



MULTI YEAR TARIFF METHODOLOGY
for
SERVICE PROVIDERS
in the
ELECTRICITY SUPPLY INDUSTRY

May 2021

LDS

TABLE OF CONTENTS

| | |
|------------------------------------------------------------------|-----------|
| SECTION 1: ABOUT THIS DOCUMENT | 1 |
| 1.1 INTRODUCTION | 1 |
| 1.2 LEGAL OBLIGATIONS..... | 1 |
| SECTION 2: DEFINITIONS | 2 |
| MULTI YEAR TARIFF METHODOLOGY | 5 |
| SECTION 3: GENERAL PRINCIPLES AND APPROACHES | 5 |
| 3.1 SCOPE OF THE TARIFF METHODOLOGY | 5 |
| 3.2 PRINCIPLES OF THE TARIFF METHODOLOGY..... | 5 |
| 3.3 REGIME FOR TARIFF REGULATION IN LIBERIA | 6 |
| 3.4 DURATION OF TARIFFS AND TARIFF METHODOLOGY | 6 |
| SECTION 4: REVENUE REQUIREMENT | 6 |
| SECTION 5: LONG RUN MARGINAL COST | 7 |
| SECTION 6: EFFICIENT COSTS | 8 |
| 6.1 UNCONTROLLABLE EXPENSES | 8 |
| 6.2 CONTROLLABLE EXPENSES | 8 |
| SECTION 7: REGULATED ASSET BASE (RAB) | 8 |
| SECTION 8: WEIGHTED AVERAGE COST OF CAPITAL (WACC) | 9 |
| SECTION 9: SERVICE PERFORMANCE | 10 |
| SECTION 10: RISK MANAGEMENT MECHANISMS | 11 |
| 10.1 MAJOR REVIEWS | 11 |
| 10.2 TRIGGER FOR REOPENERS..... | 11 |
| 10.3 MINOR REVIEWS | 11 |
| 10.4 CLAW-BACK MECHANISM | 11 |
| SECTION 11: PROVISIONS FOR SELF-SUPPLY BY LARGE CONSUMERS | 11 |
| SECTION 12: PROVISIONS FOR MICRO-UTILITIES | 12 |
| 12.1 TARIFF SETTING METHODOLOGY FOR MICRO UTILITIES..... | 12 |
| SECTION 13: TARIFF SCHEDULES | 12 |

LDS

SECTION 1: ABOUT THIS DOCUMENT

This document:

- Sets out the regulatory framework and tariff methodology for the determination of electricity tariffs in Liberia; and
- Provides guidelines to service providers or operators on the processes to be followed for new electricity tariffs application, modification of existing tariff arrangements, and tariff adjustments. Tariff charges are payable by all consumer types - industrial, commercial and residential.

1.1 INTRODUCTION

The Liberia Electricity Regulatory Commission (Commission) is an independent electricity sector regulator established by Section 13 of the Electricity Law of 2015 (2015 ELL). Section 3.3 of the 2015 ELL mandates the Commission to, among other functions, license electricity operators and regulate tariffs. Regulating tariff involves the determination of revenue requirements and approving tariffs for operators in the electricity sector.

On Tariff Methodology, Section 8.2 of 2015 ELL prescribes that the methodology shall include appropriate incentives, both positive and negative, for performance, compliance with all applicable standards, and efficient operations. The regulated service providers are expected to propose tariffs to the Commission in accordance with the Tariff Methodology that is approved by the Regulator.

This Tariff Methodology is developed as part of the Commission's regulatory instruments in the exercise of its oversight of the electricity sector of Liberia.

