



# **LESOTHO ELECTRICITY AUTHORITY**

## **Charging Principles for Electricity and Water and Sewerage Services**

# Charging Principles for Electricity and Water and Sewerage Services

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## Table of Contents

1. Abbreviations .....	3
2. Definitions .....	4
3. Introduction .....	4
4. Applications for new, or changes to, transfer prices or end-user tariffs .....	4
5. Multi-year or single year tariff applications .....	5
6. Required revenue .....	5
7. Reasonableness of costs in required revenue calculations .....	6
8. Deferment of tariff increases .....	6
9. Regulatory Asset Base (RAB) .....	6
10. Required rate of return: Weighted Average Cost of Capital (WACC) .....	6
11. Forecasts and outturn adjustments .....	6
12. Audited data, tariff submissions and outturn adjustments .....	7
13. Tariff design .....	7
Annex A: Weighted Average Cost of Capital .....	8
A. Debt and equity ratios .....	9
B. Cost of debt .....	9
C. Cost of equity – the Capital Asset Pricing Model (CAPM) .....	10
D. Example calculation of Equity, Debt and WACC .....	11

# Charging Principles for Electricity and Water and Sewerage Services

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## 1. Abbreviations

CAPM	Capital Asset Pricing Model
CBL	Central Bank of Lesotho
CPI	Consumer Price Index
GOL	Government of Lesotho
JSE	Johannesburg Stock Exchange
RAB	Regulatory Asset Base
RAGS	Regulatory Accounting Guidelines
LEA	Lesotho Electricity Authority
LEWA	Lesotho Electricity and Water Authority
LV	Low voltage
MV	Medium voltage
NERSA	National Energy Regulator of South Africa
SARB	South African Reserve Bank
SAPP	South African Power Pool
WACC	Weighted Average Cost of Capital

# Charging Principles for Electricity and Water and Sewerage Services

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## 2. Definitions

**Beta ( $\beta$ ) :-** Defines the existing relationship between return of an investment and the return of the market as a whole. It measures a systematic risk of a security or portfolio in comparison to the market.

**Pass-Through: -** The act, action, or process of offsetting increased costs by raising prices.

**Outturn: -** The actual amounts, results etc at the end of a period of activity, rather than those that were expected or calculated earlier.

## 3. Introduction

Section 24 of LEA Act 2002 as amended lay down obligations on service providers in relation to applications for changes to tariffs and rights and obligations of the Authority in relation to the review and approval of those tariff applications.

Licensees are also required to comply with the Charging Principles and other regulatory accounting matters that are specified in their licences.

In implementing its duties, the LEA Board has issued Electricity Charging Principles in 2007 and has revised the '*Charging Principles*' to guide regulated entities in the preparation and submission of tariffs to the Authority. The Charging Principles should be read in conjunction with the Regulatory Accounting Guidelines (RAGs).

Throughout this document, references to LEA shall be assumed to refer to LEWA when the LEA (Amendment) Bill is enacted.

References to 'tariffs' below are also assumed to refer to prices contained in short-term or multi-year agreements (eg. power purchase agreements) entered into between licensees, between regulated businesses or between licensees and consumers or users.

## 4. Applications for new, or changes to, transfer prices or end-user tariffs

Unless otherwise agreed with the Authority, licensees shall submit tariff applications for each regulated business undertaken by the licensee whether these are end-user tariffs or transfer prices.

Applications may be submitted collectively for all businesses undertaken by the licensee or individually for each business separately. However, where tariff applications are made individually, transfer prices (from other businesses operated by the licensee) for which any business tariff depends on should first have been approved by the authority.

# Charging Principles for Electricity and Water and Sewerage Services

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The cost allocation between regulated businesses shall be based on methodologies proposed by licensees and approved by the Authority which shall, in turn, be based on cost allocation guidelines in the RAGs. Cost allocation methodologies should be submitted and approved in advance of applications for new tariffs or changes to tariffs. Once approved, cost allocation methodologies do not need to be re-submitted before subsequent tariff applications unless changes to the methodologies are proposed.

