

# **Bhutan Electricity Authority**



## **Tariff Determination Regulation, 2007**

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## **1 Purpose, scope and commencement**

- 1.1 This regulation shall be cited as the Bhutan Electricity Authority - Tariff Determination Regulation, 2007
- 1.2 The purpose of this regulation is to provide for the determination of electricity prices in accordance with the Electricity Act of Bhutan, 2001.
- 1.3 This regulation shall extend to the whole of the Kingdom of Bhutan.
- 1.4 All distribution, supply, transmission, generation and system operation Licensees shall comply with the provisions in this regulation.
- 1.5 All electricity tariffs for sale of electricity shall comply with the terms of this regulation, except for:
  - i) Import of electricity from other countries;
  - ii) Export of electricity to other countries;
  - iii) Sales of electricity under Power Purchase Agreements, which shall be governed by the licence terms of the Licensee.
- 1.6 The Authority may, in particular cases, give dispensation from this regulation and conditions in Licences awarded by the Authority pursuant to the Electricity Act of Bhutan, 2001.
- 1.7 This regulation shall come into force from 1<sup>st</sup> January 2007
- 1.8 This regulation includes the schedules attached to it, which may be updated by the Authority from time to time, and which form an integral part of this regulation.
- 1.9 The Authority may amend this regulation from time to time as it sees fit.

## **2 Interpretation and definitions**

- 2.1 For the purpose of this regulation, any word or expression used to which a meaning has been assigned in the Electricity Act of Bhutan, 2001, shall have that meaning, unless explicitly indicated in this regulation.
- 2.2 The following words and expressions shall have the meaning ascribed to them:

“Act” means the Electricity Act of Bhutan, 2001;

“Additional Energy” means any electrical energy provided by a generation Licensee to its customers in excess of the Royalty Energy allocated to that generation Licensee;

“Additional Price” means the price in Ngultrum per kWh for Additional Energy;

“Authority” means the Bhutan Electricity Authority;

“Average Price” means a price in Ngultrum per kWh for each Customer Group that is determined by the Authority in its price reviews according to the provisions of this regulation;

“Bhutan Electricity Authority” means the authority of that name established pursuant to Part 2 of the Act;

“Customer Group” means a group of customers, where each Customer Group is defined by the voltage at which supply is provided;

“Design Energy” means the total energy which could be generated in 90% dependable year with 95% installed capacity of the station.

“Gearing Ratio” means the ratio of debt to assets;

“Government” means the Royal Government of Bhutan;

“GWh” means one million kilowatt hours;

“kWh” means kilowatt hour, being a measure of electrical energy;

“Licence” means a licence issued under the provisions of Part 3 of the Act;

“Licensee” means any person issued with a licence pursuant to Part 3 of the Act;

“Minister” means the Minister who is the Head of the Ministry;

“Ministry” means the Ministry which is assigned responsibility for the electricity sector;

“Ngultrum” means the currency of the Kingdom of Bhutan;

“Non-Tariff Revenue” means revenue collected from Customers that does not arise from the sale of electricity, such as application fees, connection fees and meter test fees;

“Power Purchase Agreement” means a bilateral contract dealing with the sale and purchase of power and electrical energy;

“Royalty Energy” means the energy to be provided by a generation Licensee to its customers determined in accordance with this regulation, which is charged at the Royalty Price;

“Royalty Price” means the price in Ngultrum per kWh for Royalty Energy;

“Subsidy” means a financial transfer from one entity to another in order to reduce the cost or price of services;

“Tariff Period” means the period, in a designated number of years, for which the approved tariffs shall apply;

“Tariff Schedule” means the detailed set of charges to be applied by a Licensee to its customers for electricity supply services provided to its customers;

“WACC” means the Weighted Average Cost of Capital determined in accordance with Section 6.6.3.