1.2 LEGAL OBLIGATIONS¹

The following sections of the 2015 ELL provide the regulatory framework and offer specific guidelines for tariff determination in the Liberia Electricity Supply Industry (LESI):

1. Section 3.3 mandates the Regulator to *“regulate tariffs and issue regulations designed to implement this law.”* It further states that the Regulator *“may require audited financial statements from licensees”*.
2. Section 8.1 on Tariff Principles mandates that tariffs approved by the Regulator *“a) must enable an efficient licensee to recover the full cost of its licensed activities, including a reasonable margin or return; and b) must*

¹ 2015 Electricity Law of Liberia Act

| | |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| “Charge” | The amount of money required for electricity Service; |
| “Clawback” | An adjustment of the audited financial results of an operator to reflect the prior decision of the Commission; |
| “Commission/Regulator” | The Liberia Electricity Regulatory Commission; also known as the Regulator; |
| “Distribution” | The process of delivering electric energy from convenient points on the transmission system (usually a substation) to consumers at a voltage specified by the Regulator; |
| “Depreciation” | An accounting tool for allocating cost over the service life of a physical asset; |
| “Equity Beta” | Is a co-efficient indicating the degree of correlation between the market returns and the return on an asset at different levels of a company’s debt; |
| “Generation” | The large-scale production of electricity from primary source(s) of energy; |
| “IBT” | Inclining Block Tariffs (IBT) are unit prices that are constant over some range of customer consumption but are higher at higher levels of consumption; |
| “Market Beta” | The variability for company returns against the composite market return; |
| “Price” | Amount of money charged or paid for electricity or its services; |
| “Regulatory Asset Base” | The regulatory asset value on which the allowed rate of return or Weighted Average Cost of Capital (WACC) is earned; |

| | |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| “Regulatory Levy” | A charge imposed on service providers by the Regulator subject to Legislative approval; |
| “Risk Free Return” | The return on a long-term government bond where the possibility of default is minimal; |
| “Service Provider” | A Licensee or Permit Holder. Also known as Operator; |
| “Self-supply” | Supplying electricity for one’s own use directly from self-generation; |
| “Tariff” | Electricity pricing, including related charges such as, but not limited to, connection charges; |
| “Tariff adjustment” | A change in the level or structure of charges that a service provider offers to customers; |
| “Tariff Review” | A regulatory evaluation of tariffs to inform a decision by the Board of Commissioners of LERC; |
| “Tariff Structure” | A set of different charges contained in a tariff that is offered to customers by an operator; |
| “Triggers for Reopeners” | The threshold at which the Commissioner considers a reopening of the control or where an outright reopener of the control would take place. |
| “WACC” | The Weighted Average Cost of Capital also known as the allowed Rate of Return is an average representing the expected return on all of a company’s securities, i.e. debts and equities. |

MULTI YEAR TARIFF METHODOLOGY

SECTION 3: GENERAL PRINCIPLES AND APPROACHES

3.1 SCOPE OF THE TARIFF METHODOLOGY

Consistent with Section 8.3 of the 2015 ELL, this Tariff Methodology shall be used to regulate tariffs for the following regulated activities of the electricity supply industry of Liberia:

- Generation;
- Self-Supply;
- Transmission Network Owner;
- Transmission System Operator;
- Distribution;
- Trading or Supply;
- Export;
- Import;
- Micro – utilities
 - Grid connected service providers
 - Off- grid isolated service providers

For vertically integrated structures, generation, transmission and distribution will be regulated as ring-fenced activities with accounting separation. Regulated generation and transmission costs will be a pass-through into distribution retail tariffs.

3.2 PRINCIPLES OF THE TARIFF METHODOLOGY

Section 8.1 of the 2015 ELL provides clear guidance on the principles to consider in the determination of tariffs. It states:

1. License conditions determined under this law relating to the setting or approval of tariffs:
 - a. Must enable an efficient licensee to recover the full cost of its licensed activities, including a reasonable margin or return;
 - b. Must provide for or prescribes incentives for continued improvement of the technical and economic efficiency with which services are to be provided;
 - c. Must give end users proper information regarding the costs that their use imposes on the licensee's business;

- d. Must avoid undue discrimination; and
 - e. May permit the subsidy of tariffs to certain classes of customers.
2. A licensee may not charge a customer any other tariff and make use of provisions in agreements other than that determined or approved by the Regulator as part of licensing conditions.
 3. Notwithstanding subsection (2), the Regulator may, in prescribed circumstances, approved a deviation from set or approved tariffs.

