ELECTRIC ENERGY TARIFFS IN A DEREGULATED ECONOMY FOR SELF RELIANCE AND SUSTAINABLE DEVELOPMENT IN NIGERIA

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Abstract

Electric energy which is placed on top of the energy stratification and its uses at home, industry, agriculture, and in transport is indispensable. Tariffs are ways in which electric utilities derive their income from customers through effective electricity bills. This paper examines and analyses the energy billing in a deregulated economy in terms of its benefits for sustainable development especially for its capacity in eliminating subsidies, improvement in public financing and sale of assets. It as well shows its improvement of macro performance in generation of energy, transmission and distribution system. Moreover electric energy and billing are cost effective as well as competitive with improved service to consumers while at the same time encouraging private investment, lower consumer tariffs, and efficiency in operation. various tariffs system such as flat demand rate, straight rate, block rate, Hopkinson rate, Doherty rate, Wright rate and further proposed three important tariffs demand rate known as Otokpa, and Ajeibi demand rate. Energy billing in deregulated economy were analyzed and benefits of deregulated of electric energy for sustainable development were examined as elimination of subsidies, improve public financing through sale of assets, improve performance or generation, transmission and distribution system by effective competition, improved service to consumers, encourage private investment, lower consumer tariffs through efficient operations. It is indeed the recommendation and conclusion of this paper that as sensitive as electric energy. It should be jointly managed both by government and the private sector to create a better monitoring of performances in outputs for public good.

INTRODUCTION

Electric energy companies in the world incurred loss due to low tariff, high generation, and transmission and distribution losses and as a result many countries in the world have undertaken comprehensive review of the sector to make electric utility more responsive to public needs, improve and private sector participation in electric power generation, transmission and distribution.

In Nigeria, the electricity was in the hand of National Electric Power Authority (NEPA) and is now the Power Holding Company of Nigeria (PHCN) to generate, transmit, distribute and market to the general public. Electricity in Nigeria is distributed via the National grid system. Power is not decentralized; this body implements different energy policies. Before the deregulation reform, PHCN had a monopoly in generation, transmission and distribution, but currently the generation and distribution section are under a serious reforms. The tariffs system is

formulated and monitor by the Nigeria Electricity Regulatory Commission with the following mandates:

1. To determine the tariff for electricity, wholesale, bulk, grid or retail in the country.
2. To determine the tariff payable for the use of transmission facilities
3. To regulate power purchase and procurement process of transmission facilities in the nation.
4. To promote competition, efficiency and economy in the activities of the electricity industry.
5. To perform other functions, as conferred by the Federal Government as regards operation of Power system in the country, safety standards, power quality standards, National Power Policy etc.

Energy billing and customer information system in a deregulated power sector may be different from the present day billing system where consumer receives monthly bill for electricity consumption and meter rent, since generation, transmission and distribution function may be performed by different companies. It is advisable that billings for each of these are shown separately on each consumer's bill (Nicholgon, K.E. etal 200). Additional segmentation for metering function and customer service may also be made by Distribution Company or Retail Company. Other information of the electric bill are profile code, customer name and address, rate in kilowatt hour (KWH) and total amount changed and consumed by customers.

TARIFF

Tariffs are different methods of charging customers (Gupta, B.R, 2000). A good electric tariff should fulfill the following objectives and requirements.

1. Must have a satisfactory net return on the capital investment.
2. Cost of metering, billing, collection and miscellaneous services must be recovered.
3. Cost of operation, supplies, maintenance of losses must be recovered
4. It should be simple and comprehensive to the public.
5. Cost of capital investment in generation, transmission and distribution equipment must be recovered.
6. Should be uniform over large population.
7. It should provide incentive for using power during the off-peak hours.

COMPARISM OF ELECTRIC UTILITY COMPANIES WITH OTHER FIRMS IN NIGERIA

In Nigeria electric business enjoy monopoly, and it is subjected to government control especially as regards to fixation in tariff, the amount of voltage and frequency is specified by electricity rules. PHCN directly sell the commodity to the consumer's and there are no middle men like whole-sale dealers and retailers. Generally, electric utility trading required huge investment and return on investment is low, duplication of facilities or competition is uneconomical and this lead to monopoly. (Roley, T.A 1977).

