Nigerian Electricity Regulatory Commission

(Estimated Billing) Methodology, 2012

METHODOLOGY NO:

NIGERIAN ELECTRICITY REGULATORY COMMISSION

In the exercise of the Powers conferred upon it by Section 96(1) and 96(2)(f) of the Electric Power Sector Reform Act 2005 (Act No. 6 of 2005) and all other powers enabling it in that behalf, the Nigerian Electricity Regulatory Commission hereby establishes the following Methodology for ESTIMATED BILLING.

Arrangement of Clauses

CHAPTER I

GENERAL

1. Short Title and Commencement

(1) This Proposed Methodology shall be cited as Nigerian Electricity Regulatory Commission (Estimated Billing) Methodology, 2012.

(2) This Proposed Methodology shall come into force on the date on which it is approved by the Commission.

(3) This Methodology shall be signed by the Chairman/Chief Executive Officer who shall also cause the seal of the Commission to be affixed hereunto.

2. Purpose

This Methodology is to provide for the standardization of the method used by Distribution Companies (Discos) to estimate a customer's power usage and bills accruing thereby in instances where the Disco is unable to read the customer's bill within a billing period.

This Methodology also provides for the standardization of the indices to be considered by Discos in estimating the power usage of a customer connected to the electricity system without a meter.

3. Definitions and Interpretation

(1) In this Methodology, unless the context otherwise requires:

"**Act**" means the Electric Power Sector Reform Act 2005

"**Commission**" means The Nigerian Electricity Regulatory Commission (NERC)

"Consumer" means any end –user of electricity who is a customer of a Distribution licensee that is not an eligible customer and, for the purpose of filing a complaint with the Commission and for any other reason that the Commission may determine, a person who is temporarily disconnected or otherwise without service, provide that a person who has applied for, but has yet to receive service shall also be deemed to be a consumer.

"Chairman" means the Chairman and/or Chief Executive Officer of the Nigerian Electricity Regulatory Commission, or any person appointed to act in that behalf.

"Codes" means the collection of Rules, Regulations that are consolidated and classified according to subject matter, like the Grid Code, Metering Code, etc.

"Distribution Company" means a Distribution licensee that is granted license to distribute electricity under Section 67 (1) of the Act or the entity Licensed by the Nigerian Electricity Regulatory Commission to carry out the management of electricity distribution within an authorized area.

"Diversity factor" means the probability that a particular piece of equipment will come on at the time of the facility's peak load. It is the ratio of the sum of the individual non-coincident maximum demands of various subdivisions of the system to the maximum demand of the complete system

"Person" includes an individual, company, partnership or any other association of individuals, whether incorporated or not;

"Methodology" means the Nigerian Electricity Regulatory Commission (Estimated Billing) Methodology, 2012.

"**New Customer**" means a person who has applied to a Disco to be connected to the distribution grid network and has been so connected by the Disco but is yet to be issued a meter

Power Factor means ratio of active power to apparent power (KW to KVA)

"Static Equipment Audit" means Auditing of the installed appliances and equipment in customer premises.

Load Factor means ratio of average load to peak load over a designated period

"Trader" means a person engaged in any form of marketing, brokering or intermediation in the sale of electricity, whether or not it entails the purchase of electricity for resale, or whether or not title is taken to the electricity sold.

(2) All other words or phrases not defined in this Methodology shall have the meaning defined in the Electric Power Sector Reform Act of 2005 or any Regulation or Codes issued by the Commission.

CHAPTER II
METER READING BY THE DISTRIBUTION COMPANIES

4. Categories of Customers that may be Issued Estimated Billing

4.1 New Customer: A new Customer is any person who has applied to a Disco to be connected to the distribution network and has been so connected by the Disco but is yet to be issued a meter.

(a) Where a customer has applied for electricity supply in a format required by the DISCO and approved by the Commission and the customer is connected to electricity supply without a meter and were a derogation is obtained on the provisions of Section 1.2 of the regulations on Standards of Services which stipulates the Disco must fit meters within 10 working days, the customer shall be estimated but supplied and installed a meter within three (3) months of such application at the customer's premises.