3.3 REGIME FOR TARIFF REGULATION IN LIBERIA

A hybrid price cap approach that incorporates features of rate of return and incentive-based regulations, is adopted for the tariff methodology in Liberia. This approach is selected due to the specific guidance provided by the law for the determination of tariffs. The law requires:

- a predetermined annual inflation adjustment of controllable costs
- a predetermined list of uncontrollable costs approved by the Board of Commissioners and are subject to an annual automatic cost adjustment.
- a performance based regulation that provides positive incentives to compensate for the reduction of system losses (technical and commercial) or penalties for poor performance, improvements in service quality and reliability standards based on pre-established thresholds.

3.4 DURATION OF TARIFFS AND TARIFF METHODOLOGY

The 2015 ELL stipulates in Section 8.2 (6) “that *the Regulator shall review tariff methodologies no less than every five (5) years. However, in no event, absent clear demonstration of error or need, shall tariffs have a life of less than two (2) years.*”

Therefore, the duration of tariffs approved by the Commission shall be for three (3) years and the Tariff Methodology shall be reviewed after five (5) years. The effective date of a tariff shall be the reference point for its duration. For the Tariff Methodology, it shall be the date it is approved by the Board of Commissioners of LERC.

SECTION 4: REVENUE REQUIREMENT

The Revenue Requirement shall be computed for all regulated activities using the below formula:

$$RR_t = OPEX_t + T_t + D_t + (WACC_t \times RAB_t)$$

Where:

- RR_t = Revenue Requirement for current period
 $OPEX_t$ = Operating Expenses for current period
 D_t = Depreciation for current period
 $WACC_t$ = Weighted Average Cost of Capital (rate of return) for current period
 RAB_t = Regulated Asset Base for current period
 T_t = Taxes for current period

For each operator involved in a regulated activity for which tariff is regulated, the Regulated Asset Base for the current period (RAB_t) shall be calculated using the formula below:

$$RAB_t = RAB_{t-1} + CAPEX_t - D_t$$

Where:

- RAB_{t-1} = Closing balance of the Regulated Asset Base at (t-1)
 $CAPEX_t$ = Capital Expenditure for current period
 D_t = Depreciation for current period

SECTION 5: LONG RUN MARGINAL COST

Standard economics theory suggests that electricity prices upon which tariffs are set should be based on marginal costs (MC), because in the absence of externalities, this maximises economic welfare. Setting prices equal to Marginal Costs means users will continue purchasing extra units until it is no longer economically efficient to produce them at that set price. Marginal cost-based pricing therefore sends signals to customers and producers by encouraging them to balance the benefits obtained by consuming a good or service with the cost of providing it.

The Long-run Marginal Cost (LRMC) approach shall be used to determine the justified cost for all licensees. For vertically integrated structures, LRMCs estimated for generation, transmission and distribution shall be the starting point from which adjustments are made for the final tariff design for consumer categories. The historical cost of the operator's fixed assets is phased out by gradually introducing fixed charges per consumer categories. Finally, Increasing Block Tariff (IBT) thresholds shall be introduced, and the LRMCs are adjusted to reflect social equity concerns.

This strategy addresses the purpose of tariff administration spelled out in section 2.1.2 of the 2015 ELL. Operators are incentivized to pursue better demand management for loss reduction to become operationally efficient.

SECTION 6: EFFICIENT COSTS

LERC shall provide for the full recovery of all operational costs that are necessary and are prudently incurred by a licensee. In determining the revenue requirement, LERC shall verify that costs were economically incurred using the least cost approach and that assets are used or usable for the provision of electricity service. LERC shall require licensees to submit information to aid in the determination of efficient costs including business plans forecasts, audited and unaudited financial statements and budget execution reports.