### **3 General conditions and tariff principles**

- 3.1 No Licensee shall charge any tariff for distribution, supply, transmission, generation or system operation to any other person or entity without the approval of the Authority, with the exception of generation tariffs regulated by power purchase agreements.
- 3.2 Tariffs shall refer to charges levied by the Licensee at specific connection points and shall be independent of distance to the customer.
- 3.3 Tariffs shall be determined according to the following principles, in accordance with Section 14.1 of the Act:
  - i) Fairness to both service customers and service providers;
  - ii) No unjust discrimination against service providers or those who wish to use the services;
  - iii) Reflect the actual cost of efficient business operation;
  - iv) Conducive to efficiency improvement in business operation;
  - v) Enhance efficient and adequate supply to satisfy the domestic demand;
  - vi) Transparency in the determination and presentation of tariffs.
- 3.4 Tariffs shall be publicly announced, and disseminated in such a way that the public can examine the determination of tariffs.
- 3.5 Any deviations from the tariff principles set out in Section 3.3 shall be in accordance with subsidy policies set out by the Minister, and in accordance with this regulation and the Act.

### **4 Tariff approval process**

- 4.1 At least four months prior to expiry of the period for the application of the prevailing tariffs charged by a Licensee, the Licensee shall apply for a revised Tariff Schedule.
- 4.2 A tariff review shall be conducted by the Authority, in accordance with this regulation, and shall result in the determination of Average Prices for each Customer Group.
- 4.3 The Authority shall determine efficiency and productivity targets to be used in tariff determination at each tariff review as set out in the Schedules to this regulation, and may revise the Schedules attached to this regulation at each tariff review.
- 4.4 The Licensee shall co-operate with the Authority in the execution of the tariff review, and shall provide the necessary information to conduct the tariff review.
- 4.5 Public hearing

- 4.5.1 The Authority may hold a public hearing at which the results of the tariff review shall be presented, and the Licensee shall present its application to the public. A notice advertising the public hearing shall be placed in at least one national newspaper at least ten working days prior to the date of the hearing.
- 4.5.2 Where a public hearing is held, the Authority shall allow three weeks following the public hearing for written comments dealing with the tariff application to be submitted.
- 4.5.3 Following consideration of the written comments, and any responses to these comments by the Licensee, the Authority shall either approve or amend the Tariff Schedule applied for by the Licensee.
- 4.6 The Tariff Schedule as approved by the Authority shall be consistent with the Average Prices determined in accordance with this regulation.
- 4.7 The Authority shall set the date on which the new Tariff Schedule shall apply, and the duration of its application, including any indexing or adjustment over this period.
- 4.8 Should for any reason the Authority fail to approve a new Tariff Schedule prior to the expiry of the prevailing Tariff Schedule, the prevailing Tariff Schedule shall be adjusted by the increase over the preceding twelve months in the consumer price index and continue in force until such time a new Tariff Schedule is approved.
- 4.9 Interim tariff applications
  - 4.9.1 Notwithstanding Section 4.7 and Section 5.2, a Licensee may apply to the Authority for an interim tariff adjustment prior to the expiry of the prevailing Tariff Schedules, should the business environment be substantially and significantly different from that assumed when the preceding tariff application was made.
  - 4.9.2 Should the Authority not concur that the business environment has changed in significant and substantial ways, then the interim tariff application shall be declined and the prevailing Tariff Schedule shall remain in force.
  - 4.9.3 Otherwise, the Authority shall consult with affected parties and issue a revised Tariff Schedule that shall come into force on the date determined by the Authority and shall remain in force until the end of the current Tariff Period.
  - 4.9.4 The Authority shall provide a written response to the interim tariff application within sixty (60) days of the application.

## **5 Form of economic regulation**

- 5.1 The Authority shall approve a Tariff Schedule for each Licensee that sets the maximum prices that shall be charged.

- 5.2 The Tariff Schedule so established shall apply for the duration of the Tariff Period, with appropriate indexing or other adjustments over the course of the Tariff Period.
- 5.3 Where the costs of supply are determined by the Authority to be significantly different from prevailing tariffs, the Authority may make suitable transition arrangements in order to ensure tariff stability.
- 5.4 There shall be no reconciliation of revenues accrued against costs incurred in the preceding Tariff Period in the determination of tariffs for the subsequent Tariff Period.
- 5.5 The cost of supply shall provide for an allowance for operating and maintenance costs, and not the actual operating and maintenance costs.
- 5.6 For generation Licensees, the determination of tariffs shall provide for an allowance for auxiliary consumption at the power stations, as well as an allowance for station availability.
- 5.7 For transmission, distribution and supply Licensees, the costs of supply shall provide for an allowance for technical losses, commercial losses and non-payment.

