

ELECTRICITY REGULATORY AUTHORITY



QUARTERLY TARIFF ADJUSTMENT METHODOLOGY

$$IRAF_q = \left(\frac{1}{1-TUDEF_y} \right) * \left[\frac{IRAF(G)_q + IRAF(T)_q + IRAF(D)_q}{TGU_q} \right]$$

$$IRAF(T)_q = \left(\frac{1}{1-LD_y} \right) * \left(\frac{1}{1-LT_y} \right) * \left[CR_y + RT_y + GOMC_y + TX_y \right] * Z_A$$

$$IRAF(D)_q = \left(\frac{1}{1-LD_y} \right) * \left[DOMC_y * LC_y * \left(\frac{INI_q}{INI_R} - 1 \right) * X_R \right]$$

$$IRAF_q = \left(\frac{1}{1-TUDEF_y} \right) * \left[\frac{IRAF(G)_q + IRAF(T)_q + IRAF(D)_q}{TGU_q} \right]$$

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$$FERFAF(G)_q = \left(\frac{1}{1-LD_y} \right) * \left(\frac{1}{1-LT_y} \right) * \left[CR_y + RT_y + GOMC_y + TX_y \right] * Z_A$$

$$FERFAF(T)_q = \left(\frac{1}{1-LD_y} \right) * \left(\frac{1}{1-LT_y} \right) * \left[PP_q + C_q + I_q - E_q \right] * Z_A$$

$$FERFAF(D)_q = \left(\frac{1}{1-LD_y} \right) * \left[CR_d_y + ROI_y + TX_d_y + LP_y + CD_y + DOMC_y * EC_y * \left(\frac{INI_{eq}}{INI_{eR}} - 1 \right) \right] * X_R$$

$$IRAF(G)_q = \left(\frac{1}{1-LD_y} \right) * \left(\frac{1}{1-LT_y} \right) * \left[GOMC_y * LC_y * \left(\frac{INI_q}{INI_R} - 1 \right) \right] * X_R$$

CONTENTS

PART I

INTRODUCTION	2
--------------------	---

PART II

SCHEDULE OF TARIFFS FOR ELECTRICAL ENERGY SUPPLIED BY UMEME LIMITED.....	4
--	---

PART III

QUARTERLY TARIFF ADJUSTMENT METHOD	5
--	---

PART IV

IMPLEMENTATION OF QUARTERLY TARIFF ADJUSTMENTS	15
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Pursuant to Section 10 of the Electricity Act, 1999, and the Regulations 4 and 5 of the Electricity (Tariff) Code Regulations, 2003 the Electricity Regulatory Authority hereby establishes the following quarterly tariff adjustment methodology, applicable to the electricity end user retail Tariffs to be charged by Umeme Limited to the Consumers of electrical energy.

PART I

INTRODUCTION

This methodology, hereby established shall take effect from the 16th January, 2014 and shall for each Consumer become effective so as to apply to all bills raised based on meter readings taken on or after that date.

The following words, expression and phrases used in this document and annexes shall have the following meaning:-

Adjustment Factor	Difference between Base Tariffs and alternative tariffs attributable to variations in fuel prices, exchange rates and inflation.
Alternative Tariff	Electricity tariffs calculated from updated real-time data.
Authority	Electricity Regulatory Authority.
Base Period	The period prior to the implementation of the first Quarterly Adjustment Factor.
Base Tariff	Electricity tariff calculated at beginning of calendar year using fixed input factors throughout the year, making Base Tariffs constant for the calendar year.
Billing Period	The period of time elapsing between the issuing of two consecutive bills by Umeme Limited but with the exception of the first and last period; each such period of time shall be as near to thirty days as possible.
Consumer	Any person supplied with electrical energy, but does not include a person supplied with electrical energy for delivery or supply to another person.

Distribution Losses	Total losses in the distribution system, comprising both technical and commercial losses.
End-user Tariffs	Prices charged to Umeme Limited's customers, comprising fixed fees, energy charges and maximum demand charges (where applicable).
IPP	Independent Power Producer.
Lifeline Rate	A subsidised electricity price applicable for small quantities of electricity consumed, intended to provide a benefit to the low income domestic Consumers.
Operating & Maintenance Costs	The costs of operations and maintenance, including staff costs, repairs and maintenance, overhead costs and other operating expenses.
Return on Investment	The allowed return on the investor's total investment.
Revenue Requirement	The amount of revenue that a company requires to meet its regulated costs.
Transmission Losses	The technical losses that occur in the transmission network.
UETCL	Uganda Electricity Transmission Company Limited.

