

# **Bhutan Electricity Authority**



## **Tariff Determination Regulation 2016**

## TABLE OF CONTENTS

PRELIMINARY .....	1
GENERAL CONDITIONS AND TARIFF PRINCIPLES.....	2
TARIFF APPROVAL PROCESS.....	3
FORM OF ECONOMIC REGULATION .....	5
COST OF SUPPLY METHODOLOGY.....	6
APPLICATION OF SUBSIDY .....	10
DETERMINATION OF GENERATION PRICES.....	11
DETERMINATION OF END-USER PRICES .....	14
MISCELLANEOUS.....	22
Schedule A: Benchmarks for O&M costs.....	24
Schedule B: Depreciation rates.....	25
Schedule C: Return Allowances .....	26
Schedule D: Allowance for Auxiliary Consumption and Availabilities.....	26
Schedule E: Loss Allowances.....	26
Schedule F: Allocation Factors.....	27
Annexure-I: Public Hearing Procedure .....	28

## **TARIFF DETERMINATION REGULATION 2016**

In exercise of the power vested by Section 11.1(i) (b) of the Electricity Act of Bhutan, 2001; in order to provide for the determination of electricity prices, the Bhutan Electricity Authority hereby adopts the Tariff Determination Regulation 2016 as follows:

### **CHAPTER I PRELIMINARY**

#### **Title and Commencement**

1. This Regulation shall:
  - (1) Be cited as the Tariff Determination Regulation 2016; and
  - (2) Come into force with effect from April 2016.

#### **Scope**

2. This Regulation shall apply to all Licensees including:
  - (1) Generation Licensee;
  - (2) Transmission Licensee;
  - (3) Distribution and Supply Licensee; and
  - (4) System Operation Licensee.
3. Notwithstanding Clause 2 of this Regulation, all electricity tariffs for sale of electricity shall comply with the terms of this Regulation, except for:
  - (1) Import of electricity from other countries;
  - (2) Export of electricity to other countries; and
  - (3) Sale of electricity from generators under Power Purchase Agreements.

#### **Objective**

4. The objective of this Regulation is to provide for the determination of electricity prices in accordance with the Electricity Act of Bhutan, 2001 and the Domestic Electricity Tariff Policy 2016.

#### **Exemption**

5. The Authority may, in particular cases, give dispensation from this Regulation.

#### **Repeal**

6. This Regulation repeals the Tariff Determination Regulation 2007. However, the prevailing Schedules A-F of the Tariff Determination Regulation 2007 shall continue to be in force until updated and notified by the Authority.

**CHAPTER II**  
**GENERAL CONDITIONS AND TARIFF PRINCIPLES**

7. No Licensee shall levy any tariff or charges for generation, transmission, distribution and supply 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.
8. The Licensee shall levy tariffs at specific connection points and tariffs shall be independent of distance to the customer.
9. The Authority shall determine tariffs according to the following principles, in accordance with Section 14.1 of the Electricity Act:
  - (1) Fairness to both service customers and service providers;
  - (2) No unjust discrimination against service providers or those who wish to use the services;
  - (3) Reflect the actual cost of efficient business operation;
  - (4) Conducive to efficiency improvement in business operation;
  - (5) Enhance efficient and adequate supply to satisfy the domestic demand; and
  - (6) Transparency in the determination and presentation of tariffs.
10. The Authority shall announce the tariffs publicly and disseminate in such a way that the public can examine the determination of tariffs.
11. Any deviations from the tariff principles set out in Clause 9 of this Regulation shall be in accordance with subsidy policies of Government.

**CHAPTER III  
TARIFF APPROVAL PROCESS**

12. The Licensee shall submit their investment plans for the upcoming tariff period to the Authority, at least nine months prior to the expiry of the current tariff period.
13. The Licensee shall submit application for a revised Tariff Schedule along with complete set of documents, at least four months prior to the expiry of the current tariff period.
14. The Authority shall review the tariff in accordance with this Regulation, and shall result in the determination of Average Prices for each Customer Group.
15. The Authority shall determine efficiency and productivity targets to be used in tariff determination at each tariff review.
16. The Licensee shall provide the necessary information to conduct the tariff review.
17. The Authority may hold a public hearing in accordance with the Annexure I of this Regulation.
18. The Tariff Schedule as approved by the Authority shall be consistent with the Average Prices determined in accordance with this Regulation.
19. The Authority shall set the date on which the new Tariff Schedule shall apply, and the duration of its application.
20. If the Authority fails to approve a new Tariff Schedule prior to the expiry of the prevailing Tariff Schedule, the prevailing Tariff Schedule may be adjusted by average twelve months consumer price index and continue to be in force until such time a new Tariff Schedule is approved.

**Interim tariff applications**

21. Notwithstanding Clause 19 and Clause 25 of this Regulation, 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 of the licensee be substantially and significantly different from that assumed when the preceding tariff application was made.
22. 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. 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.

23. The Authority shall provide a written response to the interim tariff application within sixty days of the application.