## **6 Cost of supply methodology**

- 6.1 The Authority shall determine the costs of supply for the forthcoming Tariff Period for the Licensee.
- 6.2 The scope of costs shall include: -
  - i) Operating and maintenance costs;
  - ii) Depreciation;
  - iii) A return on fixed assets, including an allowance for company taxation;
  - iv) Power purchases and fuel costs for electricity generation, should either of these be applicable;
  - v) The cost of losses and non-payment of electricity bills;
  - vi) The cost of working capital; and
  - vii) Any regulatory fees, duties or levies that the Licensee is liable to pay under the Laws of Bhutan.
- 6.3 Determination of operating and maintenance costs
  - 6.3.1 The operating and maintenance allowance shall incorporate expenses including but not limited to salaries and wages, transportation expenses, insurance of assets, maintenance expenses, office materials, rentals, consumables and all such expenses that are treated as recurrent costs under standard accounting practices.

- 6.3.2 The determination of the operating and maintenance allowance shall take into consideration historical costs, as adjusted for inflation, incurred by the Licensee; industry benchmarks applicable to the Licensee, as set out in Schedule A; opportunities for efficiency improvements; and may include comparison with benchmarks from comparable utilities in the region.
  - 6.3.3 The determination of the operating and maintenance allowance shall take into consideration additional costs associated with new assets and growth in the customer base, using appropriate industry benchmarks applicable to the Licensee, as set out in Schedule A.
  - 6.3.4 The Authority may include in the operating and maintenance allowance provision for asset write-offs not covered by insurance, and may spread such write-offs over two tariff periods should the extent of the write-off significantly influence the objective of tariff stability.
- 6.4 Determination of asset values
- 6.4.1 Asset values used to determine depreciation charges and the return on net fixed assets shall under normal circumstances be based on historical asset values, and shall not be based on revalued asset values unless the Authority so determines.
  - 6.4.2 In the determination of depreciation and the return on net fixed assets, the Authority shall make allowance for asset additions and asset disposals and other asset value adjustments over the course of the Tariff Period.
  - 6.4.3 The determination of asset additions shall take into consideration the investment plans of the Licensee. These investment plans shall be submitted to the Authority for scrutiny during the tariff review.
  - 6.4.4 In the determination of asset values, the Authority shall allow interest accrued during construction and associated labour costs to be capitalised, in accordance with standard accounting practices.
  - 6.4.5 Where a Licensee replaces components of a capital nature, these components shall be treated as asset additions and not maintenance expenses.
- 6.5 Determination of depreciation
- 6.5.1 The allowance for depreciation shall be based on the economic lifetime of the assets, in accordance with Schedule B, which may be updated by the Authority from time to time.
  - 6.5.2 The allowance for depreciation shall take into consideration asset additions and retirements over the Tariff Period.
  - 6.5.3 Where a Licensee purchases replacement components of a capital nature, including replacement turbines at hydropower generating stations, these components shall be depreciated over the expected economic lifetime of the asset under the specific circumstances of the Licensee.

6.5.4 Under special circumstances, in particular where the financing of a large capital investment imposes a disproportionately high cash burden in the early years of the asset lifetime, the Authority may allow accelerated depreciation. This allowance will only be made where it is necessary to ensure the financial viability of the Licensee.

## 6.6 Determination of return on assets and taxation

6.6.1 The return on assets shall be determined as the product of the WACC, as defined in Section 6.6.3, multiplied by the net asset values at the start of any year.

6.6.2 The net asset values used for the determination of the return on assets shall exclude any assets used for rural electrification purposes that have been paid for by donor grants.

