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Electricity Theft in Nigeria: How Effective Are the Existing Laws?

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Abstract
There is an overwhelming concern that if electricity theft is not controlled urgently, it will contribute immensely to a continued cycle of mountain debts and inefficiencies for not just the DISCOs but also for the GENCOs. There is an estimated average loss of about N21 billion annually in the power sector to energy theft. Against this backdrop, this paper provides a menu of options for the DISCOs in controlling electricity theft. In doing this, existing laws and regulations prohibiting energy theft in Nigeria and relevant empirical literatures were duly reviewed. Cutting edge ideas on how to combat electricity theft were drawn from cross country experiences. Experience from the United Kingdom, United States of America and South Africa coupled with Nigeria's peculiarities informed the issues raised for legislative consideration.
Keywords: Electricity theft; existing laws; Nigeria.
JEL Classification: D11, D6

I. Introduction

The Distribution Companies (DISCOs) are one part of the three divisions of the Power Sector value chain that arose from the power sector privatization process in 2013. The DISCOs are responsible for delivering electricity to homes, the billing of consumers and revenue collection. The DISCOs have noted that the continuing threat of electricity theft is a major contributing factor to its current liquidity problems, huge debts and inefficiency in carrying out their primary functions. There is an overwhelming concern that if electricity theft is not controlled urgently, it will contribute immensely to a continued cycle of mountain debts and inefficiencies for not just the DISCOs but also for the GENCOs. Consequently, this brief provides a menu of options for the DISCOs in controlling electricity theft.

II. Background

The privatization of the power sector in 2013 brought about the division of Power Holding Company of Nigeria (PHCN) into three, namely; the Generating Companies (GENCOs), Transmission Company of Nigeria (TCN) and the Distribution Companies (DISCOs). To understand the extent of the detrimental effect of electricity theft on the power sector, the link between the three and power efficiency, has to be established. The GENCOs are responsible for transforming hydro and gas power into electricity and transmit this electricity to the TCN. The TCN uses their transmission grid to collect bulk electricity from the GENCOs and transmit to the DISCOs. The DISCOs buy electricity from the TCN and distributes to consumers for a price (tariff). While the GENCOs and DISCOs are privately owned, the TCN is owned and controlled by the Federal Government.

Privatizing the Power Sector was premised on the need for constant and adequate power, which is a pre-requisite for promoting industrialization and economic growth[1]. On this basis, the expectations from privatizing the power sector included an increased efficiency in the generation, transmission, and distribution and billing system. Ultimately, privatization was supposed to reduce the power sector infrastructure deficit and ensure efficient distribution.

However, the expected benefits of privatization has been limited. The GENCOs average electricity generation stands at 3,000 MW compared to Nigeria's installed generating capacity of 10,396 MW. Limited access to foreign exchange as well as unfavourable exchange rate shocks are among the major threats to power generation[2]. For TCN, Nigeria's average electricity consumption per inhabitant is only 150 kWh per capita which is one of the lowest in the world[3]. High number of system collapses, inadequate manpower to ensure proper maintenance of transmission equipment, and the continuous vandalization of transmission equipment have contributed in the low electricity consumption per inhabitant. Also, the DISCOs are in huge debt and are poorly funded. This is as a result of poor revenue collection framework and inefficient supply from the National Grid.

The Federal Government as well as the National assembly have both asserted that the privatization process has not worked as expected and agreed for the need for urgent actions in the power sector, which will involve the

[1] Joseph, I.O. (2014). Issues and Challenges in the Privatized Power Sector in Nigeria. Journal of Sustainable Development Studies, 6(1), 161 -174.
[2] http://sparkonline.com.ng/2017/01/understanding-the-nigerian-power-sector-gencos.html
[3] http://sparkonline.com.ng/2017/01/understanding-the-nigerian-power-sector-tcn.html

review of the privatization process[1]. Of important consideration to the needed improvements in the power sector and also the proposed review process, is the challenge of Electricity theft confronting the DISCOs. Electricity theft refers to the criminal act of using electricity without paying for it. It involves bypassing the prepaid meters and the unlawful direct connection to the distribution source.