**CHAPTER IV**  
**FORM OF ECONOMIC REGULATION**

24. The Authority shall approve a Tariff Schedule for each Licensee that sets the maximum tariffs that shall be charged.
25. 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.
26. Where the cost of supply for a Customer Group not eligible for subsidy 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.
27. Where the cost of supply for a Customer Group eligible for subsidy are determined by the Authority to be significantly different from prevailing tariffs, the Authority shall recommend a subsidy schedule to Government to ensure tariff stability.
28. 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.
29. The cost of supply shall provide for an allowance for operating and maintenance costs, and not the actual operating and maintenance costs.
30. For generation Licensees, the determination of tariffs shall provide for an allowance for auxiliary consumption at the power stations as well as a target for water utilization.
31. For transmission, distribution and supply Licensees, the costs of supply shall provide for an allowance for technical losses, commercial losses and non- payment.

**CHAPTER V**  
**COST OF SUPPLY METHODOLOGY**

32. The Authority shall determine the costs of supply for the forthcoming Tariff Period for the Licensee.
33. The scope of costs shall include:
- (1) Operation and maintenance costs;
  - (2) Depreciation;
  - (3) A return on fixed assets, including an allowance for company taxation;
  - (4) Power purchases and fuel costs for electricity generation, should either of these be applicable;
  - (5) The cost of losses and non-payment of electricity bills;
  - (6) The cost of working capital; and
  - (7) Any regulatory fees, duties or levies that the Licensee is liable to pay under the Laws of Bhutan.

**Determination of Operation and Maintenance costs**

34. The operation 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.
35. The operation and maintenance allowance shall not include Corporate Social Responsibility expenses.
36. The incomes from rent and hires stemming from activities financed through costs that are included in the historical costs and asset schedule shall be deducted from the allowance.
37. The determination of the operation 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 of this Regulation; opportunities for efficiency improvements; and may include comparison with benchmarks from comparable utilities in the region.
38. The determination of the operation 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 of this Regulation.
39. The operation and maintenance benchmarks for new assets shall be maintained lower than that of older assets.



40. The Authority may include in the operation 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.

### **Determination of Asset Values**

41. Asset values used to determine depreciation charges and the return on net fixed assets shall be based on historical asset values.
42. Assets owned by the Licensees but not in use and/or which are not used for generation, transmission or distribution of electricity shall not be considered for tariff determination. The Licensee shall maintain a register for the assets which fall under the above category and furnish justifications at the time of tariff review.
43. 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.
44. The cost of investments made as per national plans but not utilized on account of the reasons beyond the control of the Licensees, shall be spread out across all customer groups as per Schedule F of this Regulation. The Licensee shall maintain a register for the assets which fall under the above category and furnish justifications at the time of tariff review.
45. The asset additions with regard to hydropower and associated transmission systems including expansion and up-gradation thereof which are not approved by the Department of Hydropower and Power Systems and the asset additions with regard to rural electrification, small/mini/micro hydro 25 MW and below, non-conventional renewable energy resources including expansion and up-gradation thereof not approved by Department of Renewable Energy shall not be considered for tariff determination.
46. 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.
47. In the determination of asset values, the Authority shall allow interest accrued during construction and associated labour costs to be capitalized, in accordance with standard accounting practices.
48. Where a Licensee replaces components of a capital nature, these components shall be treated as asset additions and not maintenance expenses.

### **Determination of Depreciation**

49. The allowance for depreciation shall be based on the economic lifetime of the assets, in accordance with Schedule B of this Regulation.
50. The allowance for depreciation shall take into consideration asset additions and retirements over the Tariff Period.
51. 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.
52. Under circumstances when the Licensees are in difficulty in meeting the debt service obligation, accelerated depreciation may be allowed during the initial debt servicing period. This allowance will only be made where it is necessary to ensure the financial viability of the Licensee.

### **Determination of Return on Assets**

53. The return on assets shall be determined as the product of the Weighted Average Cost of Capital and the net asset values at the start of any year.

### **Determination of the Cost of Working Capital**

54. The amount of working capital shall include a reasonable allowance for inventories and arrears and shall be allocated across Customer Groups.
55. The Authority shall determine the interest on working capital based on the prevailing lowest short term lending rate of a financial institution in Bhutan at the time of the tariff review.
56. The cost of working capital shall be determined as the product of the interest on working capital, as determined in accordance with Clause 55 of this Regulation and the amount of working capital.

### **Determination of the Cost of Losses**

57. The Authority shall determine the losses by taking into consideration both technical and commercial losses, in accordance with Schedule E of this Regulation, and it shall be expressed as a Loss Factor being the combination of technical and commercial losses.
58. Technical losses shall be differentiated for each Customer Group as a function of the voltage level of supply.
59. A single commercial loss factor shall apply for all Customer Groups.

60. 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.
61. 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.

#### **Determination of Allocation Factors**

62. The Authority shall determine the allocation factors for the assets and associated costs like operation and maintenance costs, inventories, fees and levies and system operation shall be allocated to Customer Group based on the following guidelines:
  - (1) Where assets and associated costs are exclusively used by a particular Customer Group, the same shall be allocated fully to this Customer Group;
  - (2) Where assets and associated costs are for export purpose, the entire cost shall be allocated to that Customer Group;
  - (3) Where generation, transmission and distribution assets and their associated costs are meant for joint usage by different Customer Groups, the allocation factor shall be based on capacity demand; and
  - (4) From the above Clauses 62 (1), 62(2) and 62(3) of this Regulation, weighted average allocation factors for all the Customer Groups shall be determined for allocating assets and associated costs that do not fall under the above three items including fees and levies of the Authority.