6.6.3 The WACC shall be calculated as the before-tax weighted average cost of capital as follows:

$$WACC = \frac{CoE \times (1 - Gearing)}{(1 - Tax)} + CoD \times Gearing$$

Where,

- WACC is the weighted average cost of capital, as a percentage;
- CoE is the cost of equity, as a percentage; as determined by the Authority for the Licensee;
- Gearing is the standard ratio of debt to total fixed assets, as determined by the Authority, and not the actual gearing ratio of the Licensee;
- CoD is the cost of debt, as a percentage, being the weighted average interest rate of the Licensee's loans, including any major loans that have been fully redeemed, with suitable allowance made for currency risk of any loans not made in local currency, provided that the cost of debt should not exceed reasonable benchmarks;
- Tax is the prevailing rate of company taxation, as a percentage.

6.6.4 Schedule C, to be updated periodically by Authority, presents return allowances to be used for generation, transmission and distribution companies.

## 6.7 Determination of the cost of working capital

6.7.1 The amount of working capital shall include a reasonable allowance for inventories kept by the Licensee and shall be allocated across customer Groups.

6.7.2 The cost of working capital shall be determined as the product of the WACC, as determined in accordance with Section 6.6.3 and the amount of working capital.

- 6.8 Determination of the cost of losses
- 6.8.1 Losses shall take into consideration both technical and commercial losses, and shall be expressed as a Loss Factor being the combination of technical and commercial losses.
  - 6.8.2 Technical losses shall be differentiated for each Customer Group as a function of the voltage level of supply.
  - 6.8.3 A single commercial loss factor shall apply for all Customer Groups.
  - 6.8.4 The cost of losses shall be determined as the product of the Loss Factor, differentiated for each Customer Group, and the marginal cost of power purchases.
- 6.9 The Average Price determined for each Customer Group shall take account of a Collection Rate, common for all Customer Groups, which shall reflect the targeted rate of collections set by the Authority over the Tariff Period.

## **7 Application of subsidies**

- 7.1 The Authority shall implement subsidy policies as determined by the Minister.
- 7.2 As allowed for in Subsection 6.6.2, the Licensee shall not earn a return on any rural electrification assets paid for by capital grants arising from donor agencies.
- 7.3 The Authority may allow a portion of energy generated by Licensees, termed Royalty Energy, to be sold by generation Licensees at a Royalty Price, so as to implement a transfer of subsidy from generation Licensees to customers in accordance with the policy of the Minister.
- 7.4 The Authority, in consultation with the Minister, shall determine which Customer Groups should benefit from the sale of Royalty Energy in the determination of end-user prices, and the extent to which they should benefit.
- 7.5 The tariff structure for household customers shall provide for limited amounts of electricity to be provided at low prices as a special measure to ensure that electricity is affordable to the poor.
- 7.6 Only under special circumstances and as a transition mechanism will the Authority allow cross-subsidies from one Customer Group to another.
- 7.7 Should the Authority, in consultation with the Minister, determine that subsidies to a particular Customer Group shall be reduced or eliminated; appropriate measures shall be taken to reduce or eliminate these subsidies gradually so as to ensure price stability.

## **8 Determination of generation prices**

- 8.1 Determination of the average cost of supply
  - 8.1.1 The total cost of supply for a Licensee in any year shall be determined as

$$TC = OM + DEP + RoA + RoWC$$

Where

- TC is the total cost of supply in million Ngultrum;
- OM is the allowance for operating and maintenance costs in million Ngultrum, including any regulatory and other fees;
- DEP is the allowance for depreciation of assets in million Ngultrum;
- RoA is the return on fixed assets in million Ngultrum, determined as
- $RoA = WACC \times NA$

Where

- WACC is the weighted average cost of capital, as determined in accordance with Section 6.6
- NA is the net value of all fixed assets at the start of the year, in million Ngultrum
- RoWC is the return on working capital in million Ngultrum, determined as
- $RoWC = WACC \times \left[ REV \times \frac{ARREARS}{365} + INVENTORIES \right]$

Where

- WACC is the weighted average cost of capital, as determined in accordance with Section 6.6
- $REV = OM + DEP + RoA$
- ARREARS is the allowed days receivables, in days;
- INVENTORIES is the allowance for inventories, in million Ngultrum.

