

DRUK GREEN POWER CORPORATION LIMITED



**Proposal of Domestic Generation Tariff of
18 MW Suchhu Hydropower Project**

February 2024

Contents

1.	Executive Summary	1
2.	Introduction	3
3.	Parameters Used for Tariff Determination.....	3
3.1	Tariff Period.....	3
3.2	Cost Parameters.....	3
3.2.1	Cost of Equity.....	3
3.2.2	Cost of Debt.....	4
3.2.3	Gearing Ratio.....	4
3.3	O&M Allowance	4
3.3.1	Inflation	4
3.4	Cost of Working Capital	4
3.4.1	Inventories	4
3.4.2	Regulatory Fees and System Operator Charges	4
3.5	Energy Volumes.....	5
3.5.1	Annual Energy Volumes	5
4.	Generation Tariffs.....	5
5.	Conclusion	5
6.	Annexures.....	5
6.1	Annexure I: Project cost details (attached separately)	5
6.2	Annexure II: Tariff Model	5

1. Executive Summary

The 18 MW Suchhu Hydropower Project, developed under the Small Hydropower Project Phase-I initiative, is scheduled for commissioning by February 2025. The project construction is overseen and managed by Druk Hydro Energy Ltd (DHyE), a subsidiary of DGPC. On commissioning, the project will be placed under DGPC for O&M.

This proposal for the Domestic Generation Tariff for the 18 MW Suchhu Hydropower Project (SHPP) has been prepared by DGPC. In accordance with the Domestic Electricity Tariff Policy 2016 and the Tariff Determination Regulation 2022, the tariff period is set for 3 years period and tariff determined in line with the parameters set out in the policy and regulation with the returns determined on Net Asset basis. Based on the current policy and regulation, the tariff for Suchhu for the first three years period works out to **Nu. 6.78 per unit** with a 13% royalty and **Nu. 5.90 per unit** with 0% royalty; which is working out to be higher than the domestic tariffs of the existing hydropower plants and proposed domestic tariffs for upcoming other small and large/mega hydropower projects.

A tariff determination mechanism (for export of surplus power) that is adopted for the GoI assisted hydropower projects is to consider the levelized tariff over the period of the concession. The proposed Renewable Energy Policy also recommends levelized tariff with some predetermined escalation and/or fixed tariff over the concession period. The draft RE Policy further recommends that for tariff considerations:

- 1) The value of equity at the time of commissioning of the project shall be maintained throughout the project concession period for determination of Return on Equity (RoE).
- 2) The allowance for RoE should be comparable to that of regional power market and industrial benchmark to attract and sustain investments.

DGPC has therefore worked out a levelized domestic generation tariff for the Suchhu project for the 30 years concession period as **Nu. 5.24 per unit** with the tariff parameters as under:

SN	Parameters	Parameters
1	Project Hard Cost (MNu.)	2,519.42
2	IDC (MNu.)	66.87
3	Total Project Cost (with IDC) MNu.	2,586.29
4	Gearing Ratio (%)	70%
5	Cost of Equity (%)	13.74%
6	Cost of Debt (%)	10.50%
7	Tax (%)	30%
8	Royalty (%)	0%
9	Saleable Energy (GWh)	75.71
10	Interest on Working Capital (%)	9.75%
11	Loan period (years)	20
12	O&M Base rate (%)	1%
13	Annual Escalation (%)	4.93%
14	Tariff period (years)	30
15	Arrears (days)	30
16	Inventories (MNu.)	14.50
17	LCOE Tariff (Nu. /kWh) for 30 years	5.24

As the project is yet to be fully commissioned, certain cost parameters adopted for the tariff determination are best-estimates. The total project cost considered for the tariff includes the expected cost to completion on factoring in Interest During Construction (IDC) and is based on a debt-to-equity ratio of 70:30. This cost excludes transmission line costs. Other cost parameters, such as inventory and operation & maintenance (O&M) costs, have been referenced from similar operational hydropower plants.

The domestic tariff proposal has been prepared to reflect the actual cost of efficiently operating the Suchhu Hydropower Project (SHPP). The proposed domestic generation tariff is based on a net average annual energy generation of 75.71 GWh after accounting for auxiliary losses. The generation tariff proposal is structured to recover the cost of generation while ensuring operational efficiency.

DGPC submits this proposal to the Electricity Regulatory Authority (ERA) for consideration of the domestic generation tariff for Suchhu.

2. Introduction

With the anticipation of 18MW Suchhu Hydropower Project to be commissioned by February 2025, DGPC is submitting the proposal for the domestic generation tariff application for review and consideration by ERA.