**CHAPTER VI**  
**APPLICATION OF SUBSIDY**

63. Upon determination of the Average Price for each Customer Group, where the costs of supply for Customer Group eligible for subsidy are determined by the Authority to be significantly different from prevailing tariffs, the Authority shall recommend a subsidy schedule to the Ministry.
64. In recommending the subsidy schedule to the Ministry, the Authority shall be guided by the subsidy allocation principles of the Government.
65. The Authority shall implement subsidies as approved by the Government.

**CHAPTER VII  
DETERMINATION OF GENERATION PRICES**

**Determination of the average cost of supply**

66. The Weighted Average Cost of Capital for the generation Licensee shall be calculated as follows:

$$WACC_g = \frac{CoE_g(1 - Gearing_g)}{1 - Tax} + (CoD_g \times Gearing_g)$$

Where,

- (1)  $WACC_g$  is the weighted average cost of capital for the Generation Licensee “g”, as a percentage;
  - (2)  $CoE_g$  is the cost of equity, as set out in Schedule C of this Regulation, as a percentage for the Generation Licensee “g”;
  - (3)  $Gearing_g$  is the ratio of debt to total net fixed assets, as set out in Schedule C of this Regulation for the Generation Licensee “g”;
  - (4)  $CoD_g$  is the actual cost of debt for the tariff period for the Generation Licensee “g”, as a percentage, being the weighted average interest rate of the Licensee’s loans 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; and
  - (5) Tax is the prevailing rate of company taxation, as a percentage.
67. The total cost of supply for a Generation Licensee in any year shall be determined as:

$$TC_g = OM_g + DEP_g + RoA_g + RoWC_g + FEES_g$$

Where,

- (1)  $TC_g$  is the total cost of supply of the Generation Licensee “g”, in million Ngultrum;
- (2)  $OM_g$  is the allowance for operating and maintenance costs of the Generation Licensee “g”, in million Ngultrum;
- (3)  $DEP_g$  is the allowance for depreciation of assets for the Generation Licensee “g”, in million Ngultrum;
- (4)  $RoA_g$  is the return on fixed assets of the Generation Licensee “g”, in million Ngultrum, determined as:

$$RoA_g = WACC_g \times NA_g$$

Where,

- i)  $WACC_g$  is the weighted average cost of capital for the Generation Licensee “g”, as determined in accordance with Clause 66 of this Regulation; and

ii)  $NA_g$  is the net value of all fixed assets at the start of the year for the Generation Licensee “g”, in million Ngultrum.

(5)  $RoWC_g$  is the return on Working Capital for the Generation Licensee “g”, in million Ngultrum. The return on working capital shall cover the allowance for arrears and inventories, and shall be calculated as follows:

$$RoWC_g = I * \left[ REV_g \times \frac{ARREARS_g}{365} + INVENTORIES_g \right]$$

Where,

- i) I is the interest rate for working capital as determined in Clause 55 of this Regulation;
- ii)  $REV_g = OM_g + DEP_g + RoA_g$
- iii)  $ARREARS_g$  is the allowed days receivables for the Generation Licensee “g”, in days; and
- iv)  $INVENTORIES_g$  is the allowance for inventories for the Generation Licensee “g”, in million Ngultrum.

(6)  $FEES_g$  is the allowance for regulatory fees and levies of the Generation Licensee “g”, in million Ngultrum.

68. The annual energy volumes shall be determined as the mean annual energy generation of the past three years based on 98% water utilization factor to the extent of generation capacity less royalty energy adjusted for auxiliary consumption, determined as follows:

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

Where,

- (1) ENERGY is the annual energy volume in any year, in GWh;
- (2)  $ENERGY_i$  is the average historical mean annual energy generation of the past three years for plant “i”, in GWh;
- (3)  $AUX_i$  is the allowance for auxiliary consumption at plant “i”, as set out in Schedule D of this Regulation, as a percentage; and
- (4)  $ROYALTY_i$  is the free energy which is made available to RGoB by plant “i”, as a percentage.

69. 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  $WACC_g$ , as follows:

$$AC_g = \frac{\sum_{n=1}^{TP} TC_{g,n} / (1 + WACC_g)^n}{\sum_{n=1}^{TP} ENERGY_n / (1 + WACC_g)^n}$$

Where,

- (1)  $AC_g$  is the average cost of supply for the Generation Licensee “g”, in Ngultrum per kWh;
- (2) TP is the number of years in the Tariff Period;
- (3)  $TC_{g,n}$  is the total cost of supply of generation Licensee “g” in year “n” in million Ngultrum, as determined in accordance with Clause 67 of this Regulation;
- (4)  $ENERGY_n$  is the energy volume in year “n” in GWh, as determined in accordance with Clause 68 of this Regulation; and
- (5)  $WACC_g$  is the weighted average cost of capital for the Generation Licensee “g”, as determined in Clause 66 of this Regulation.