## 5. Multi-year or single year tariff applications

Licensees may submit applications for multi-year revenue requirements or tariffs that contain indexation to external drivers for specified components of the revenue requirements or tariffs (e.g. inflation, power or water purchase costs, etc).

Where licensees apply for multi-year revenue requirements or tariffs, the licensees must submit forecasts over the period covering the proposed duration of the multi-year tariff and additional time will therefore be required by the Authority to review the application.

For network businesses (electricity transmission and distribution and water and sewerage other than licensed water treatment plants and sewage treatment plants) requesting multi-year tariffs, licensees will normally be expected by the Authority to request a revenue-cap formulae<sup>1</sup> with some pass-through costs and some incentive components designed to reward efficiency improvements. Other businesses (water and sewage treatment plants and power generation) requesting approval for prices in long term sales agreements where some form of indexation is involved would normally be expected by the Authority to apply a price-cap formulae<sup>2</sup> (also with some pass-through costs and with some incentive components designed to reward efficiency improvements).

## 6. Required revenue

Whether in a multi-year or single-year tariff application and whether used in revenue cap formulae or used to calculate tariffs in price cap formulae, the required revenue shall normally be based on forecasts of reasonable operating costs plus a rate of return on net re-valued fixed assets – the regulatory asset base (RAB). The rate of return and the RAB shall be calculated as described below.

For any business where fixed assets represent a very small component of total costs (this refers particularly to supply businesses), instead of estimating required revenue as cost plus an allowed return on RAB, an appropriate margin on the costs of

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<sup>1</sup> The formula calculates the required revenue (rather than the tariff) and the actual tariff in each year of the price control period is then calculated by dividing the required revenue by the forecast sales. In this formula, the licensee does not suffer (except temporarily) if sales fall but equally the licensee does not benefit if sales are higher than expected.

<sup>2</sup> The formula directly calculates the allowed price. Revenue forecasts are not considered in the calculation of allowed prices except at the time the tariff application is made to LEA. With these formulae, the licensees benefit if sales are above expectations but suffer if sales are below expectations.

# Charging Principles for Electricity and Water and Sewerage Services

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purchased services may be proposed to the Authority for approval. The appropriate margin in this context should be designed to cover reasonable costs expected to be incurred including staff costs, office rental and consumables, capital work in progress (if any), provision for unavoidable write-off of debt, and capital at risk (eg., commitments to purchase electricity from SAPP).

## **7. Reasonableness of costs in required revenue calculations**

The reasonableness of capital expenditures and operating costs shall be reviewed by licensees from time to time and the findings of those reviews shall be presented to the Authority. For all multi-year tariff applications such reviews shall be presented to the Authority. In reviewing capital expenditures and operating costs, the licensee shall, where possible, compare costs within its own sector within Lesotho and shall compare costs with companies outside Lesotho that are operating under similar conditions.

## **8. Deferment of tariff increases**

In cases where, following review of a tariff submission, the Authority recognises that a tariff increase is justified but, following discussion with the licensee, agreement is reached to postpone a tariff increase, the required revenue that would otherwise have been collected if the tariff increase had been allowed may be recovered in subsequent tariff periods. The recovery of deferred revenue in subsequent years may be escalated using the rate of return as stated in section 9 below to reflect the licensee's opportunity cost of capital.

## **9. Regulatory Asset Base (RAB)**

Fixed assets shall be re-valued and depreciated in accordance with the RAGs.

The RAB of regulated businesses shall be valued as described in the RAGs unless otherwise specifically stated in the licences.

## **10. Required rate of return: Weighted Average Cost of Capital (WACC)**

The allowed rate of return shall be calculated using the real Weighted Average Cost of Capital (WACC)<sup>3</sup> as described in Annex A. WACC shall also be used in capitalising funds used during construction – as described in the RAGs.

## **11. Forecasts and outturn adjustments**

Licensees shall seek to ensure that forecasts of costs and sales that are used in preparing tariff applications are reasonably accurate and are not biased upwards or downwards. The Authority shall, from time to time, review forecasts in relation to systematic bias in the forecasts used.

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<sup>3</sup> WACC is calculated net of inflation.