4.2 Customers with faulty meters: These are existing Customers who have been issued meters which are no longer functional.

(a) Where a customer's meter develops a fault and a complaint is appropriately made by the customer, the DISCO shall repair or replace the faulty meter before the end of the billing cycle within which the complaint was made.

4.3 Customers whose meters cannot be read: These are customers whose meter readings could not be obtained by the DISCO due to inaccessibility occasioned by locked doors, customers not at home at the time of reading the meter, presence of dogs on the premises etc.

(a)Whenever a DISCO is unable to obtain a meter reading at a customer's premises and notifies the customer in a manner approved by the Commission, the DISCO shall estimate the customer's usage for the period.

(b)The DISCO shall endeavour to read the meter, at least, once in three (3) months and the estimated bills issued shall not amount to a figure in excess of the cumulative average of the customer's consumption.

5. Routine Meter Reading

5.1 DISCOs shall endeavor to obtain an actual reading of all meters recording electricity usage at all supply addresses within their areas of operations every month, or at such intervals as approved by the Commission.

5.2 Where the Distribution Company is unable to obtain an actual meter reading at a customer's premises, the customer's electricity usage shall be estimated by the company unless the customer provides his own meter readings within a stipulated period.

5.3 Except in cases of new connections, where there is no meter on the premises, the estimation of the customer's power usage shall be based on the outcome of the load audit which shall be agreed to by both the customer and the Disco. The Audit shall be carried out on Consumer Application for Supply Form like PHCN Form 74

5.4 Where a DISCO estimates a customer's usage the DISCO shall adopt the Commission's approved methodology for estimated billing, and the customer's estimated electricity usage shall, in no circumstance, be arbitrarily inflated by the DISCO.

CHAPTER II

METHODOLOGY FOR ESTIMATED BILLING

6. New Connections

6.1 The recommended methodology for estimation of a new connection shall be ***"Static Equipment Audit"***. Static Equipment Approach is the auditing of the installed appliances and equipment in a customer's premises by the application of appropriate load and availability factors to determine the estimated consumption of a prospective customer at the beginning of a relationship which is signed off by both the Disco and the Customer.

6.2 A new Customer shall be required to obtain and complete a Consumer Application for Supply Form of the Distribution Company (such as PHCN Form 74) detailing appliances and equipment upon which the energy consumption of the premises is estimated and the customer is placed in the appropriate tariff class.

6.3 The Disco Installation Inspector shall carry out a load inventory at the consumer's premises using the completed form, mentioned in 6.2 above, as a reference document.

6.4 For all installed equipment on the inventory with a known nameplate capacity rating $\mathbf{S_{ir}}$ (KVA), the inspector shall apply the appropriate appliance power factor and from standard values or proven operational practice, apply the requisite load factor and diversity factor.

6.5 The total load summation (P_a) for all the equipment in the customer's premises shall represent the customer's average load.

Total average load $P_a = \sum P_i$ in KW

where $P_i = S_{ir} * PF_I * LF_i * DF_i$ for i^{th} appliance in KW

The consumption estimate C shall therefore be:

$$C = \alpha P_a * 720$$ in KWH for 30 days in a month and 24 hours in a day.

Where α = (Number of hour the feeder is on) **/** (Total number of hours in the billing cycle)

Therefore

$$C = 720 * \alpha P_a$$ in KWh

6.6 The Discos shall be required to submit to the Commission, the diversity factor used for the estimation.

6.7 Appendix A enlists the typical values of appliances ratings which can be used in the determination of the new customer's energy consumption in Kilowatt Hour (KWH).

7. Metered Customers

7.1 The Commission's Regulation on "Customer Services Standards of Performance for Distribution Companies" provides in section 1.10 (Meter Reading Frequency) that the standard for actual reading of all meters installed to record the usage of electricity by customers must be done at least once every three months.