**CHAPTER VIII**  
**DETERMINATION OF END-USER PRICES**

70. The Authority, in its tariff review undertaken in accordance with Chapter III of this Regulation, shall determine an Average Price for each Customer Group applicable for the Tariff Period.
71. All customers connected to a common voltage level shall comprise one Customer Group for the purposes of determining Average Prices. Within each Customer Group, different tariff structures for different customer categories may be created by the Licensee to implement the subsidy policies of Government.
72. The Weighted Average Cost of Capital for each Customer Group shall be calculated as follows:

$$WACC_C = \frac{CoE(1 - Gearing_C)}{1 - Tax} + (CoD_C \times Gearing_C)$$

Where,

- (1)  $WACC_C$  is the weighted average cost of capital for the Customer Group “C”, as a percentage;
- (2)  $CoE$  is the cost of equity, as set out in Schedule C of this Regulation, as a percentage for the Licensee;
- (3)  $Gearing_C$  is the ratio of debt to total net fixed assets, as set out in Schedule C of this Regulation for the Customer Group “C”;
- (4)  $CoD_C$  is the actual cost of debt related to assets utilized by the Customer Group “C”, as a percentage, being the weighted average interest rate of the Licensee’s loans 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; and
- (5)  $Tax$  is the prevailing rate of company taxation, as a percentage.

**Allocation of Network Costs**

73. The total annual network costs of the Licensee shall comprise the sum of the allowance for return on assets, the allowance for depreciation, the operating and maintenance allowance and any allowances for fees and levies.
74. 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 Clause 73 of this Regulation, in accordance with the following:



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

Where,

- (1)  $NETWORK_C$  is the network cost allocated to Customer Group “C”, in million Ngultrum;
- (2)  $WACC_C$  is the Weighted Average Cost of Capital for Customer Group “C” for the Licensee, determined in accordance with Clause 72 of this Regulation, as a percentage;
- (3)  $ASSET_i$  is the net historical value of assets in asset category “i”, in million Ngultrum;
- (4)  $DEP_i$  is the depreciation allowance for assets in asset category “i”, in million Ngultrum;
- (5)  $OM_i$  is operating and maintenance allowance for cost category “i”, in million Ngultrum;
- (6)  $FEES$  is the allowance for regulatory fees and levies, in million Ngultrum;
- (7)  $AALLOC_{i,c}$  is the allocation factor to Customer Category “C” for asset-related costs in asset category “i”, as a percentage, where  $\sum_c AALLOC_{i,c}=1$ ;
- (8)  $OMALLOC_{i,c}$  is the allocation factor to Customer Category “C” for operating and maintenance costs in cost category “i”, as a percentage, where  $\sum_c OMALLOC_{i,c}=1$ ; and
- (9)  $FALLOC_C$  is the allocation factor for fees, as a percentage, where  $\sum_c FALLOC_{i,c}=1$

### Allocation of the Cost of Working Capital

75. The allowance for the cost of working capital shall be determined as the interest on an allowance for working capital, where the allowance for working capital shall consist of an allowance for arrears and inventories.
76. The cost of working capital allocated to each Customer Group “C” shall comprise a share of the total cost of working capital, where the sum of allocations across all Customer Groups “C” shall equal the total cost of working capital referred to in Clause 75 of this Regulation, in accordance with the following:

$$RoWC_C = I * \left[ REV_C \times \frac{ARREARS_C}{365} + INVENTORIES \times IALLOC_C \right]$$

Where,

- (1)  $RoWC_C$  is the return on working capital allocated to Customer Group “C” in million Ngultrum;
- (2)  $I$  is the interest rate for working capital as determined in Clause 55 of this Regulation;
- (3)  $REV_C = OM_C + DEP_C + RoA_C$

Where,

- i)  $OM_C$  is the allowance for operating and maintenance costs for the Customer Group “C”, in million Ngultrum;
- ii)  $DEP_C$  is the allowance for depreciation of assets for the Customer Group “C”, in million Ngultrum; and
- iii)  $RoA_C$  is the return on fixed assets for the Customer Group “C”, in million Ngultrum, determined as:

$$RoA_C = WACC_C \times NA_C$$

Where,

- a)  $WACC_C$  is the weighted average cost of capital for the Customer Group “C”, as determined in accordance with Clause 72 of this Regulation, as a percentage; and
  - b)  $NA_C$  is the net value of all fixed assets at the start of the year for the Customer Group “C”, in million Ngultrum.
- (4)  $ARREARS_C$  is the allowed days receivables for the Customer Group “C”, in days;
  - (5)  $INVENTORIES_C$  is the allowance for the value of inventories, in million Ngultrum; and
  - (6)  $IALLOC_C$  is the allocation factor to Customer Group “C” for inventories, as a percentage, where  $\sum_C IALLOC_{i,c}=1$ .