# Charging Principles for Electricity and Water and Sewerage Services

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For the pass-through component of multi-year tariffs and for annual tariffs except for those components of annual tariffs that are fixed (for example, a fixed allowance may be made for electricity losses), an outturn adjustment shall be made in the following tariff year to adjust for deviations between the forecast costs and the outturn costs. For single year tariffs and the automatic adjustment component of multi-year tariffs, licensees shall annually reconcile the outturns with the forecast in the previous tariff period for which audited accounts are available (see below).

## **12. Audited data, tariff submissions and outturn adjustments**

The RAGs require that accounts be submitted to the Authority within six months of the end of the financial year to which they apply. This means that accounts for year  $y$  may not be received until up to six months into year  $y+1$ , and outturn adjustments made using audited accounts will be applied in year  $y+2$ .

As a result of the delay in the availability of audited data, allowed revenues in any one year will need to be adjusted to reflect over or under-recovery of revenues from up to two previous financial years.

For example, if allowed revenues are being calculated for 2010/11 (year  $y+2$ ), the audited data for 2008/09 (year  $y$ ) will be available half way through the financial year 2009/10 (year  $y+1$ ) and no data for the financial year 2009/10 will be available as inputs to the revenue requirement calculations in 2010/11. It will therefore be necessary to make the outturn adjustments to allowed revenues in 2010/11 based on forecasting errors made for the year 2008/09.

To account for the delays implied in the above process, and to remove any perverse incentives or disincentives to forecast accurately, interest<sup>4</sup> shall be applied to the adjustment data to increase allowed outturn adjustment, either positively or negatively, if there has been under- or over-recovery.

## **13. Tariff design**

The design of tariffs shall, to the extent that is reasonable given the limitations on metering and given the benefits that cost reflectivity brings, reflect the costs of providing the different components of the service (location, supply at peak times, average supply, off-peak supply, seasonal supply, services that do not vary with supply). The Charging Principles recognise that complex tariff designs are less commonly justified for water and sewage services.

For electricity transmission, distribution and supply, tariffs and charges shall distinguish between high voltage (HV), medium voltage (MV) and low voltage (LV) off-take points and supply.

Electricity transmission charges shall not vary by location of users or generators.

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<sup>4</sup> The interest rate at which licensee borrows money to finance shortfall in its regulated businesses.

# Charging Principles for Electricity and Water and Sewerage Services

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## Annex A: Weighted Average Cost of Capital

As stipulated above, the allowed rate of return and the rate of interest for capitalising funds used during construction shall be determined using the Weighted Average Cost of Capital (WACC) method. A real WACC shall be applied.

Real, post-tax WACC is defined as:

$$WACC = \frac{d}{d+e} r_{debt} (1-t) + \frac{e}{d+e} r_{equity} \quad (1)$$

Where,

$d$  = the market value of the firm's debt

$e$  = the market value of the firm's equity

$\frac{d}{d+e}$  = the debt ratio, and  $\frac{e}{d+e}$  is the equity ratio

$r_{debt}$  = the real cost of debt

$r_{equity}$  = the real cost of equity, determined using CAPM as described below

$t$  = the corporate tax rate

The real WACC is calculated net of inflation. Thus, for example, the cost of debt in the above equation ( $r_{debt}$ ) is the nominal cost of debt less inflation (calculated as the nominal cost of debt divided by  $(1 + \text{applicable inflation rate})$ ). Similarly, the real cost of equity ( $r_{equity}$ ) is the nominal cost of equity divided by  $(1 + \text{applicable inflation rate})$ , as in equation (5) below. The applicable inflation rate will depend on the country from which the data is sourced (as discussed below) and may be different for debt and equity. In the case where the rate of inflation in Lesotho is used it shall be based on the CPI as published by the Lesotho Bureau of Statistics.

The real, pre-tax allowed rate of return ( $WACC_{pre-tax}$ ) that is used to calculate the real, pre-tax allowed revenue of the regulated Businesses, shall be calculated as:

$$WACC_{pre-tax} = \frac{r_{CAPM}}{(1-t)} \quad (2)$$

The following sections, A, B and C, respectively, explain how debt and equity ratios, cost of debt and cost of equity are computed. Section D provides illustrative example of their calculation, and WACC.