TARIFF SYSTEM

A lot of tariffs have been proposed over the years and are in use. They are generally derived from the following equation

$A=Cx + dy + f$

Where

A = Total amount of bill for a certain period (one month)
x = maximum demand during the period (KW or KVA)
y = total energy consumed during the period (KWH)
c = unit charge for maximum demand (Naira/Kw, Naira/ KVA)
d = unit cost of energy, (Naira for KVA)
f = constant charge, (in Naira).

A standard or general bill consists of three parts, one depending on maximum power demand, the second on total energy consumed and the third being a constant figure (Barely, E.E 1974).

1. FLAT DEMAND RATE

The flat demand rate can be expressed in the form of $A=Cx$, this implies that the bill depend on unit charge for maximum demand in naira per kilowatt and maximum demand during the period in kilowatt.

It is the earliest form of tariff and the bill in those days was based on the total number of lamps installed in the premises and currently this tariff is restricted to sign lighting, signal system, street lighting and in irrigation farms where the number of hours are fixed and energy consumption can be easily predicted. This charge is made according to the horse power of the motor installed based on the rated capacity .The cost of metering equipment and meter reading is eliminated by the use of this form at tariff (Gupta, B.R. et al 1975).

2. STRAIGHT METER RATE

This tariff is in the form of $A=dy$ .It is a function of total energy consumed during the period in kilowatt hour and the unit cost of energy in naira per kilowatt hour. This implies that these charges depend on the energy used. It is used in residential and commercial customers because of its simplicity (Gupta, B.R et al 1975) on the other hand, its main challenge is that customer who does not use energy has zero bills though it caused the utility company to incur a definite expenditure due to its readiness to serve him and discourage the use of electricity.

3. BLOCK METER RATE

This tariff is a modification of straight meter rate based on sliding scale where a certain unit rate is for a certain block of energy and for each succeeding block of energy. The corresponding unit charge decrease and is expressed in the form of A= dy, + dzy2+ ……. + dn [y- + y2 + ….tyn + …. + yn-1)] where d1, d2, d3, are unit charges for energy blocks of magnitude y1, y2, y3 etc. generally the charge and energy consumption are divided into three blocks; a high rate for the initial certain number of energy units, lower rate for the next certain number of energy units and still lower for the remaining energy units

(Roley, T.A 1977). This tariff is commonly used for residential and commercial customers. In Nigeria, this tariff is in a reverse form to restrict the energy consumption and as a result the unit energy charges increases with increase in energy consumption.

4. HOPKINSON DEMAND RATE

This tariff favour the utility company and is in the form of A= Cx + dy. It includes a demand charge based on the maximum demand plus a charge based on energy consumed; the factors c and d may be constant or may vary as per sliding scale. It is mainly used for industrial customers and introduces the problem of measuring the maximum power demand of the customers. The maximum demand can either be taken as a certain fraction of the corrected load or measured by a maximum demand meter (Gupta, B.A et al 1991). The demand charges are based on KVA of maximum demand; these in most cases discourage customers from using low power factors.

5. DOHERTY RATE

This rate is mainly for industrial customers that uses heavy electrical machine. The tariff is in form of Cx + dy + f that has three components. This rate favours the electric utility because the rate recovers maximum demand irrespective of the amount of energy consumed and considers total energy consumed during the period and unit cost of energy.

6. WRIGHT DEMAND RATE

This tariff is generally specified for those industrial customers who have a control over their maximum demands and may be in the form of Cx + dy but offers an inducement to a customer to keep his maximum demand at a low value and energy charge for a reduction in maximum demand is low. This implies an improvement in load factor.

7. TARIFF PROPOSAL FOR RESIDENTIAL CUSTOMERS IN NIGERIA

There is a lot of inconsistency in the billing system from time to time and they are a need for stability within the sectors; say a review in every four years. In a developing country like Nigeria, the tariff system should be in either in the form of;

A = Cx +f _____ (1) Otokpa
Where X= maximum demand during the period in kilowatt.
C = unit charge for maximum demand in naira per kilowatt.
F = monthly charges for metering and other constant.