Electricity theft is characterised by; a deliberate action to deceive the electricity company by tampering with the meter for lower readings, rigging an electricity line from the power source by bypassing a meter, intentional billing irregularities by using employees of electricity companies, and unpaid bills.

III. Issues on Electricity theft in Nigeria

Electricity theft is a serious problem to the entire value chain of the power sector. Theft of electricity increases prices for customers and reduces safety. It leads to misallocation of costs among suppliers, which can distort competition and hamper the efficient functioning of market operators. When Electricity theft occurs, the cost of purchasing electricity from the GENCOs through TCN will be higher than the revenue collected from the sales of electricity to consumers. This is so because, electricity theft allows consumers to use electricity without paying for it. Electricity theft leaves the DISCOs with a huge liability. The DISCOs are unable to pay for electricity transmitted from the GENCOs, which makes them reject electricity while remaining indebted to the GENCOs. In turn, this reduces revenues to the GENCOs while increasing the cost of generating electricity. The GENCOs cannot meet their obligations to gas suppliers, rendering them highly indebted with a reduced effectiveness in performing their primary function. Electricity theft induces a cycle of indebtedness and ineffectiveness for both the DISCOs and GENCOs.

The occurrence of electricity theft has become dire. For instance, the Ikeja Electricity Distribution Company (IKEDC) reported that 43,000 prepaid meters out of 134000 installed by the company have already been tampered with.[2] The Porth Hacourt Electricity Distribution Company (PHED) reported a loss of about 30% of expected revenue to energy theft. The distribution company noted that energy theft represented a huge revenue leakage to the company. The Enugu Electricity Distribution Company (EEDC) reported a loss of about 43% of its expected monthly revenue to energy theft[3]. There is an estimated average loss of about N21 billion annually in the power sector to energy theft.

IV. Existing Laws and Regulations Prohibiting Energy Theft[4] in Nigeria

Section 94 (3) of the Electric Power Sector Reform Act (EPSRA) provides that 'Notwithstanding anything contained in any other law, any person who wilfully destroys, injures or removes equipment or apparatus of a licensee commits an offence and is liable on conviction to imprisonment for a period of not less than five (5) years and not more than seven (7) years.

The Miscellaneous Offences Act (MOA) also contains provisions dealing with tampering with electrical equipment. Section 9 of the Act provides that 'any person who unlawfully disconnects, removes, damages, tampers, meddles with or in any way whatsoever interferes with any plant, works, cables, wire or assembly of wires designed or used for transforming or converting electricity shall be guilty of an offense and liable on conviction to be sentenced to imprisonment for life. Section 10 of the Act goes on to provide that 'any person who unlawfully disconnects, removes, damages, tampers, meddles with or in any way whatsoever interferes with any plant, works, cables, wire or assembly of wires designed or used for transforming or converting electricity shall be guilty of an offence and liable on conviction to be sentenced to imprisonment for life.

The Nigerian Electricity Regulatory Commission (NERC) theft and Other Related Offences Regulations (2014) provides that, any person who wilfully and unlawfully taps, tampers with a meter, installs or uses a tampered meter, receives electricity supply by by-passing a meter, or uses any other device or method which results in diversion in a manner whereby electricity is stolen or wasted, damages or destroys an electric meter, or causes or allows any of them to be so damaged or destroyed as to interfere with the proper or accurate metering of electricity, to abstract or consume electricity or knowingly use or receive the direct benefit of electric service through any of the acts mentioned in the regulation or uses electricity for the purpose other than for which the usage of electricity was authorised, so as to abstract or consume or use electricity shall be guilty of an offence under Sections 383 and 400 of the Criminal Code, Sections 286(2) of the Penal Code and Section 1 of the Regulation. The offences are punishable with terms of imprisonment as applicable under Sections 390 of the Criminal Code, Section 287 of the Penal Code or with imprisonment for a term of three years under the regulation or with fine or with both fine and imprisonment.