PART II

SCHEDULE OF TARIFFS FOR ELECTRICAL ENERGY SUPPLIED BY UMEME LIMITED

Pursuant to Section 10 and 75 of the Electricity Act, 1999, the Electricity Regulatory Authority has set out the Schedule of Electricity end-user Tariffs for 2018 in table 1, to be charged by Umeme Limited to the consumers for the supply of electrical energy in each Billing Period.

TABLE 1:- BASE ELECTRICITY END-USER TARIFFS

DOMESTIC CONSUMERS - CODE 10.1					
Low voltage single phase supplied at 240 volts					
Lifeline - First 15 Units (Ush/kWh)	150				
Energy above 15 units (Ush/kWh)	718.9				
COMMERCIAL CONSUMERS - CODE 10.2					
Three phase low voltage load not exceeding 100 Amperes		Average	Peak	Shoulder	Off-peak
Energy Charge (Ush/kWh)		648.3	839.6	646.3	401.4
MEDIUM INDUSTRIAL CONSUMERS - CODE 20					
Low voltage 415Volts, with maximum demand up to 500kVA		Average	Peak	Shoulder	Off-peak
Energy Charge (Ush/kWh)		592.5	766.2	589.8	366.1
LARGE INDUSTRIES CONSUMERS - CODE 30					
High Voltage 11,000Volts or 33,000Volts, with maximum demand exceeding 500kVA but up to 1,500 kVA		Average	Peak	Shoulder	Off-peak
Energy Charge (Ush/kWh)		375.5	497.1	382.6	247.7
EXTRA - LARGE INDUSTRIES CONSUMERS - CODE 40					
High Voltage 11,000Volts or 33,000Volts, with maximum demand exceeding 1,500kVA and dealing in manufacturing		Average	Peak	Shoulder	Off-peak
Energy Charge (Ush/kWh)		371.1	491.8	378.5	246.5
STREET LIGHTING - CODE 50					
Energy Charge (Ush/kWh)	701.9				

PART III**QUARTERLY TARIFF ADJUSTMENT METHOD**

The Electricity end-user tariffs above are the 2018 Base Tariffs and will be subject to Quarterly Adjustments for changes in the Macroeconomic factors of Fuel, Exchange rate and Inflation.

DETERMINATION OF THE BASE TARIFF

The Base Tariffs shall be set at the start of each calendar year taking into account the total Electricity Sub-sector Revenue Requirement and will remain constant throughout the respective year. The Base Tariffs do not include the cost of fuel and the fuel handling costs as these shall be included in the fuel costs Adjustment Factor and adjusted depending on changes in fuel prices and dispatch of thermal plants.

The annual Base Tariff shall be adjusted at the beginning of each calendar year to take into account changes in other tariff parameters such as energy losses, collection rates, operations and maintenance costs, and investment costs.

The Base Macroeconomic parameters used in the determination of the 2018 Base Tariffs are as shown in table 2.

Table 2: Macroeconomic Parameters Used in Determination of 2018 Base Tariffs

Macroeconomic Parameters	Rate
Exchange rate US Dollar	3,634.92
Core Consumer Price Index (CPI)	164.15
US Producer Price Index (US PPI)	200.7
International Prices of Fuel (US\$ per barrel)	60.74

Although the Base Tariffs shall remain constant throughout the calendar year, the macroeconomic parameters used in the determination of the Base Tariffs don't necessarily remain constant necessitating a need for Adjustment Factors.

The Tariff Adjustment Factor applicable in each quarter comprises of the following:-

- a) Fuel Adjustment Factor.
- b) Exchange Rate Adjustment Factor.
- c) Inflation Rate Adjustment Factor.