Or

A = dy + f _____ (2) Ajeibi
Where
D = unit cost of energy in naira per kilowatt hour
Y = total energy consumed during the period in kilowatt hour.
F = monthly charges for metering and other constant

$\int_a^b f(x)\,dx$ _____Ajeibi,

where f(x) is the integration value of cost of Generation, transmission, and distribution and must be charged based on the building types: hut, one bedroom, bungalow, Duplex, high rising and sky scrapers

The mode of payment in Nigeria is either post paid or prepaid metering.

1. Post paid is the process whereby customers are allowed or given access to the electrical energy and at the end of the specified period, electrical utility company calculate and bring the tariff in form of bill and give to both industrial and residential customer. This system does not favour the electric utility companies because of long history of bad debt incurred by influential customers and government offices while the prepaid system is in the form of billing system where customer pays and procures for both monthly charges and electrical units ahead/or before access is given to them for usage. The billing below is a sample of prepaid tariff in Lagos, Nigeria.

PHCN EKO DISTRIBUTION ZONE
VAT NO: LCV25230601

Date : 30/11/2011 12:22:33
Customer: Awotundu S.A
Location No: MUS9043130382-01
Meter No: 01325914628
Address: 10 Karimu Street, Mushin
Debt Collected : =N=0.00
Monthly Charges: =N=325.00
Charges VAT : =N=15.47
Cost of units: =N=629.56
Total units: 86.2kwh = N=7.30/kwh
Unit VAT = N= 29.97
Total paid =N=1000.00
Electricity Token PIN: 53809614709795095316
GNO: M30N00188169
Operator : C.P. Anyasie
SGC: 600292 Tariff: 1 KRN:1

SOURCE: PHCN EKO distribution zone, Lagos.
November, 2011

PHCN EKO DISTRIBUTION ZONE
VAT NO: LCV25230601
Credit token

Date: 08/06/2012 13:26:05
Consumer: Awotundu S.A
Location No: MUS9043130382-01

Meter No: 01325914628
Address: 10 Karimu Street, Mushin
Debt Collected : =N=0.00
Monthly Charges: =N=575.00
Charges VAT : =N=27.37
Cost of units: =N=379.56
Total units: 29.5kwh = N=12.87/kwh
Unit VAT = N= 18.07
Total paid =N=1,000.00
Electricity Token PIN: 3427318548590960 6477
GNO: M30N00213047
Operator : Akanbi Akintunde A
SGC: 600292 Tariff: 1 KRN:1

Source: PHCN EKO distribution zone, Lagos.
June ,2012

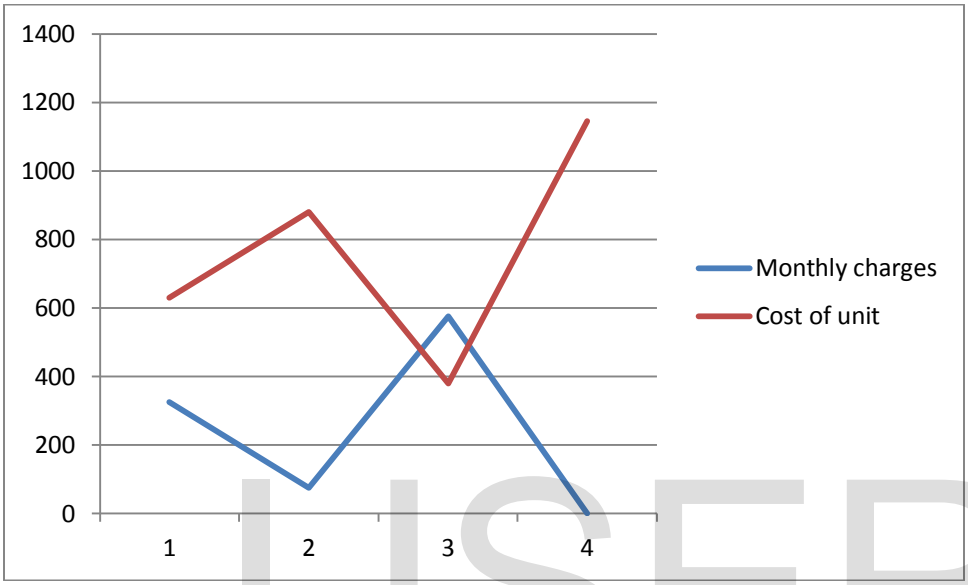
PHCN EKO DISTRIBUTION ZONE
VAT NO: LCV25230601
Credit Token