# Charging Principles for Electricity and Water and Sewerage Services

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## A. Debt and equity ratios

For Businesses that are considered by the Regulator to be potentially competing with the private sector, the debt to equity ratio shall be proposed by the Licensees subject to review and agreement by the Regulator and may differ in each of the Regulated Businesses depending on the nature of the business and the risk profile of that business. For such businesses the basis for determining the debt to equity ratio shall be the assumed efficient proportions of the two funding sources in the Regulated Businesses' capital structures.

For Businesses that are not considered by the Regulator to be potentially competing with the private sector, the debt to equity ratio used in WACC calculations and tariff setting shall be the actual debt to equity ratios. For such businesses, in the event that the outturn debt to equity ratio differs from the debt to equity ratio forecast at the start of the tariff period, an over- or under-recovery correction factor may be applied in subsequent periods to compensate.

*Note that the rules are designed to allow Regulated Businesses that are not considered by the Regulator to be competing with the private sector to pass through the cost of debt into the allowed revenue.*

## B. Cost of debt

With the exception of Businesses that are considered by the Regulator to be potentially competing with the private sector, the allowed cost of debt,  $r_{debt}$ , shall be based on the actual cost of debt in each year of the price review. Deviations between the expected cost of debt and the outturn cost of debt may be recovered through the appropriate over- or under-recovery correction factors in subsequent periods. The real cost of debt shall be calculated as:

$$r_{debt} = \left( \frac{\sum I}{\sum D} \right) / (1 + i_{debt}) \quad (3)$$

Where,

$\sum I$  = total interest paid on debt for the year

$\sum D$  = total outstanding debt, calculated as the average of total outstanding debt at the start of the year and total outstanding debt at the end of the year

$i_{debt}$  = the outturn inflation rate in Lesotho

Where the total interest cost and total outstanding debt are denominated in foreign currency these shall be converted to Maloti using the average daily exchange rate for the year as published by the Central Bank of Lesotho (CBL).

# Charging Principles for Electricity and Water and Sewerage Services

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For Businesses that are considered by the Regulator to be potentially competing with the private sector, the real cost of debt used in the WACC calculation shall be the commercial cost of similar debt (net of inflation) relating to loans of a similar vintage.

*Note that the above is designed to allow the allowed revenue to vary with the interest rate but, because the level of debt is an assumed fixed proportion of the total costs of financing and because, in practice, some state-owned Businesses may actually benefit from concessionary loans, the actual cost of debt is not passed through into allowed revenues. An arrangement should be made that ensures that any profits that arise because of this are passed to Government as dividends.*

## C. Cost of equity – the Capital Asset Pricing Model (CAPM)

The Capital Asset Pricing Model (CAPM) shall be used to calculate the real cost of equity for the regulated firm,  $r_{equity}$ . This will then be used in the WACC calculation (equation (1)).

The nominal cost of equity ( $r_{CAPM}$ ) is defined as follows:

$$r_{CAPM} = [r_f + r_c + \beta_d \cdot (r_m - r_f)] \quad (4)$$

Where,

$r_{CAPM}$  = Rate of return of equity capital

$r_f$  = the risk free rate

$r_c$  = the country risk premium

$r_m$  = the market return

$\beta$  = the risk affecting the regulated firm or measure of a risk of a firm

and each of these values is in nominal terms.

Since there is not a sufficiently developed securities market (i.e., a share market) in Lesotho, a market from a proxy country may be used to provide the market return ( $r_m$ ). South Africa offers a natural proxy. Although the economic characteristics and risk conditions of South Africa differ from those in Lesotho, a number of factors are common between the two and South Africa offers securities market depth and liquidity far exceeding any other comparator country in the region.

Accordingly, the market return may be calculated from the Johannesburg Stock Exchange's (JSE) leading market index ["TOPI Top 40" index] as published by JSE on its website or in leading financial newspapers.