7.2 Section 5.1.1 of the part 3 of the Metering Code specifies that the Discos should schedule at least once in four (4) readings for all manually read meters.

7.3 The methodology recommended for metered customers shall be to bill the customer on the last actual reading obtained until another reading is established. Consequently, a reconciliation shall be carried out which may result in the crediting or debiting of the customer.

8. Unmetered Maximum Demand (MD) customers

8.1 The methodology for the estimation of bills for the Unmetered MD customers shall be the "**Load Measurement Method"** which shall be the measurement of the voltage and current on the customer premises for a specific period (between one to twenty four hours) during normal operation and the application of the formula provided hereunder for estimation of monthly Consumption

Consumption in KWh = $3 \times V_L \times I_L \times PF \times A \times LF \times 1000$

Where :

V_L = Line Voltage in Volts

I_L = Line Current in Amperes

PF = Power Factor

LF = Load Factor

A = Number of hours of power supply availability in the month

Amount Payable = (Tariff Class rate x KWH) + Fixed Charge +VAT

9. Unmetered Non-MD Customers

9.1 The methodology applicable to these categories of customers and others not captured above shall be termed **"Inventory of Connected Load Method".** This method involves the subtraction of all the metered load from the energy supplied to the feeder (33 or 11KV) and the application of an appropriately determined availability factor and correction of losses which is aggregated among the various number and classes of customers supplied by the feeder.

9.2 The method shall require the determination (in advance through statistical analysis of historic information) of the averages of the proportions of the consumptions for the various classes of customers in the urban and rural areas and the relationship derived below is applied to determine the proportion of the energy supplied to the feeder which shall be proportionately distributed among the various customers.

9.3 The above methodology shall be determined as follows:

On the assumption that the total grid energy supplied to a Disco is equal to the Energy on all its feeders, if energy on all feeders is X then,

Energy available for billing, $Z = X - \mu X$.

Where μ = % of Distribution technical loss (10% - MYTO rate)

Then

$$Z = X - 0.1X = 0.9X$$

If Z_m = Energy consumed by metered customers (both prepaid and manually read)

Z_u = Energy consumed by unmetered customers

Z_i = Energy of illegal connections (non Technical or commercial loss of 18% - MYTO rate for the Disco), then total energy available for billing which should be equal to the total energy billed will be,

$$Z = Z_m + Z_u + Z_i$$

Therefore, the energy which should be billed to unmetered and legally connected customers, $Z_u = Z - Z_m - Z_i = 0.82Z - Z_m$

Or

$$Z_u = 0.72X - Z_m$$ (in terms of the total grid energy to the feeders)

Considering that load on a feeder may be prone to shedding, availability factor=

α = (Number of hour the feeder is on) **/** (Total number of hours in the billing cycle)

Then total energy for the unmetered customers becomes

$$\mathbf{Z_u} = \alpha Z_u = \alpha (0.82Z - Z_m)$$

Or

$$\mathbf{Z_u} = \alpha Z_u = \alpha (0.72X - Z_m)$$

Determination of the load for each Class and a customer in the class,

If ℓ_c represents the proportion of the load consumed per customer class based on a historic figure per feeder (which could be the feeder being considered), then

$$\ell_c = \frac{\quad}{\quad}$$

Where: Na = Number of Customer in a class in the feeder
Ca = Average consumption or load of a class in the feeder
N_iC_i = Total Consumption or load of all classes in the feeder

Consequently, the **consumption per customer per class of Unmetered Customer** can be determined as:

$$\mathbf{Z_{ci}} = \ell_c \frac{\quad}{\quad}$$

Where: N_c =Number of customer in a class being considered in the feeder

Therefore for the various Classes of customers we obtain as follows;