8.1.2 The annual energy volumes shall be determined as the Design Energy for each power station owned by the Licensee adjusted for auxiliary consumption and availability, determined as follows

$$ENERGY = \sum_i ENERGY_i \times (1 - AUX_i) \times AVAIL_i$$

Where

- ENERGY is the annual energy volume in any year, in GWh;
- ENERGY<sub>i</sub> is the Design Energy, in the case of hydropower, or expected energy production, in the case of thermal power plant, for plant “i”, in GWh;
- AUX<sub>i</sub> is the allowance for auxiliary consumption at plant “i”, as set out in Schedule D, as a percentage;

- AVAIL<sub>i</sub> is the station availability allowance for plant “i” as set out in Schedule D, as a percentage.

8.1.3 The average cost of supply shall be taken as the ratio of the discounted annual costs of supply to the discounted energy volumes, with discounting applied over the Tariff Period using the WACC, as follows

$$AC = \frac{\sum_{n=1}^{TP} TC_n / (1 + WACC)^n}{\sum_{n=1}^{TP} ENERGY_n / (1 + WACC)^n}$$

Where

- AC is the average cost of supply for the Licensee in Ngultrum per kWh;
- TP is the number of years in the Tariff Period;
- TC<sub>n</sub> is the total cost of supply in year “n” in million Ngultrum, as determined in accordance with subsection 8.1.1;
- ENERGY<sub>n</sub> is the energy volume in year “n” in GWh, as determined in accordance with subsection 8.1.2.
- WACC is the weighted average cost of capital, as determined in Section 6.6

## 8.2 Determination of Royalty Price

- 8.2.1 For each Licensee, the Authority shall determine the volume of Royalty Energy to be provided in each month of the calendar year based on the average generation of the Licensee of the past three years. This volume of Royalty Energy over twelve consecutive months in a calendar year shall not exceed fifteen percent of the actual annual energy generated by Licensees, adjusted for auxiliary consumption as per Schedule D of this regulation. *(With first amendment during the 9<sup>th</sup> commission meeting held on 28<sup>th</sup> March 2008)*
- 8.2.2 For each Licensee, the Authority shall determine an amount of subsidy, in consultation with the Minister, to be provided through the Royalty Price in each year of the Tariff Period.
- 8.2.3 The Royalty Price shall then be determined as the average cost of supply less the ratio of the discounted subsidy amounts to the discounted Royalty Energy, with discounting applied over the Tariff Period using the WACC, as follows:

$$RP = AC - \frac{\sum_{n=1}^{TP} SUB_n / (1+WACC)^n}{\sum_{n=1}^{TP} ROYALTY_n / (1+WACC)^n}$$

Where

- RP is the Royalty Price in Ngultrum per kWh;
- AC is the average cost of supply determined in accordance with Section 8.1;
- TP is the number of years in the Tariff Period;
- SUB<sub>n</sub> is the subsidy amount in million Ngultrum in year “n”;
- ROYALTY<sub>n</sub> is the amount of Royalty Energy in year “n”
- WACC is the weighted average cost of capital, as determined in accordance with Section 6.6

### 8.3 Determination of Additional Price

8.3.1 Any energy delivered by a generation Licensee to a distribution Licensee above the Royalty Energy shall be termed as Additional Energy.

8.3.2 The price for Additional Energy, termed as the Additional Price, shall be equal to the Average Cost.

## 9 Determination of end-user prices

9.1 The Authority, in its tariff review undertaken in accordance with Section 4, shall determine an Average Price for each Customer Group applicable for the Tariff Period.

9.2 All customers connected to a common voltage level shall comprise one Customer Group for the purposes of determining Average Prices. Within each Customer Group, the Licensee may create different tariff structures for different customer categories.

### 9.3 Allocation of Network Costs

9.3.1 The total annual network costs of the Licensee shall comprise the sum of the operating and maintenance allowance, any allowances for fees and levies, the allowance for depreciation, and the allowance for return on assets.

