment grade) with a stable outlook.⁴

14. Table 5 provides the projected financial performance of DGPC. DGPC is expected to undertake the public investment portion of new hydropower projects. It will need to leverage its balance sheet to raise commercial financing including financing from international resources. DGPC has an aggressive capital investment plan based on the umbrella agreement signed between the governments of Bhutan and India for achieving a target of 10,000 MW of additional electricity exports from Bhutan to India. This will lead to an increase in the turnover from Nu14 billion in 2014 to Nu63 billion by 2022, at a compounded annual growth rate of 18%. As power supply will far exceed internal demand in Bhutan in the long term, DGPC would be able to export more power and the profitability indicators would improve, as the export tariff is much higher than the domestic tariffs. Return on assets declines slightly during 2019–2023 due to the expected commissioning of power plants, which will substantially increase the asset base.

⁴ The international credit-rating agency, Moody's Investors Service is ICRA's largest shareholder.

Table 5: Druk Green Power Corporation, Projected Financial Performance

Item	2014	2015	2017	2019	2021	2023
Total revenue (Nu billion)	14.14	15.24	19.83	45.48	58.60	63.20
Profit after tax (Nu billion)	5.49	5.67	7.12	15.90	18.50	20.87
Cost of supply (Nu/kWh)	1.03	1.05	1.37	2.15	2.49	2.66
Average tariff (Nu/kWh)	1.73	1.75	2.02	2.84	3.17	3.36
Debt service coverage ratio	2.7	2.7	3.3	3.2	2.6	2.7
Debt–equity ratio	0.3	0.3	0.3	1.1	1.3	1.2
Return on equity (%)	13.0	12.8	13.8	14.1	14.7	15.2
Return on assets (%)	8.9	9.0	10.0	6.4	6.2	6.6

kWh = kilowatt-hour.

Source: Asian Development Bank estimates.

F. Summary of Financial Management Assessment

15. The financial management assessment was undertaken to determine the current ability of DGPC and THyE to fulfill ADB’s fiduciary requirements. The assessment was in accordance with ADB guidelines using the financial management assessment questionnaire.

16. DGPC has successfully managed the ADB-funded Dagachhu project. DGPC and its subsidiaries follow an accrual basis of accounting as per provisions of its governing statutes and generally accepted accounting principles. DGPC is taking a phased approach to achieve compliance with International Financial Reporting Standards; implementation is in progress. As a corporate and government entity, DGPC is subject to audit under the Companies Act of the Kingdom of Bhutan, 2000 and the Royal Audit Authority. DGPC provides quarterly reports to BEA and the Royal Monetary Authority for foreign currency receipts and payments.

17. Accounting and financial reporting responsibilities are carried out as per a defined set of delegation of powers. DGPC has implemented an enterprise resource planning (ERP) system for all its subsidiaries and its head office; all reporting requirements are handled through the ERP system. The manuals (e.g., internal audit manual, risk management manual, delegation of power) clearly specify procedures for all routine financial management and related administrative activities. The auditor’s report found that DGPC has adequate internal control systems, suitable budgetary systems, adequate competitive bidding, and sufficient organizational system controls to carry out operations in an orderly and efficient manner. Accordingly, the financial management risk for DGPC is assessed as low, and sufficient fiduciary arrangements are in place for the purpose of the project.⁵

18. THyE was incorporated as a wholly owned subsidiary of DGPC on 25 April 2014 to implement the Nikachhu hydropower project. THyE follows all the processes, systems, and manuals of DGPC. DGPC applies the ERP package to its subsidiaries including THyE, and will monitor implementation of its policies and practices. It has seconded experienced staff to THyE. DGPC and THyE financial statements will be covered by the internal and external auditing and ADB review.

⁵ Financial Management Assessment (accessible from the list of linked documents in Appendix 2 of the report and recommendation of the President).