[1] https://www.thisdaylive.com/index.php/2017/10/13/fg-to-review-power-sector-privatisation/
[2] http://www.nigeriaelectricityhub.com/tag/electricity-theft/
[3] http://dailypost.ng/2017/10/06/energy-theft-eedc-introduces-whistle-blowing/
[4] https://www.linkedin.com/pulse/curbing-menace-electricity-theft-nigeria-urgent-call-legal-ehanmo/

V. Brief review of empirical literature

According to Smith (2004) electricity theft can be in the form of fraud (meter tampering), stealing (illegal connections), billing irregularities, and unpaid bills. He undertook estimates of the extent of electricity theft using a sample of 102 countries for 1980 and 2000. The results showed that theft is increasing in most regions of the world. The financial impacts of theft are reduced income from the sale of electricity and to charge more to consumers. The study further revealed that electricity theft is closely related to governance indicators, with higher levels of theft in countries without effective accountability, political instability, low government effectiveness and high levels of corruption. Smith (2004) therefore recommended that electricity theft can be reduced by applying technical solutions such as tamper-proof meters, managerial methods such as inspection and monitoring, and in some cases restructuring power systems ownership and regulation.

Utilizing data from the power corporation of Uttar Pradesh, India's most populous state, Golden, and Min (2011) studied the politics of electricity theft over a ten year period (2000-09). Their results showed that electricity theft is substantial in magnitude and that the extent of theft varies with electoral cycle of the state. They also found that in the years when elections to the State Assembly are held, electricity theft is significantly greater compared to the non-election years. Theft is increasing with the intensity of tube wells, suggesting that it is linked to unmetered electricity use by farmers. Incumbent legislative members of the state assembly are more likely to be reelected as power theft in their locality increases. Their interpretation of the various results was that power theft exhibits characteristics consistent with the political capture of public service delivery by local elites. Their results fail to substantiate that theft is linked either to political criminality or is the product of weak institutions.

Nielsen (2012) found that illegal electricity usage has a positive correlation with rate of illiteracy and regular events of violence, such as terrorism. According to the study, if the illiteracy rate and terrorist events in a region or city are higher, illegal electricity usage is expected to be higher because high illiteracy and terrorism usually indicate low income in that region or city. Investments to a city or region are discouraged due to insecurity. This finding was corroborated by Steadman (2010) who discovered that regions with higher murder rates and lower household incomes are using more illegal electricity.

Jamil and Ahmad (2014) acknowledged that electricity theft is a common problem in many countries and that energy worth billions of dollars is stolen annually from electricity grids. To them, the problem has socioeconomic, political, environmental and technical roots, but the solution is generally sought solely through technical. In the light of the foregoing, they empirically investigated the effects of various factors including electricity price, per capita income, probability of detection, fines collected from offenders, weighted temperature index and load shedding, that may explain electricity theft. The study employed annual panel data obtained from nine electricity distribution companies in Pakistan for the period 1988–2010. The study estimates the Fixed Effects models through the least squares dummy variable (LSDV) technique and Generalised Method of Moments (GMM). The results indicated that per capita income has significant negative and electricity price a positive effect on electricity theft with sufficiently high coefficient values. The probability of detection variable appears with a positive sign in both estimations indicating a poor deterrence. The results of LSDV showed a positive impact of fine on conviction on electricity theft. But in GMM estimation, this variable appears with a right sign. The results from both models were robust in the case of load shedding and temperature variables. The findings showed that economic variables are most significant in explaining electricity theft.

Jumale, Khaire, Jadhawar, Awathare, and Mali (2016) in a study for India found that electricity distribution authorities loose a large chunk of income, due to illegal connections or dishonesty of customers for their personal gains. According to them, various systems are introduced by researchers to detect the theft and diminish the non-operational loses. The methods like Support Vector Machine (SVM), Fuzzy C-means Clustering, Fuzzy logic, User profiling, Genetic Algorithm, among others, are used to detect theft in electricity. The authors noted that two disadvantages associated with using these systems based on this methodologies is accuracy and also the infrastructure needed to employ them (like smart energy meter). They proposed new system which tries to enhance the accuracy of theft detection.