(a) FUEL ADJUSTMENT FACTOR CALCULATIONS

Changes in fuel prices affect UETCL's costs of purchasing power from IPPs with fossil-fired electricity generation. Hence, changes in fuel prices affect the Power Purchase Costs by UETCL. The fuel price Adjustment Factor also contains changes in revenue requirement due to changes (from base) in quantities of purchased power (generation mix). The expression for the fuel price Adjustment Factor is presented below.

$$FPAF_q = \left(\frac{1}{1-TUDF_y} \right) * \left(\frac{1}{1-LD_y} \right) * \left(\frac{1}{1-LT_y} \right) * \frac{[\sum_i^n [(C_{i,m,A} - C_{i,m,0}) * G_{i,m,A} S_i] + OM_{i,m} * G_{i,m,A} + \sum_i^n [P_{i,m,A} - P_{i,m,0}]]}{G_{m,A}}$$

(i)

Equation (i) shows the fuel price Adjustment Factor, which is defined by the difference in fuel costs for thermal plants (C) and differences in dispatch for all other plants (P). It should be noted that as fuel costs for thermal plants are in US dollars, exchange rate fluctuations away from base values will also be captured in this expression.

Where;

$FPAF_q$ = Fuel Price Adjustment Factor for quarter q.

$TUDF_y$ = the Target Uncollected Debt Factor for the year y as set by the Authority.

LD_y = the target system Loss Factor in Distribution for the year to which the adjustment relates as set by the Authority.

LT_y = the target system Loss Factor in Transmission for the year to which the adjustment relates as set by the Authority.

- $C_{i, m, A}$ = actual price in Ush/kg paid by the thermal power producer for fuel consumed by the plant i during the quarter immediately preceding each Billing Period for the thermal plant. This price also includes an exchange rate component as the price paid by the thermal power plant is in US dollars.
- $C_{i, m, 0}$ = the base price in Ush/kg paid by the thermal power producer for fuel consumed by the thermal plant i . This price also includes an exchange rate component as the price paid by the thermal power plant is in US dollars.
- $G_{i, m, A}$ = electric energy in kWh purchased by UETCL from the thermal power plant i during the quarter immediately preceding each Billing Period for the thermal plant.
- S_i = specific fuel consumption in kg/kWh for the following thermal plants as licensed by the Authority.
- $OM_{i, m}$ = Operation and Maintenance costs for thermal plant i .
- $P_{i, m, A}$ = total power purchase costs by UETCL in the quarter proceeding the Billing Period at the alternative exchange rate, alternative inflation, alternative fuel prices and any other emergency/unexpected costs incurred as approved by the Authority, with the exception of purchase costs from thermal plants.
- $P_{i, m, 0}$ = total power purchase costs by UETCL in the quarter proceeding the Billing Period at the base exchange rate, base inflation, base fuel prices and any other emergency/unexpected costs incurred as approved by the Authority, with the exception of purchase costs from thermal plants.
- $G_{m, A}$ = total of all kWh purchased by UETCL from all electric power producers during the quarter immediately preceding each Billing Period, alternative values.

N = the total number of thermal electric power producers from which UETCL purchased power during the quarter immediately preceding each Billing Period.

(b) EXCHANGE RATE ADJUSTMENT FACTOR CALCULATIONS

Foreign exchange rates affect costs for all companies involved in supplying power, as part of the companies' costs are incurred in US dollars, and are in turn paid using Uganda shillings. Hence, a depreciation of the Uganda Shilling will raise costs and an appreciation will lower costs. Below is the exchange rate Adjustment Factors for all the electricity supply companies (where G refers to Eskom, T refers to UETCL and D refers to Umeme Limited):

Total changes in tariffs attributable to exchange rates can be expressed as:

$$FERFAF_q = \left(\frac{1}{1 - TUDF_y} \right) * \left[\frac{FERFAF(G)_q + FERFAF(T)_q + FERFAF(D)_q}{TGU_q} \right] * X_0$$

(ii)

Equation (ii) describes the total exchange rate adjustment factor as the sum of Adjustment Factors for all parties in the electricity supply chain.

Where:

$FERFAF_q$ = Overall Foreign Exchange Rate Fluctuation Adjustment Factor in quarter q .

$FERFAF(G)_q$ = the Foreign Exchange Rate Fluctuation Adjustment Factor in quarter q relating to Generation.

$FERFAF(T)_q$ = the Foreign Exchange Rate Fluctuation Adjustment Factor in quarter q relating to Transmission.

$FERFAF(D)_q$ = the Foreign Exchange Rate Fluctuation Adjustment Factor in quarter q relating to Distribution.

TGU_q = total projected kWh purchased by UETCL from electric power producers in quarter q. This includes any potential new power plants.