In accordance with the Domestic Electricity Tariff Policy 2016 and the Tariff Determination Regulation 2022, the tariff period is set for 3 years period and tariff determined in line with the parameters set out in the policy and regulation with the returns determined on Net Asset basis. Based on the current policy and regulation, the tariff for Suchhu for the first three years period works out to **Nu. 6.78 per unit** with a 13% royalty and **Nu. 5.90 per unit** with 0% royalty; which is working out to be higher than the domestic tariffs of the existing hydropower plants and proposed domestic tariffs for upcoming other small and large/mega hydropower projects.

A tariff determination mechanism (for export of surplus power) that is adopted for the Government of India (GoI) assisted hydropower projects is to consider the levelized tariff over the period of the concession. The proposed Renewable Energy Policy also recommends levelized tariff with some predetermined escalation and/or fixed tariff over the concession period. The draft RE Policy further recommends that for tariff considerations:

- 1) The value of equity at the time of commissioning of the project shall be maintained throughout the project concession period for determination of Return on Equity (RoE).
- 2) The allowance for RoE should be comparable to that of regional power market and industrial benchmark to attract and sustain investments.

Based on these principles, DGPC proposes adopting a tariff determination mechanism similar to that of GoI assisted projects, featuring a levelized tariff over the project's useful life while maintaining return on equity throughout the concession period. Other tariff determination parameters have been applied in accordance with the prevailing tariff policy and tariff determination regulations as presented below.

3. Parameters Used for Tariff Determination

3.1 Tariff Period

With the proposal of levelized tariff for the project concession period, the tariff period for SHPP is proposed for the period of 30 years starting from February 2025.

3.2 Cost Parameters

3.2.1 Cost of Equity

The Cost of Equity (CoE) of 13.74% has been proposed based on the provisions of the Tariff Policy. The long-term average lending rates of the financial institutions of all sector is 11.24% as given in Table 1. As per the Tariff Policy, ERA could allow a reasonable premium up to a maximum of 250 basis points on the above rates depending on the domestic market situation and gearing ratio applied. With the premium of 250 point, a post-tax cost of equity of 13.74% is proposed.

Table 1: Average long-term lending rates of financial institutions in Bhutan

SN	Financial Institutions	Interest Rate
1	Bhutan Development Bank Limited	10.75%
2	Bank of Bhutan Limited	11.58%
3	Bhutan National Bank Limited	12.10%
4	Tashi Bank Limited	10.72%
5	Druk PNB Limited	10.88%
6	Royal Insurance Corporation Limited	11.83%
7	Bhutan Insurance Limited	12.23%
8	National Pension and Provident Fund (NPPF)	9.83%

Average Rate	11.24%
---------------------	---------------

Source: Interest rates information available on the respective company websites (Interest rates considered term loan above 10 years as long term)

3.2.2 Cost of Debt

The Cost of Debt (CoD) of 10.50% is proposed. This is as per the term loan with local Financial Institutes of Bhutan, the interest rate for loan is 10.50%.

Table 2: Loan Details

Loan particulars	Principle Amount (MNu.)	Interest rate	Repayment period	Loan balance 31.12.2025 (MNu.)	Loan balance 31.12.2026 (MNu.)	Loan balance 31.12.2027 (MNu.)
Financial Institutions of Bhutan	1466.5	10.50%	20 Years	1,442.31	1,415.59	1,386.05

3.2.3 Gearing Ratio

The gearing ratio for the SHPP has been considered 70% in line with the Tariff Policy against the actual gearing ratio of 57%.

3.3 O&M Allowance

The O&M allowance of SHPP has been considered as 1% of the total project cost, which works out to Nu. 25.86 million. O&M efficiency gains of 1% is proposed as new power plant experiences teething problem at the start of operation.

3.3.1 Inflation

The average annual inflation rate of 5.93% based on the average inflation rate for the past three years is proposed. As per Clause 7.4 of the Tariff Policy, the inflation rate used for escalation of O&M expenses shall be based on the historical average inflation rates published by the National Statistics Bureau (NSB). The historical inflation figures are based from the Consumer Price Index bulletin of the NSB for non-food items and calculated as the arithmetic average of the year-on-year inflation rates.

Table 3: Year on Year historical Inflation on Non-Food Item

Year	2021	2022	2023	Average
Inflation figures	6.82%	7.01%	3.96%	5.93%

Source: Consumer Price Index Bulletin, National Accounts and Price Division, National Statistical Bureau.

3.4 Cost of Working Capital

The calculation of the cost of working capital uses the annual inventories and arrears.

3.4.1 Inventories

The inventory value for SHPP have been considered at BHP inventory levels at 51.55 of BHP inventory which amounts to Nu. 14.50 million (*in the ratio of MW = 18/64 * 51.55 = 14.50*) and, an arrear of 30 days has been proposed.