# Charging Principles for Electricity and Water and Sewerage Services

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For consistency, when adopting a market return for South Africa, the risk free rate in the CAPM formula ( $r_f$ ) shall be the South African Reserve Bank's (SARB) [10-year] bond rate.

The Regulated Business's beta ( $\beta$ ) shall be either calculated using market returns on a publicly traded comparator firm from the same or similar industry as the regulated firm, or shall be taken from standard published estimates of beta for the regulated sector.

Where standard published estimates for beta are used they shall be from a reputable agency and, to the extent possible, shall be based on countries at a similar stage of economic development as Lesotho or from the African region or both.

It is necessary to include a country risk premium ( $r_c$ ) where the other components of CAPM are based on data from another country, as is likely to be the case. The country risk premium reflects country-specific risk in Lesotho relative to the second country. Where South Africa is used as the proxy, country risk premium shall be calculated from the spread between longest duration Government of Lesotho (GoL) Treasury Bills and the Republic of South Africa (RSA) Government bonds of a matching tenure. GoL Treasury Bills are currently issued for a maximum duration of [364 days]. However, the longest matching duration between GoL and RSA bills is currently [273 days].

Note, an acceptable alternative is to use the pre-tax CAPM figure applied by regulators in the appropriate industry (electricity or water) in neighbouring countries, adjusted for Lesotho country risk. For example, for the electricity sector, the CAPM applied by National Energy Regulator of South Africa (NERSA) in regulating ESKOM may provide some guidance.

The real cost of equity for use in the WACC calculation shall be calculated as:

$$r_{equity} = \frac{r_{CAPM}}{(1 + i_e)} \quad (5)$$

Where  $i_e$  is the annual inflation rate in the country from which the cost of equity data is sourced (in this case South Africa). The inflation rate shall be based on the CPI as published by Statistics South Africa.

## D. Example calculation of Equity, Debt and WACC

The following calculation for an electricity distribution Business is **provided for the purposes of illustration only**. This business is a natural monopoly and, for the purposes of this illustration, is not expected to be privatised nor is it considered by the Regulator to be potentially competing with the private sector.

Beginning with the **cost of equity** calculated using CAPM. Say the nominal 10-year RSA bond rate is 8.2% and the average long-term return on the JSE's TOPI index is 15%. This indicates a risk free rate of 8.2% and gives a market premium of (15% - 8.2%) = 6.8%. Say an electricity distribution beta of 0.8 has been obtained from

## Charging Principles for Electricity and Water and Sewerage Services

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international benchmark studies. Finally, say the rate on 273 day GoL Treasury Bills is 7.6% and the rate on the 273 day South African Treasury bill is 7.1%, giving a country risk spread of 0.5%.

$r_{CAPM}$  is then calculated as:

$$r_{CAPM} = 8.2 + 0.5 + 0.8 * (6.8) = 14.1\% \quad \text{Using (4)}$$

The current annual inflation rate from South African CPI is 6.2%, giving a real cost of equity as follows:

$$r_{equity} = (14.1 / 1.062) = \mathbf{13.3\%} \quad \text{Using (5)}$$

Next, **cost of debt** is calculated in this case from actual debt costs (since electricity distribution is not expected to face commercial competition). Say the actual interest costs for the year denominated in United States dollars was US\$10,000,000 average total outstanding debt was US\$120,000,000, and the CPI inflation rate in Lesotho was 4.2%. Real cost of debt was:

$$r_{debt} = (10 / 120) / (1.042) = \mathbf{7.9\%} \quad \text{Using (3)}$$

Finally, the **actual debt ratio** was found from the regulated accounts to be **28%**. Combining these components in the WACC calculation with a tax rate of 25% gives real post-tax WACC of:

$$WACC = (0.28 * 7.9) * (1 - 0.25) + (0.72 * 13.3) = \mathbf{11.2\%} \quad \text{Using (1)}$$

The **real, pre-tax WACC** for use in the regulated allowed rate of return is then:

$$WACC_{pre-tax} = 11.2 / (1 - 0.25) = \mathbf{15.0\%} \quad \text{Using (2)}$$