X_0 = Base Exchange rate for the Base Period

Exchange rate Adjustment Factors for generation is expressed as:

$$FERFAF(G)_q = \left(\frac{1}{1 - LD_y} \right) * \left(\frac{1}{1 - LT_y} \right) * [CR_y + RT_y + GOMC_y + TX_y] * Z_A$$

(iii)

Equation (iii) shows the exchange rate adjustment formula for Generation.

Where:

CR_y = Annual capital recovery charges in year y equivalent to depreciation expenses related to asset investment made by the company in USD.

RT_y = Annual generation return on investment in year y in USD.

$GOMC_y$ = Annual generation operation & maintenance costs in USD.

TX_y = Annual income tax payable with respect to the return on the company's capital investment in year y in USD.

Z_A = proportionate change in the exchange rate (X_A) in the current Billing Period t from the Base Exchange rate (X_0), where:

$$Z_A = \frac{X_A - X_0}{X_0}$$

Exchange rate Adjustment Factors for transmission can be expressed as:

$$FERFAF(T)_q = \left(\frac{1}{1-LD_y} \right) * \left(\frac{1}{1-LT_y} \right) * [PP_q + C_q + I_q - E_q] * Z_A \quad (iv)$$

Equation (iv) shows the exchange rate adjustment formula for Transmission (UETCL).

Where:

PP_q = Sum of the foreign currency costs paid by UETCL to electric power producers in the quarter immediately preceding current Billing Period.

C_q = Sum of the foreign currency costs for operation and maintenance incurred by UETCL in the quarter immediately preceding current Billing Period.

I_q = Foreign currency costs paid by UETCL for power imports.

E_q = Foreign currency revenue for UETCL for power exports.

Exchange rate Adjustment Factors for distribution can be expressed as:

$$FERFAF(D)_q = \left(\frac{1}{1-LD_y} \right) * [CRd_y + ROI_y + TXd_y + LP_y + CD_y + DOMC_y * EC_y * \left(\frac{INI_{eq}}{INI_{eR}} - 1 \right)] * Z_A$$

(v)

Equation (v) shows the exchange rate adjustment formula for distribution (Umeme Limited).

Where:

CRd_y = Annual capital recovery charges for distribution in year y equivalent to depreciation expenses related to asset investment made by the company in USD.

ROI_y = Annual distribution return on investment in USD in year y.

DOMC_y = Distribution Operation and Maintenance costs for the year y in USD.

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TXd_y = Income tax payable for distribution with respect to the return on the company's capital investment in year y.

- $LP_y =$ Annual USD lease payments in year y .
- $CD_y =$ Other annual USD costs incurred by distribution companies in year y .
- $EC_y =$ USD content of Umeme's operating costs in year y expressed as a percentage of total operating costs.
- $INI_{eR} =$ The producer price index for finished goods less food and energy, series ID WPUfd4131 as calculated and published by the United States Bureau of Labor Statistics used in the computation of the Base Tariff.
- $INI_{eq} =$ The producer price index for finished goods less food and energy in quarter q , series ID WPUfd4131 for the month preceding the quarter to which the adjustment relates to calculated and published by the United States Bureau of Labor Statistics. For instance, inflation rate adjustments calculated for the period January-March in a given year will be based on November in the preceding year.

(c) INFLATION ADJUSTMENT FACTOR CALCULATIONS

Operation and maintenance costs for utilities in the electricity supply chain are inflation-adjusted. Inflation fluctuations will therefore imply cost fluctuations to the utilities. Inflationary adjustment is done on a quarterly basis using the index composite underlying Consumer price inflation for the month preceding the quarter to which the tariff relates as published by the Uganda Bureau of Statistics.

Below is the inflation rate Adjustment Factors for all the electricity supply companies (where G refers to Eskom, T refers to UETCL and D refers to Umeme Limited).

Total change in tariffs attributable to inflation rates is expressed as:

$$IRAF_q = \left(\frac{1}{1-TUDF_y} \right) * \left[\frac{IRAF(G)_q + IRAF(T)_q + IRAF(D)_q}{TGU_q} \right] \quad (vi)$$

Equation (vi) describes the total inflation rate adjustment factor as the sum of Adjustment Factors for all parties in the electricity supply chain.