R1= $\ell_{cR1} Z_2 / N_{R1}$ for RI customer Class

R2= $\ell_{cR2} Z_2 / N_{R2}$ for R2 customer Class

R3= $\ell_{cR3}\, Z_2 / N_{R3}$ for R3 customer Class

R4= $\ell_{cR4}\, Z_2 / N_{R4}$ for R4 customer Class

C1= $\ell_{cC1}\, Z_2 / N_{C1}$ for C1 customer Class

C2= $\ell_{cC2}\, Z_2 / N_{C2}$ for I customer Class C2 to

Street Lights= $\ell_{\text{Street Light}}\, Z_2 / N_{\text{Street Light}}$ for Street Lights customer Class

Chapter IV

MISCELLANOUS PROVISIONS

10. Proceedings before the Commission

All proceedings before the Commission under this Methodology shall be governed by the Business Rules, including amendments and statutory re-enactments thereof.

11 . Amendment or repeal

The Commission may from time to time amend or repeal, in whole or in part, the provisions of this Methodology.

12 . Dispute resolution

Disputes between the Distribution Licensee and Customers which are not resolved by the parties will be handled in accordance with the Customer Handling Procedure

THE COMMON SEAL OF NIGERIAN ELECTRICITY REGULATORY COMMISSION

Was affixed pursuant to the ORDER OF THE COMMISSION

On this _____, 2012

APPENDIX A

Appliance	Type	Rating	Power Demand in Kilowatt (kw)	Rated Current in Amperes (Amps)	No. of Hrs. to consume one unit of electricity (i.e. 1 Kwh)
Lamps (Incandescent)		**40 Watts**	**0.04**	**0.2**	**25**
		60 Watts	**0.06**	**0.25**	**17**
		100 Watts	**0.10**	**0.4**	**10**
Lamps (CFL)		11 Watts	0.011	0.1	91
		16 Watts	0.016	0.11	63
		25 Watts	0.025	0.12	40
Lamps (Linear compact florescent)		20 Watts	0.02		50
		40 Watts	0.04		25
Lamp (Light Emitting Diode-LED)		3 Watts	0.003		333
		5 Watts	0.005		200
Iron	**Small**	**750 Watts**	**0.75**	**3.2**	**1.3**
	Medium	**850 Watts**	**0.85**	**3.6**	**1.2**
Toaster	**Regular**	**1000 Watts**	**1.0**	**4.3**	**1**
Kettle	**Small**	**2000 Watts**	**2.0**	**8.6**	**0.5**
	Medium	**3500 Watts**	**3.5**	**15**	**0.3**
Water-Heater	**50 liters**	**1200 Watts**	**1.2**	**5.2**	**0.8**
	100 liters	**2500 Watts**	**2.5**	**11**	**0.4**

Cooker	Small	6000 Watts	6.0	26	0.2
(4 plate with oven)	Regular	8000 Watts	8.0	34	1.2
	Large	10000 Watts			
Single plate cooker	Portable	1800 Watts	1.8	7.7	0.6
Fan	Table	0.08 HP	0.06	0.25	17
	Standing	0.1 HP	0.7	0.3	14
	Ceiling	0.3 HP	0.22	0.9	45
GSM Charger		20 Watts	0.02	0.1	1
Hair Dryer	Regular	1000 Watts	1.0	4.3	1
Sewing	Regular	100 Watts	0.10	0.4	10
Popcorn Popper	Regular	250 Watts	0.25	1.1	4
Desktop Computer		200 Watts	0.2	0.9	5
Printer	Regular	100 Watts	0.10	0.4	10
Laptop Computer		50 Watts	0.05	0.2	20
Satellite Receivers		35 Watts	0.04	0.6	25
Hair Dryer	Regular	1000 Watts	1.0	4.3	1
Blender	Regular	300 Watts	0.3	1.4	3.3
Water Dispenser	Heating	500 Watts	0.5	2.3	2
	Cooling	98 Watts	0.098	0.4	10.2
Photocopying Machine	Small	1200 Watts	1.2	5.5	0.8

	Medium	**1750 Watts**	**1.8**	**7.9**	**0.6**
Typewriter	**Regular**	**52 Watts**	**0.05**	**0.2**	**20**