9.3.2 Annual network costs allocated to each Customer Group shall comprise a share of each element of the total annual network costs, where the sum of allocations across all Customer Groups shall equal the total annual network costs referred to in subsection 9.3.1, in accordance with the following:

$$\begin{aligned}
NETWORK_C = WACC \times & \sum_i [ASSET_i \times AALLOC_{i,C}] \\
& + \sum_i [DEP_i \times AALLOC_{i,C}] \\
& + \sum_i [OM_i \times OMALLOC_{i,C}] \\
& + FEES \times FALLOC_C
\end{aligned}$$

Where

- NETWORK<sub>C</sub> is the network cost allocated to Customer Group “C”, in million Ngultrum;
- WACC is the Weighted Average Cost of Capital for the Licensee, determined in accordance with Section 6.6, as a percentage.
- ASSET<sub>i</sub> is the net historical value of assets in asset category “i”, in million Ngultrum;
- DEP<sub>i</sub> is the depreciation allowance for assets in asset category “i”, in million Ngultrum;
- OM<sub>i</sub> is operating and maintenance allowance for cost category “i”, in million Ngultrum;
- FEES is the allowance for fees and levies, in million Ngultrum;
- AALLOC<sub>i,C</sub> is the allocation factor to Customer Category “C” for asset-related costs in asset category “i”, as a percentage, where  $\sum_C AALLOC_{i,C} = 1$
- OMALLOC<sub>i,C</sub> is the allocation factor to Customer Category “C” for operating and maintenance costs in cost category “i”, as a percentage, where  $\sum_C OMALLOC_{i,C} = 1$
- FALLOC<sub>C</sub> is the allocation factor for fees, as a percentage, where  $\sum_C FALLOC_{i,C} = 1$

9.3.3 Allocation factors utilised in the allocation of network costs to Customer Groups, are presented in Schedule F, and may be updated by Authority from time to time.

#### 9.4 Allocation of the Cost of Working Capital

9.4.1 The allowance for the cost of working capital shall be determined as the product of the WACC and an allowance for working capital, where the allowance for working capital shall consist of an allowance for arrears and inventories.

9.4.2 The cost of working capital allocated to each Customer Group shall comprise a share of the total cost of working capital, where the sum of allocations across all Customer Groups shall equal the total cost of working capital referred to in subsection 9.4.1, in accordance with the following:

$$WC_C = WACC \times INV \times IALLOC_C$$

Where

- $WC_C$  is the cost of working capital allocated to Customer Group “C” in million Ngultrum;
- WACC is the Weighted Average Cost of Capital for the Licensee, determined in accordance with Section 6.6, as a percentage.
- INV is the allowance for the value of inventories, in million Ngultrum;
- $IALLOC_C$  is the allocation factor to Customer Category “C” for inventories, as a percentage, where  $\sum_C IALLOC_C = 1$ .

## 9.5 Determination of Average Prices

9.5.1 The Power Purchase Price, for determination of Average Prices, shall comprise of the weighted average of purchases from domestic generators at their Additional Price and purchases from imports, at the average import price, as follows:

$$PPP = \frac{\sum_i [AP_i \times DOMESTIC_i]}{\sum_i DOMESTIC_i}$$

Where

- PPP is the Power Purchase Price in Ngultrum per kWh;
- $AP_i$  is the Additional Price for generator “i” in Ngultrum per kWh, as determined according to Section 8.3;
- $DOMESTIC_i$  is the volume of electricity supplied to the Licensee by generator “i”, in GWh;

9.5.2 The cost of supply for a Customer Group in a particular year shall be determined as the sum of energy purchase costs, valued at the Power Purchase Price determined in accordance with subsection 9.5.1, network costs allocated to that Customer Group, the cost of Working Capital allocated to that Customer Group, less any Non-Tariff Revenue from that Customer Group, less any subsidies allocated to that Customer Group, as follows:

$$COST_C = (1 + LOSS_C) \times PPP \times SALES_C + IP \times IMPORT \times IMALLOC_C \\ NETWORK_C + WC_C - REV_C - SUB_C$$