6.1 UNCONTROLLABLE EXPENSES

The 2015 ELL in Chapter 8 and Section 8.3 (5) stipulates that certain costs like fuel costs, impact of currency fluctuations on costs, and other costs may be uncontrollable by operators and would therefore be subject to a dollar-for-dollar, without a mark-up, pass through adjustment to tariff. Regulatory levy imposed by the regulator shall also be considered uncontrollable by the operator. To implement this provision of the Law, the LERC will identify and approve uncontrollable costs as part of tariff review and approval process.

6.2 CONTROLLABLE EXPENSES

These are costs under the control of Licensees. The only aspect of these costs that Licensees may not control is the impact of external factors like inflation. Within the control period of the tariff, Licensees may request inflation adjustment with supporting justification once a year for consideration by the Board of LERC. Upon review of request, LERC may approve inflation adjustment which shall be added to the tariff.

SECTION 7: REGULATED ASSET BASE (RAB)

The RAB must represent assets that are used and usable for the provision and supply of the regulated electricity services in the generation, transmission, distribution, supply, import, export and including micro utilities in the Liberia Electricity Supply Industry.

The RAB of regulated business operations must include all assets necessary for the provision of regulated services, based on the net depreciated value of the allowable assets.

$$RAB = NAV + CWIP + WC + IDC - CC - GFA$$

Where:

RAB = Regulated Asset Base

NAV = Net Asset Value

CWIP = Construction Work in Progress
WC = Net Working Capital
IDC = Interest During Construction
CC = Contribution from Customers
GFA = Net Value of Grant Funded Assets

Working Capital shall be calculated as below:

$$WC = \frac{[Revenue\ Lag(days) - Expense\ Lead\ (days) \times OPEX]}{365\ days}$$

Note:

- a. The straight-Line Depreciation Method shall be applied to the historical cost of assets in the computation of the net value of assets of the rate base.
- b. CWIP shall be included in the RAB with appropriate rate of return once investors have spent money on plants or equipment under construction.
- c. Net Asset Value for Grant Funded Assets shall be deducted from the RAB for the calculation of the Return on Capital. This is in accordance with Section 8.2, subsection 7 of the 2015 ELL which requires that tariff must not reflect the costs of any portion of the regulated entity's asset base that was acquired by contribution from a third party.

SECTION 8: WEIGHTED AVERAGE COST OF CAPITAL (WACC)

The after tax real weighted average cost of capital (WACC) shall be applied as rate of return in the computation for the revenue requirement.

$$WACC = \left(\frac{E}{D + E} \times r_e \right) + \left[\left(\frac{D}{D + E} \times r_d \right) \times (1 - T) \right]$$

Where:

D = Total debt in the capital structure

E = Total equity in the capital structure

r_d = rate of return on debt

r_e = rate of return on equity; and

T = Tax rate

The equity return in the capital structure is calculated using the Capital Asset Pricing Model (CAPM).

$$R_e = R_f + \beta \times (R_m - R_f)$$

Where:

R_e = Return on equity

R_f = Risk-free rate

R_m = Return on the market

β = Market beta

The below table shows the value of various parameters published in the final report of the Electrical Cost of Service Study & Development of Cost Reflective Pricing Model. Unless there is a compelling justification for change, these values shall be used in the determination of the real WACC.

| Component | Value |
|-------------------------------|--------------|
| <i>Debt/(debt + equity)</i> | 60.0% |
| <i>Equity/(debt + equity)</i> | 40.0% |
| <i>Cost of debt</i> | 1.7% |
| <i>Income tax</i> | 0.0% |
| <i>Risk-free rate</i> | 1.8% |
| <i>Asset beta</i> | 0.4 |
| <i>Equity beta</i> | 1 |
| <i>Market risk premium</i> | 6% |
| <i>Country risk</i> | 10.0% |
| <i>Cost of equity</i> | 18.0% |
| <i>Nominal WACC</i> | 8.1% |
| <i>Inflation rate</i> | 2.0% |
| <i>Real WACC</i> | 6.0% |

Operators are required to use a 60:40 capital structure in the computation of WACC.