### **Allocation of Cost of System Operator**

- 77. The System Operator Cost shall be allocated to the customer categories based on energy consumption or wheeled, in accordance with Schedule F of this Regulation.
- 78. The WACC for the System Operator Licenses shall be calculated as follows:

$$WACC_S = \frac{CoE(1 - Gearing_S)}{1 - Tax} + (CoD_S \times Gearing_S)$$

Where,

- (1)  $WACC_S$  is the weighted average cost of capital for the System Operator Licensee, as a percentage;
- (2)  $CoE$  is the cost of equity, as set out in Schedule C of this Regulation, as a percentage for the Licensee;
- (3)  $Gearing_S$  is the ratio of debt to total net fixed assets, as set out in Schedule C of this Regulation, as a percentage for the System Operator Licensee;
- (4)  $CoD_S$  is the actual cost of debt for assets used by the System Operator Licensee as a percentage, being the weighted average interest rate of the Licensee’s loans 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; and
- (5)  $Tax$  is the prevailing rate of company taxation, as a percentage.

79. The total cost for the System Operator Licensee in any year shall be determined as:

$$TC_S = OM_S + DEP_S + RoA_S + RoWC_S$$

Where,

- (1)  $TC_S$  is the total cost of supply of the System Operator Licensee, in million Ngultrum;
- (2)  $OM_S$  is the allowance for operating and maintenance costs of the System Operator Licensee, in million Ngultrum, including any regulatory and other fees;
- (3)  $DEP_S$  is the allowance for depreciation of assets of the System Operator Licensee, in million Ngultrum;
- (4)  $RoA_S$  is the return on fixed assets of the System Operator Licensee, in million Ngultrum, determined as:

$$RoA_S = WACC_S \times NA_S$$

Where,

- i)  $WACC_S$  is the weighted average cost of capital for the System Operator, as determined in Clause 78 of this Regulation; and
  - ii)  $NA_S$  is the net value of all the fixed assets at the start of the year for the System Operator Licensee, in million Ngultrum.
- (5)  $RoWC_S$  is the return on Working Capital for the System Operator Licensee, in million Ngultrum. The return on working capital shall cover the allowance for arrears and inventories, and shall be calculated as follows:

$$RoWC_S = I * \left[ REV_S \times \frac{ARREARS_S}{365} + INVENTORIES_S \right]$$

Where,

- i)  $I$  is the interest rate for working capital as determined in Clause 55 of this Regulation;
- ii)  $REV_S = OM_S + DEP_S + RoA_S$ ;
- iii)  $ARREARS_S$  is the allowed days receivables for the System Operator Licensee, in days; and
- iv)  $INVENTORIES_S$  is the allowance for inventories for the System Operator Licensee, in million Ngultrum.

80. The Cost of System Operator shall be allocated to each Customer Group accordance with the following formula:

$$SOC_C = TC_S \times SOALLOC_C$$

Where,

- (1)  $SOC_C$  is the cost of System Operator Licensee allocated to Customer Group “C”;
- (2)  $TC_S$  is the total cost of the System Operator Licensee as determined in accordance with Clause 79 of this Regulation; and
- (3)  $SOALLOC_C$  is the allocation factor to Customer Group “C” for System Operator related costs, as a percentage, where  $\sum_c SOALLOC_{i,c} = 1$ .

### **Determination of domestic Power Purchase Price (PPP)**

81. Upon determination of the domestic energy demand for the tariff period, the generation plants fully owned by Government as of 2015 shall be first allocated for domestic supply.
82. For the determination of the power purchase price from the generation plants fully owned by Government as of 2015, the weighted average generation cost shall be utilized.
83. In the event the fully owned Government plants as of 2015 are not able to meet the domestic demand, the plants with lowest cost of generations shall be selected to supplement the energy.
84. In the event of inadequate generation from all the fully Government owned plants to meet the domestic demand, the plants not fully owned by the Government with the lowest off-take rate shall be selected to supplement the energy.
85. The domestic Power Purchase Price, for determination of Average Costs, shall comprise of the weighted average of purchases from domestic generation plants at their Average Cost, as follows:

$$PPP = \frac{AC_{e,g} \times DOMESTIC_{e,g} + \sum_i [AC_{n,g} \times DOMESTIC_{n,g}]}{DOMESTIC_{e,g} + \sum_i DOMESTIC_{n,g}}$$

Where,

- (1) PPP is the domestic Power Purchase Price in Ngultrum per kWh;
- (2)  $AC_{e,g}$  is the Weighted Average Cost of generation for the existing plants “e,g” as of 2015, calculated in accordance with Clause 69 of this Regulation;
- (3)  $AC_{n,g}$  is the Average Cost for each new generation plant “n,g” in Ngultrum per kWh;
- (4)  $DOMESTIC_{e,g}$  is the volume of electricity supplied to the Licensee by the existing generation plants “e,g” in GWh; and
- (5)  $DOMESTIC_{n,g}$  is the volume of electricity supplied to the Licensee by each new generation plant “n,g”, in GWh.