Where:

- $IRAF_q$ = Overall Inflation Rate Adjustment Factor in quarter q.
- $IRAF(G)_q$ = Inflation Rate Adjustment Factor for Generation (Eskom) in quarter q.
- $IRAF(T)_q$ = Inflation Rate Adjustment Factor for Generation (UETCL) in quarter q.
- $IRAF(D)_q$ = Inflation Rate Adjustment Factor for Distribution (Umeme) in quarter q.

Inflation rate Adjustment Factors for generation can be expressed as:

$$IRAF(G)_q = \left(\frac{1}{1-LD_y} \right) * \left(\frac{1}{1-LT_y} \right) * \left[GOMC_y * LC_y * \left(\frac{INI_q}{INI_R} - 1 \right) \right] * X_R \quad (vii)$$

Equation (vii) shows the inflation rate adjustment formula for Generation.

Where:

- $GOMC$ = Eskom annual total operating and maintenance expenses in year y.
- LC_y = Local currency content of Eskom's net operating costs in year y expressed as a percentage of total net operating costs.
- INI_q = Index of composite price inflation equal to the average quarterly value of end of month values as calculated and published by Uganda Bureau of Statistics over the three months prior to the date of calculation.

- $INI_R =$ Reference index of composite underlying Consumer price inflation equal to the base reference rate used in the computation of the Base Tariff.
- $X_R =$ The reference exchange rate used in the determination of the Base Tariff for Eskom.

Inflation rate Adjustment Factor for transmission is expressed as:

$$IRAF(T)_q = \left(\frac{1}{1-LD_y} \right) * \left(\frac{1}{1-LT_y} \right) * \left[TOMC_y * LC_y * \left(\frac{INI_q}{INI_R} - 1 \right) \right] * X_R$$

(viii)

Equation (viii) shows the inflation rate adjustment formula for Transmission (UETCL).

Where:

- $TOMC_y =$ UETCL annual total operating and maintenance expenses in year y.
- $LC_y =$ Local currency content of UETCL's net operating costs in year y expressed as a percentage of total net operating costs.
- $INI_q =$ Index of composite price inflation equal to the average quarterly value of end of month values as calculated and published by Uganda Bureau of Statistics over the three months prior to the date of calculation.
- $INI_R =$ Reference index of composite underlying consumer price inflation equal to the base reference rate used in the computation of the Base Tariff which for UETCL is the rate at the transfer date.
- $X_R =$ The reference exchange rate, which for UETCL is the rate at the time of transfer.

Inflation rate Adjustment Factor for distribution is expressed as:

$$IRAF(D)_q = \left(\frac{1}{1-LD_y} \right) * \left[(DOMC_y * LC_y * \left(\frac{INI_q}{INI_R} - 1 \right) * X_R) \right] \quad (ix)$$

Equation (ix) shows the inflation rate adjustment formula for Distribution (Umeme Limited).

Where:

DOMC = Umeme Limited annual total operating and maintenance expenses in year y.

LC_y = Local currency content of Umeme Limited's net operating costs in year y expressed as a percentage of total net operating costs.

INI_q = Index of composite price inflation equal to the average quarterly value of end of month values as calculated and published by Uganda Bureau of Statistics over the three months prior to the date of calculation.

INI_R = Reference index of composite underlying consumer price inflation equal to the base reference rate used in the computation of the Base Tariff.

X_R = The reference exchange rate used in the determination of the Base Tariffs for Umeme Limited.

PART IV
IMPLEMENTATION OF QUARTERLY TARIFF ADJUSTMENTS

At the beginning of every calendar year, the Authority shall approve a Base Tariff taking into account the licensees' Revenue Requirements.

The process of the setting the Base Tariff shall be open, transparent and involve the participation of the public through Public Hearings and other mechanisms.

The applicable Adjustment Factor for each quarter shall be computed by the Authority based on an open and transparent as contained in Part III of this Gazette Notice.

Within two weeks following the end of each respective quarter, the Authority shall publish the applicable Adjustment Factors for that particular quarter.

The quarterly Adjustments shall not be applied on other charges such as fixed monthly service charges, maximum demand charges, reactive energy charge, reconnection fees and the lifeline end-user tariff.

In any given quarter the applicable Tariff Adjustment Factor shall be capped at a level where it does not lead to an increase in the End-User Tariff of more than 2.5% compared to the previous quarter.

ENG. ZIRIA TIBALWA WAAKO

CHIEF EXECUTIVE OFFICER

ELECTRICITY REGULATORY AUTHORITY