Where

- $COST_C$  is the cost of supply for Customer Group “C”, in million Ngultrum;
- $IP$  is the average import price in Ngultrum per kWh;
- $IMPORT$  is the volume of electricity imported, in GWh;
- $IMALLOC_C$  is the allocation of import costs to Customer Groups, where  $IMALLOC_C$  for the high voltage customer group equals one (1), and  $IMALLOC_C$  for other customer groups equals zero.
- $LOSS_C$  is the sum of technical and commercial losses allocated to Customer Group “C”, as a percentage;
- $PPP$  is the Power Purchase Price, determined in accordance with subsection 9.5.1, in Ngultrum per kWh;
- $SALES_C$  is the sales for the year attributed to Customer Group “C”, in GWh;
- $NETWORK_C$  is the network costs allocated to Customer Group “C”, determined in accordance with Section 9.3, in million Ngultrum;
- $WC_C$  is the cost of working capital attributed to Customer Group “C”, determined in accordance with Section 9.4, in million Ngultrum;
- $REV_C$  is the estimated Non-Tariff revenue for the year arising from Customer Group “C”, in million Ngultrum;
- $SUB_C$  is the amount of subsidy allocated to Customer Group “C”, in million Ngultrum, where the sum of subsidies across all Customer Groups shall not exceed the amount of subsidy referred to in Subsection 8.2.2 plus any surpluses earned on Wheeling services.

9.5.3 The Average Price for a Customer Group shall be determined as the ratio of the discounted costs of supply for that Customer Group to the discounted electricity sales to that Customer Group, where sales are adjusted for an allowed collection rate, and where discounting occurs over the Tariff Period at the WACC applicable to the Licensee, as follows:

$$AP_C = \frac{\sum_{n=1}^{TP} COST_{C,n} / (1+WACC)^n}{\sum_{n=1}^{TP} (SALES_{C,n} \times COLL) / (1+WACC)^n}$$

Where

- $AP_C$  is the Average Price for Customer Group “C”, in Ngultrum per kWh;
- TP is the number of years in the Tariff Period;
- $COST_{C,n}$  is the cost of supply allocated to Customer Group “C” in year “n”, as determined in accordance with subsection 9.5.2; in million Ngultrum;
- $SALES_{C,n}$  is the volumes of electricity sales expected from Customer Group “C” in year “n”, in GWh;
- COLL is the target collection rate set by the Authority for the Licensee, as a percentage;
- WACC is the Weighted Average Cost of Capital for the Licensee, determined in accordance with Section 6.6, as a percentage.

## 9.6 Principles for determining Tariff Schedules

9.6.1 In tariff applications, Licensees shall submit detailed Tariff Schedules, demonstrating that the expected revenue from electricity sales for each Customer Group is consistent with the Average Price for that Customer Group determined according to this regulation.

9.6.2 The following principles shall guide the preparation of Tariff Schedules:

- i) Tariff structures shall ensure affordability for the poor, through the application of low prices for small quantities of electricity;
- ii) Tariff structures may create opportunity for low-cost revenue collection mechanisms in rural areas, including the option of non-metered supplies, provided that such tariff structures also meet the principle (i) above;
- iii) Tariff structures shall provide signals to consumers that improve efficiency of consumption patterns.

**Schedule A: Benchmarks for operating and maintenance costs**

<i>Activity</i>	<i>Benchmark cost</i>
Large hydropower generation	1.0 to 1.5 per cent of capital costs, adjusted by the change in the consumer price index since installation.
Micro and mini hydropower generation	2.5 per cent of capital costs, adjusted by the change in the consumer price index since installation.
Diesel generation	10 per cent of capital costs, adjusted by the change in the consumer price index since installation.
Transmission	1.0 per cent of capital costs, adjusted by the change in the consumer price index since installation.
Distribution and supply	2.0 per cent of capital costs, adjusted by the change in the consumer price index since installation.