## Determination of Average Costs

86. 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 domestic Power Purchase Price determined in accordance with Clause 85 of this Regulation, import price, network costs allocated to that Customer Group, the cost of Working Capital allocated to that Customer Group, System Operator cost less any Non-Tariff Revenue from that Customer Group, as follows:

$$COST_C = (1 + LOSS_C) \times PPP \times SALES_C + IP \times IMPORT \times IMALLOC_C + NETWORK_C + RoWC_C + SOC_C - NTR_C$$

Where,

- (1)  $COST_C$  is the cost of supply for Customer Group “C”, in million Ngultrum;
  - (2)  $LOSS_C$  is the sum of technical and commercial losses allocated to Customer Group “C” as set out in Schedule E of this Regulation, as a percentage;
  - (3)  $PPP$  is the domestic Power Purchase Price, determined in accordance with Clause 85 of this Regulation, in Ngultrum per kWh;
  - (4)  $SALES_C$  is the sales for the year attributed to Customer Group “C”, in GWh;
  - (5)  $IP$  is the average import price in Ngultrum per KWh;
  - (6)  $IMPORT$  is the volume of electricity imported by the Transmission and Distribution Utility, in GWh;
  - (7)  $IMALLOC_C$  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;
  - (8)  $NETWORK_C$  is the network costs allocated to Customer Group “C”, determined in accordance with Clause 74 of this Regulation, in million Ngultrum;
  - (9)  $RoWC_C$  is the return on Working Capital allocated to Customer Group “C”, determined in accordance with Clause 76 of this Regulation, in million Ngultrum;
  - (10)  $SOC_C$  is the cost of System Operator allocated to Customer Group “C”, determined in accordance with Clause 80 of this Regulation, in million Ngultrum; and
  - (11)  $NTR_C$  is the estimated Non-Tariff Revenue for the year arising from Customer Group “C”, in million Ngultrum.
87. 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 Customers, as follows:

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

Where,

- (1)  $AP_C$  is the Average Price for Customer Group “C”, in Ngultrum per kWh;
- (2) TP is the number of years in the Tariff Period;
- (3)  $COST_{C,n}$  is the cost of supply allocated to Customer Group “C” in year “n”, as determined in accordance with Clause 86 of this Regulation in million Ngultrum;
- (4)  $SALES_{C,n}$  is the volumes of electricity sales expected from Customer Group “C” in year “n”, in GWh;
- (5) COLL is the target collection rate set by the Authority for the Licensee, as a percentage; and
- (6)  $WACC_C$  is the Weighted Average Cost of Capital for the Customer Group “C”, as determined in accordance with Clause 72 of this Regulation, as a percentage.

#### **Allocation of net import cost for import through generation licensee**

88. Any net monthly import cost to meet the shortfall of domestic supply shall be allocated to HV customers on a monthly basis. The monthly import cost shall be determined as follows:

$$IC_{i,n} = IMPORT_n \times \frac{SALES_{i,n}}{SUMSALES_n}$$

Where,

- (1)  $IC_{i,n}$  is the monthly import cost allocated to the HV Customers “i” in a month “n”, in Ngultrum;
- (2)  $IMPORT_n$  is the cost of net electricity imported by generation licensee in a month “n”, in Ngultrum;
- (3)  $SALES_{i,n}$  is the volumes of electricity sales attributed to the HV customers “i” in a month “n”, in GWh; and
- (4)  $SUMSALES_n$  is the sum of electricity sales to all HV customers in a month “n”, in GWh.

### **Principles for determining Tariff Schedules**

89. In preparation of the Tariff Schedules, the Licensees shall be guided by the Clause 7.14 of the Domestic Electricity Tariff Policy 2016.
90. In the 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. Any subsidies required to achieve the tariffs in the schedule shall be shown in Ngultrum per kWh per customer category.

## CHAPTER IX MISCELLANEOUS

### **Amendment**

91. The Authority may amend this Regulation from time to time as it deems fit.

### **Definition**

92. In this Regulation unless the context otherwise provides:

- (1) **“Act”** means the Electricity Act of Bhutan, 2001;
- (2) **“Authority”** means the Bhutan Electricity Authority;
- (3) **“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;
- (4) **“Bhutan Electricity Authority”** means the authority of that name established pursuant to Part 2 of the Act;
- (5) **“Customer Group”** means a group of customers, where each Customer Group is defined by the voltage at which supply is provided;
- (6) **“Domestic Supply”** means the generation, transmission or distribution of electricity for domestic consumption by way of the generation, transmission or distribution system respectively;
- (7) **“Gearing Ratio”** means the ratio of debt to total net fixed assets;
- (8) **“Government”** means the Royal Government of Bhutan;
- (9) **“GWh”** means one million kilowatt hours;
- (10) **“kWh”** means kilowatt hour, being a measure of electrical energy;
- (11) **“Licence”** means a licence issued under the provisions of Part 3 of the Act;
- (12) **“Licensee”** means any person issued with a licence pursuant to Part 3 of the Act;
- (13) **“Minister”** means the Minister who is the Head of the Ministry;
- (14) **“Ministry”** means the Ministry which is assigned responsibility for the electricity sector;



- (15) **“Ngultrum”** means the currency of the Kingdom of Bhutan;
- (16) **“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;
- (17) **“Power Purchase Agreement”** means a bilateral contract dealing with the sale and purchase of power and electrical energy;
- (18) **“Royalty Energy”** means the energy to be provided by a generation Licensee to the Royal Government of Bhutan of free of charges;
- (19) **“System Operator”** means the person/s designated by the Authority, whose function is defined under Section 39 of the Electricity Act of Bhutan, 2001;
- (20) **“Subsidy”** means a financial transfer from one entity to another in order to reduce the cost or price of services;
- (21) **“Tariff Period”** means the period, in a designated number of years, for which the approved tariffs shall apply;
- (22) **“Tariff Schedule”** means the detailed set of charges to be applied by a Licensee for provision of electricity supply services; and
- (23) **“WACC”** means the Weighted Average Cost of Capital determined in this Regulation.