Date : 17/04/2012 14:58:10
Customer: Awotundu S.A
Location No: MUS9043130382-01
Meter No: 01325914628
Address: 10 Karimu Street, Mushin
Debt Collected : =N=0.00
Monthly Charges: =N=75.00
Charges VAT : =N=3.57
Cost of units: =N=879.56
Total units: 120.5kwh = N=7.30/kwh
Unit VAT = N= 41.87
Total paid =N=1,000.00
Electricity Token PIN: 0797 2944 1467 6416 5019
GNO: M30N00206526
Operator : Akanbi Akintunde A
SGC: 600292 Tariff: 1 KRN:1

Analytical deduction for ₦1000

Date	Monthly charges	Cost of unit	Total unit	Vat
30/11/2011	325.00	629.56	7.30	29.97

17/04/2012	75.00	879.56	7.30	41.87
08/06/2012	575.00	379.56	12.87	18.07
23/06/2012	0.00	1,145.48	13.87	



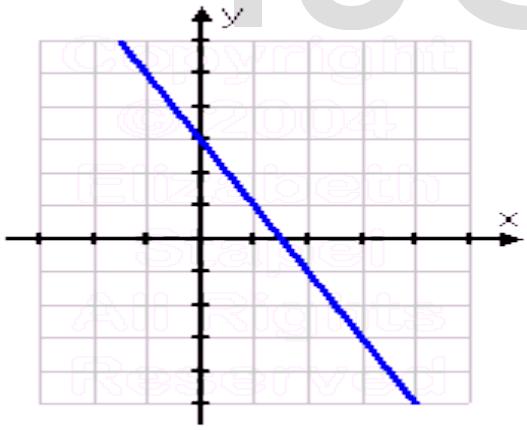


Figure 1.2 : graph of Monthly charges against unit cost

The extrapolation of monthly charges against unit cost showed a straight line curve intercepting at both y and x axis. This revealed a progressive increase in total unit in Naira/kilowatt hour (N/kwh)

BENEFITS OF DEREGULATION

Currently, electricity department and energy are still controlled strictly by government. The technical departments of generation, transmission distribution operations are funded by the government. This is capital intensive and return on investment is slow, and it is now realized that this system is unwisely, uneconomical, and is not consumer friendly. Complete deregulation of the sector can bring in the following advantages.

1. Elimination of subsidies: public fund in the form of tax payer's money are squandered on subsidies which are in most cases not given proper account of.
2. Improve public finance through sale of assets.
3. Improve performance of generation, transmission, and distribution system by introducing competition between different power players.
4. Improve and better service to consumers
5. Attract private investment and lower customer tariffs through efficient operations.

RECOMMENDATION

1. Deregulation should be carefully planned and carried out in a way and manner that the implementation will not have negative effect on the public.
2. Sales of public asset should be done in a transparent manner.
3. Only companies with the technical knowhow and financial strength should be allowed to participate on the initial take off of the deregulation process.
4. The scope of Nigerian deregulation should be such a way that will accommodate individuals, research institute, and all tiers of government.
5. Government should set up value added network (VAN) in form of energy parliament where energy senators and customers will interact both electronically and physically in such a way that will enable customers to maintain electronic mail.
6. There is an urgent need for legislative framework that will mandate all the tiers of government to establish a bureau of energy office for effective energy audit.
7. Energy is a springboard to economy development, therefore, government should establish energy development fund (EDF) to support this sector.

CONCLUSION

Energy is very sensitive to either stay in the hand of government or private alone. Both have a good role to play. Government is not a good business manager, therefore, should be restricted to the role of policy maker and should not be involve in commercial activities. In Nigeria, if the above recommendation is adhered to, electric energy requirement will be achieved and maintained.

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