SECTION 9: SERVICE PERFORMANCE

The 2015 ELL requires that the tariff methodology include appropriate incentives, both positive and negative, for performance, compliance with applicable standards, and efficient operations. Service performance targets will be approved for licensee with the required compensation (incentives). The compensation for performance will be incorporated in the tariff.

Performance targets will be agreed along the following areas:

1. Targets for Loss reduction. Operators will have agreed targets for reduction of both technical and commercial losses
2. Targets for improving quality of service, and
3. Targets for improving reliability of supply.

SECTION 10: RISK MANAGEMENT MECHANISMS

10.1 MAJOR REVIEWS

Reviews that lead to changes to the Tariff Methodology shall constitute major reviews and shall take place only when: a) 5 years after the issuance of the tariff methodology, b) when there is a material deviation in the forecast underlying the tariff regime.

10.2 TRIGGER FOR REOPENERS

When a correction factor of between 3-5% of the approved revenue requirement is realized, such deviation shall be considered material and shall be used as a trigger for re-openers. At the 3% lower limit, the LERC may ask explanations from the service provider and can consider re-opening the determination. At the 5% upper limit the LERC would re-open the determination.

10.3 MINOR REVIEWS

The minor reviews comprise the following activities:

- Tariff adjustment for uncontrollable costs
- Indexation of controllable costs

These reviews shall take place once annually and the procedures for these reviews shall be set out in the tariff approval process.

10.4 CLAW-BACK MECHANISM

Claw-back shall be implemented immediately when audited financial statements are available for the year in which the regulatory decision was made. If the adjustment is within +/- 2% of the allowed revenues, the service provider shall absorb it.

SECTION 11: PROVISIONS FOR SELF-SUPPLY BY LARGE CONSUMERS

This category constitutes large end user customers that consume more than the threshold as defined by the Electricity Licensing Regulations, 2020 and Micro Utility Licensing Regulations, 2020. They may be eligible to self-supply electricity pursuant to the authorization from the Regulator. They may be exempt from licensing or be given a single license authorizing all the functions related to regulated activities under the Law.

The Commission has the oversight role over the generation of electricity by a Self-supplier that supplies excess production for which they may seek authorization from the Regulator. A self-supplier shall enter into an agreement with a Distribution Licensees or other customers to sell the excess power generated. The Commission shall approve a special generation tariff for the Self-Supplier which shall be benchmarked to the avoided cost of procuring power from an embedded generator.

SECTION 12: PROVISIONS FOR MICRO-UTILITIES

12.1 TARIFF SETTING METHODOLOGY FOR MICRO UTILITIES

LERC shall apply the standard tariff methodology in the determination of revenue requirements for micro utilities licensees. However, it shall make provision for performance related profit margin based on the quantity of electricity sold.

$$RR_t = OPEX_t + D_t + (WACC_t \times RAB_t) + (PRPM \times S_{kwh})$$

Where:

RR_t = Revenue requirement for current period

$OPEX_t$ = Operating Expenses for current period

D_t = Depreciation for current period

$WACC_t$ = Real Weighted Average Cost of Capital (Rate of return) for current period

RAB_t = Regulated Asset Base for current period

$PRPM$ = Performance Related Profit Margin reflecting grant financing

S_{kwh} = Sales in kilowatt hours of electricity

Note: $PRPM$ shall be set at a 5% of Sales in kWh that compensates the investor for the exclusion of grant funded assets in the RAB in calculating the Return on Capital Cost, and subject to review.

SECTION 13: TARIFF SCHEDULES

The 2015 ELL provides in Section 8.3 that tariffs can consist of a fixed charge, energy charge and load or demand charge. Hence, the general tariff design

shall consist of two parts: a fixed (demand charge) and a variable (energy charge) and the tariff structure shall be inclining block to incentivise better demand management. However, residential tariffs may consist of a social or lifeline tariff for low income/low energy consuming consumers while pre-negotiated tariffs to special customers prior to the issuance of this document may be permitted provided all the supporting documentations are lodged with the Commission.

LDG