**Schedule A: Benchmarks for O&M costs**

<i>Activity</i>	<i>Benchmark cost</i>
Large hydropower generation	1.0 to 1.5 percent of capital cost, adjusted by the change in the consumer price index since installation.
Micro and mini hydropower generation	2.5 percent of capital cost, adjusted by the change in the consumer price index since installation.
Diesel generation	10 percent of capital cost, adjusted by the change in the consumer price index since installation.
Transmission	1.0 percent of capital cost, adjusted by the change in the consumer price index since installation.
Distribution	3.0 percent of capital cost, adjusted by the change in the consumer price index since installation.
Others	2.0 percent of capital cost, adjusted by the change in the consumer price index since installation.

**Schedule B: Depreciation rates**

<i>SI. 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

**Schedule C: Return Allowances**

<i>Activity</i>	<i>Cost of Equity</i>	<i>Cost of Debt</i>	<i>Gearing Ratio</i>
Generation	10 per cent	Actual cost of debt	40-70 per cent
Transmission	10 per cent	Actual cost of debt	40-70 per cent
Distribution and Supply	10 per cent	Actual cost of debt	40-70 per cent

**Schedule D: Allowance for Auxiliary Consumption and Availabilities**

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

**Schedule E: Loss Allowances**

Loss allowances for the Customer Groups, namely Export Wheeling, HV, MV and LV are provided below:

<i>Item</i>	<i>HV</i>	<i>MV</i>	<i>LV</i>
Technical losses	2.0 per cent	2.5 per cent	12.0 per cent
Commercial Losses	1.05%	1.05%	1.05%
Collection rate	100%	100%	100%

**Schedule F: Allocation Factors**

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

<i>Items</i>	<i>Category</i>		<i>Export</i>	<i>HV</i>	<i>MV</i>	<i>LV</i>	
AALLOC <sub>i,c</sub> Allocation of Asset related Costs	Buildings & land		20%	50%	15%	15%	
	Generation	Mini/micro hydels	0%	0%	0%	100%	
	Transmission	Civil structures		20%	50%	15%	15%
		400+ kV lines		100%	0%	0%	0%
		220 kV lines		55%	45%	0%	0%
		132 kV lines		50%	33%	7%	10%
		66 kV lines		0%	70%	10%	20%
		Substations		0%	79%	6%	15%
		Meters		20%	50%	15%	15%
		Distribution	Civil structures		20%	50%	15%
	33 kV lines		0%	0%	45%	55%	
	11 kV lines		0%	0%	45%	55%	
	6.6 kV lines		0%	0%	0%	100%	
	L V lines		0%	0%	0%	100%	
	Substations/transformer		0%	0%	0%	100%	
	Meters		0%	0%	0%	100%	
	Others		20%	50%	15%	15%	
OM AALOC <sub>i,c</sub> Allocation of O & M Costs	Generation		0%	0%	0%	100%	
	Transmission		20%	50%	15%	15%	
	Distribution		0%	0%	15%	85%	
	Other		20%	50%	15%	15%	
IAALOC <sub>i,c</sub> , Allocation of Inventories			20%	50%	15%	15%	
FAALOC <sub>i,c</sub> , Allocation of Fees & Levies			20%	50%	15%	15%	

## **Annexure-I: Public Hearing Procedure**

### **CHAPTER I PRELIMINARY**

#### **Title, Extent and Commencement**

1. These procedure shall:
  - (1) Be cited as Public Hearing Procedure;
  - (2) Apply to licensees and electricity consumers; and
  - (3) Come into force with effect from 1<sup>st</sup> March 2016.

#### **Purpose**

2. This procedure is to outline the procedures for conducting the public hearing for electricity tariff determination in line with Bhutan Electricity Authority – Tariff Determination Regulation 2016, whenever the Bhutan Electricity Authority decides to conduct a public hearing for tariff determination.
3. This procedure is to provide an opportunity for licensees to present their electricity tariff application and to allow consumers to raise their views and comments over the licensees' electricity tariff applications.

#### **Supersession**

4. Any procedure with respective to the public hearing adopted by the Bhutan Electricity Authority shall be superseded by this public hearing procedure.

#### **Authority for Amendment**

5. This public hearing procedure shall be amended as and when deemed necessary by the Authority.

## **CHAPTER II PRE-PUBLIC HEARING PROCEDURE**

### **Tariff Application**

6. The Licensee shall submit the tariff application to the Bhutan Electricity Authority as per the provisions of the Tariff Determination Regulation 2016.
7. The Bhutan Electricity Authority shall undertake preliminary review of the tariff application submitted by the Licensees and accordingly, inform Licensees to submit further information/data required, if any.