3.4.2 Regulatory Fees and System Operator Charges

The regulatory fees to the ERA of Nu. 0.18 million (Nu. 10,000 per MW) has been added separately in the tariff model as the annual regulatory fee for SHPP. As per the System Operator Charges Regulation 2022, the System Operator charges from the Generation, Transmission, Distribution Licenses and any other users is applicable. As per clause 37 of the regulation, the total cost of System Operator shall be recovered

from Generation, Distribution, and any other users as System Operator charges for the service rendered by System Operator and accordingly shall be allocated as follows:

- 1) Generation = Half (1/2) of total cost of System Operator
- 2) Transmission and Distribution = Half (1/2) of total cost of System Operator

The System Operator cost allocated to generation shall be further allocated to individual Generation Licensee based on the installed capacity (MW). Based on the allocation of the charges to generation, the BPSO cost from SHPP is calculated as Nu. 0.46 million per year.

3.5 Energy Volumes

3.5.1 Annual Energy Volumes

The annual mean generation projected for SHPP is 76.57 GWh. Energy volumes considered for the determination of tariff are 75.71 GWh (SHHP) which is net of auxiliary losses (1.12%) as shown in Table 4. The royalty energy is proposed 0% based on the

Table 4: Energy Volumes for SHPP (GWh)

Year	Values
Annual Energy	76.57
Less: Auxiliary Losses (1.12%)	0.86
Less: Royalty (0%)	0.00
Energy net off Aux. losses and Royalty	75.71

4. Generation Tariffs

The SHPP domestic generation levelized tariff determined using tariff determination mechanism (for export of surplus power) that is adopted for the GoI assisted hydropower projects model works out to Nu. 5.24 per kWh as given below:

5. Conclusion

The tariff proposal has been prepared according to the GoI assisted projects export tariff determination mechanism while also incorporating the provisions from TDR and the Tariff Policy. The proposed tariff will enable SHPP to earn returns as permissible within the Tariff Policy and the regulatory framework. The tariff proposed also need to adequately service the liabilities of the project.

6. Annexures

- 6.1 Annexure I: Project cost details (attached separately)
- 6.2 Annexure II: Tariff Model

08/DGPC/ERA/MD/2025/ 16

February 11, 2025

Chief Executive Officer
Electricity Regulatory Authority
Thimphu.

Subject: Submission of 18MW Suchhu HP Domestic Generation Tariff Proposal

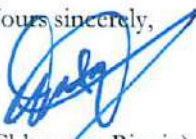
Madam,

The 18 MW Suchhu Hydropower Project (SHPP) is expected to be commissioned within February 2025. In accordance with the Domestic Electricity Tariff Policy 2016 and the Tariff Determination Regulation 2022, the tariff period is set for 3 years period and tariff determined in line with the parameters set out in the policy and regulation with the returns determined on Net Asset basis. Based on the current policy and regulation, the tariff for Suchhu for the first three years period works out to **Nu. 6.78 per unit** with a 13% royalty and **Nu. 5.90 per unit** with 0% royalty. This tariffs are on the higher side when compared to the domestic tariffs of the existing hydropower plants and proposed domestic tariffs for upcoming other small and large/ mega hydropower projects.

A tariff determination mechanism for export of surplus power from the GoI assisted hydropower projects considers the levelized tariff over the period of the concession. The proposed Renewable Energy Policy also recommends levelized tariff with some predetermined escalation and/or fixed tariff over the concession period. Based on these principles, DGPC therefore proposes adopting a tariff determination mechanism similar to that of GoI assisted projects. This allows for a levelized tariff over the project's useful life while maintaining return on equity throughout the concession period. The other tariff determination parameters have been applied in accordance with the prevailing tariff policy and tariff determination regulations. Through this, the levelized generation tariff for Suchhu works out to **Nu. 5.24 per unit**. This has been arrived at by using project generation asset cost of Nu. 2,586.29 million (*inclusive of IDC*). The generation tariff considers a cost of equity as 13.74%, cost of debt of 10.50% and gearing ratio of 70%. A mean annual energy of 76.57 GWh has been considered.

DGPC is submitting herewith the Suchhu Generation Tariff Proposal along with the ERA Tariff Application fee of Nu. 45,000 (Ngultrums Forty-Five Thousand). DGPC would like to request ERA to consider this tariff proposal for the Suchhu hydropower project favourably.

Yours sincerely,



(Chhewang Rinzin)
MD, DGPC

Copies to:

1. Hon'ble Secretary/Chairman DGPC Board, Ministry of Energy and Natural Resources (MoENR), Thimphu
2. Director General, Department of Energy, Thimphu
3. CEO, DHyE for information
4. Director (CSD)/Director (O&MD), DGPC CO for a follow-up action