*Note: Schedule A may be updated by the Authority from time to time, in accordance with Section 1.8.*

**Schedule B: Depreciation rates**

<i>Sl. No</i>	<i>Type</i>	<i>Sub type</i>	<i>Rate</i>
I	Buildings & land	Buildings	3.33 %
		Civil Structures	
		Land	0.00 %
II	Generation	Civil Works	3.33 %
		Electro-mechanical*	
		Mini and Micro Hydro Installations (<5 MW)	5.00 %
		Diesel Generating Sets	
III	Transmission	>= 220 kV Lines	3.33 %
		132 kV Lines	
		66 kV Lines	
		Transmission Substation Equipment	
IV	Distribution	33 KV Lines	3.33 %
		11 KV Lines	
		6.6 KV Lines	
		LV Lines	
		Distribution Substation Equipment	
V	Vehicles	Heavy Vehicles	15.00 %
		Light and Medium Vehicles	
		Earth Mover	
		Two Wheeler	
VI	Office Equipment	Computers & Accessories	20.00 %
		Printer	
		Photocopier	
		Overhead Projectors	
		Telecommunication Equipment	
		Other Office Equipment	
		Software	
		Furniture	10.00 %
VII	Tools	Tools & Plants	10.00 %
		Fire Fighting Equipment	
		Electrical Equipment	

\* Note that turbine runners should be depreciated over the expected lifetime in the context of the water quality at each specific generator

*Note: Schedule B may be updated by the Authority from time to time, in accordance with Section 1.8.*

**Schedule C: Return allowances**

<i>Activity</i>	<i>Cost of Equity (post-tax)</i>	<i>Cost of Debt</i>	<i>Gearing Ratio</i>
Generation	10 per cent	Actual cost of debt	70 per cent
Transmission	10 per cent	Actual cost of debt	70 per cent
Distribution and supply	10 per cent	Actual cost of debt	70 per cent

*Note: Schedule C may be updated by the Authority from time to time, in accordance with Section 1.8.*

**Schedule D: Allowance for auxiliary consumption and availabilities**

<i>Item</i>	<i>Hydropower generators</i>	<i>Thermal generators</i>
Auxiliary consumption	1.2 per cent	2.5 per cent
Availability	98 per cent	95 per cent

*Note: Schedule D may be updated by the Authority from time to time, in accordance with Section 1.8.*

**Schedule E: Loss allowances**

Loss allowances for three Customer Groups, namely HV, MV and LV are provided below.

<i>Item</i>	<i>HV</i>	<i>MV</i>	<i>LV</i>
Technical losses	1.0 per cent	2.0 per cent	15.0 per cent
Commercial losses	$\frac{0\% \times HVSales + 0\% \times MVSales + 10\% \times LVSales}{HVSales + MVSales + LVSales}$		
Collection rate	$\frac{100\% \times HVSales + 100\% \times MVSales + 90\% \times LVSales}{HVSales + MVSales + LVSales}$		

*Note: Schedule E may be updated by the Authority from time to time, in accordance with Section 1.8.*

**Schedule F: Allocation factors**

The allocation factors for transmission, distribution and supply Licensees are presented below.

<i>Item</i>	<i>Category</i>	<i>Export</i>	<i>HV</i>	<i>MV</i>	<i>LV</i>
<i>AALLOCI,c</i> <i>Allocation of asset-related costs</i>	Embedded generation	0%	0%	0%	100%
	Transmission Substations	0%	65%	15%	20%
	Transmission Lines $\geq 220$ kV	100%	0%	0%	0%
	Transmission lines 66 – 132 kV	0%	65%	15%	20%
	Distribution lines 11 kV – 33 kV	0%	0%	45%	55%
	Distribution lines $\leq 6.6$ kV	0%	0%	0%	100%
	Distribution substations	0%	0%	0%	100%
	Vehicles	20%	50%	15%	15%
	Other	20%	50%	15%	15%
<i>OMALLOCI,c</i> <i>Allocation of operating and maintenance costs</i>	Generation	0%	0%	0%	100%
	Transmission	20%	50%	15%	15%
	Distribution	0%	0%	0%	100%
	Other	20%	50%	15%	15%
<i>IALLOC<sub>C</sub></i>	<i>Allocation of inventories</i>	20%	50%	15%	15%
<i>FALLOC<sub>C</sub></i>	<i>Allocation of fees &amp; levies</i>	20%	50%	15%	15%

*Note: Schedule F may be updated by the Authority from time to time, in accordance with Section 1.8.*