### **Notice of Public Hearing**

8. The Bhutan Electricity Authority shall upload the tariff application of the Licensees on its website at least twenty one calendar days prior to the public hearing.
9. The Bhutan Electricity Authority shall notify the actual date of public hearing in at least two widely circulated national newspapers including national TV and BEA's website twenty one (21) calendar days prior to the public hearing. The notification shall contain the following information but not limited to:
  - (1) Information from where the Bhutan Electricity Authority – Public Hearing Procedure for Electricity Tariff Determination and registration form(s) can be downloaded.
  - (2) Email address, mail address and fax number for the submission of the form.
10. The Bhutan Electricity Authority shall notify the venue and time of the public hearing in at least two widely circulated national newspapers, national TV and BEA's website at least three calendar days prior to the public hearing.
11. The rescheduling of venue, time and date of the public hearing shall not be undertaken unless some untoward emergency situation occurs and shall be notified to the public through at least one widely circulated national newspaper and national TV as soon as possible.

### **Registration**

12. The participants who wish to attend the public hearing shall submit the duly filled registration **form A** to Bhutan Electricity Authority by e-mail/mail or fax.
13. The registration for the public hearing will be closed for the participants in seven calendar days prior to the public hearing.
14. The interested participants/consumer group wishing to make a presentation before a public hearing shall submit the duly filled registration **form B** by e-mail/mail or fax to Bhutan Electricity Authority at least ten calendar days prior to the public hearing. The participants/consumer group shall submit the presentation copy (hard and soft) along with the duly filled registration **form B**.

15. The selected participants/consumer group for the presentation will be informed through email/phone at least three calendar days prior to the public hearing.
16. Only the registered individuals and parties shall be allowed to attend the public hearing. The Bhutan Electricity Authority may, however, limit the number of participants to a manageable size upon ensuring that all consumer groups are represented for effective public hearing on first-come-first served basis. The consumers shall be categorized within one of the following groups:
  - (1) Low voltage consumers;
  - (2) Medium voltage consumers; and
  - (3) High voltage consumers.



## **CHAPTER III PUBLIC HEARING PROCEDURE**

### **General Procedures**

17. The public hearing shall be presided over by the Chairman of the Bhutan Electricity Authority and in his absence it shall be presided over by any other member of the Commission appointed by the Bhutan Electricity Authority as a Chairman for that purpose.
18. The quorum required of the Bhutan Electricity Authority Commission for the public hearing shall be at least two-third.
19. The Chairman of the public hearing shall announce the rules of proceedings to ensure order in the house.
20. In order to expedite the public hearing proceedings, participant may nominate a representative to voice their common concerns or issues on behalf of consumer group.
21. All participants raising queries or expressing views shall identify themselves and clarify who they are representing.
22. All queries and expressed views shall be substantive and relevant to the tariff application. The Chairman shall intervene in any irrelevant or repetitive queries and views being expressed at the public hearing.
23. The Bhutan Electricity Authority shall conduct only the hearing and shall neither engage in any debate nor take part in any discussion on the tariff application or the preliminary tariff review result during the public hearing.
24. No other than Bhutan Electricity Authority shall record and maintain the public hearing proceeding.
25. When the public hearing is officially declared closed by the Chairman, no further comments and questions shall be taken into consideration.

### **Presentation by Licensees**

26. The Licensees shall present its tariff application before the public and the said presentation shall not last more than 45 minutes.

### **Presentation by Consumers**

27. The Bhutan Electricity Authority shall select one presentation from each consumer group for end user tariff application and one presentation for generation tariff application.
28. The selected presentation of the participants shall present their presentation before a public hearing. The presentation shall not last more than 45 minutes.

## **CHAPTER IV POST PUBLIC HEARING**

### **Comments and Clarifications**

29. Any written comments shall be addressed to the Chief Executive Officer, Bhutan Electricity Authority, Post Box No. 1557, Thimphu within twenty one calendar days from the date of public hearing. Any comments received after twenty one calendar days shall not be entertained.
30. The Bhutan Electricity Authority may forward some of the relevant comments/queries to the Licensee for appropriate response(s).
31. The Bhutan Electricity Authority shall not provide any individual response to the written comments and queries raised.
32. The comments received during the public hearing and responses to the comments of consumer(s) by the licensee shall be taken into consideration during the tariff review process.

<b>REGISTRATION FORM FOR PUBLIC HEARING</b>	
1. Full Name	
2. CID No./Work permit No/Visa No.	
3. Organization (individuals please write 'self')	
4. Present Address	
5. Email Address	
6. Contact Number	a. Mobile: ..... b. Phone: .....

7. Please tick the hearing you want to attend

- BPC Public Hearing Only                       DGPC Public Hearing Only  
 Both DGPC and BPC Public Hearings

8. Consumer Category

- Low Voltage (upto 400V)                       Medium Voltage (6.6/11/33 kV)  
 High Voltage (66kV and above)

Date: \_\_\_\_\_

Applicant Signature

**FORM B**

<b>REGISTRATION FORM FOR MAKING PRESENTATION AT PUBLIC</b>	
1. Full Name	
2. CID No. CID No./Work permit No/Visa No.	
3. Organization (individuals please write 'self')	
4. Present Address	
5. Email Address	
6. Contact Number	a. Mobile: ..... b. Phone: .....

7. Please select the presentation you want to make at the public hearing:

- Low Voltage (up to 400V)
- Medium Voltage (6.6/11/33kV)
- High Voltage (66kV and above)
- Generation

Date: \_\_\_\_\_

Applicant Signature