VI. Cross Country Experience on *Combating Electricity Theft*

Country	***Legislation***	***Method of Combating Electricity Theft***
United Kingdom	Abstracting Electricity, contrary to section 13 of the Theft Act, 1968. A person who dishonestly uses without due authority or dishonestly causes to be wasted or diverted any electricity on conviction or indictment be liable to imprisonment for a term not exceeding five years.	- Confidential reports by citizens - Use of Smart Meters for billing as well as at distribution points in order to ensure electricity balancing analysis. (AMI technology) - Training and Education - TRAS: Electricity Theft Tip-Off Service – ETTOS - Artificial Intelligence and Machine Learning methods[1].
United States of America	The laws on theft differ among states. For example, the state of Louisiana (2006 Louisiana Laws - RS 14:67.6 — Theft of utility service; inference of commission of theft; penalties), provides that C (1). On a first conviction, the offender shall be fined not less than one hundred dollars nor more than five hundred dollars or imprisoned for not more than six months, or both". (2). "On a second or subsequent conviction, regardless of whether the second or subsequent offense occurred before or after an earlier conviction, the offender shall be fined not less than one hundred dollars nor more than three thousand dollars or imprisoned, with or without hard labour, for not more than two years, or both". D. "The provisions of this Section shall not apply to the attachment on the customer's side of the customer's main electric disconnect of any device which lowers the quantity of utilities actually used and does not divert such utilities or prevent their proper registration"[2].	- Meter readers need training to quickly review each meter and socket for signs of tampering, removal and other irregularities - Along with educating the paying public, utilities provide a secure web portal and confidential toll-free phone number for customers to report suspected energy theft - Reporting through the internet to remain anonymous. Utilities provide a secure web portal and confidential toll-free phone number for customers to report suspected energy theft. - Use of AMI technology. - Special meter locks are installed to prevent meter removal for those previously caught or suspected of energy theft. Transparent socket covers deters tampering also[3]

[1] https://www.electralink.co.uk/services/governance-management/theft-risk-assessment-service/
[2] https://law.justia.com/codes/louisiana/2006/146/78623.html
[3] http://www.elp.com/articles/powergrid_international/print/volume-12/issue-9/features/pulling-the-plug-on-energy-theft.html

Country	*Legislation*	*Method of Combating Electricity Theft*
South Africa	SECTION 13 of the GREATER JOHANNESBURG METROPOLITAN COUNCIL STANDARDISATION OF ELECTRICITY BY-LAWS [1] (1) When the council is satisfied that a meter has ceased to register correctly, the reading shown thereby shall be disregarded and the consumer- (a) shall be charged, in respect of the current meter reading period, the same amount as the consumer has paid in respect of the corresponding period in the preceding year subject to the adjustment necessitated by any alteration to the electrical installation or the charge determined by the council; or (b) if the consumer was not in occupation of the premises during the corresponding period referred to in paragraph (a), shall be Charged on the basis of his consumption during the three months preceding the last date on which the meter was found to be registering correctly; or (c) if the consumer was not in occupation of the premises during the whole of the period referred to in paragraph (b), shall be charged on the basis of his consumption during the three months following the date from which the meter was again registering correctly. (2) If it can be established that the meter has been registering incorrectly for a longer period than the meter reading period referred to in subclause (1), the consumer may be charged with the amount determined in accordance with the said subsection or for a longer period: Provided that no amount shall be so charged in respect of a period in excess of 38 months prior to the date on which the meter was found to be registering	- Install prepaid meters in vandal-proof boxes to avoid user interference and tampering - Encourage report of illegal electricity connections - Targeting these neighbourhoods with load shedding - Operation Khanyisa Campaign to combat electricity theft and mobilise South Africans to use power legally. - Extended penalties to the owners of any property where electricity theft occurs.

VI. Conclusions and issues for legislative consideration

Borrowing from the UK, we recommend confidential reporting by citizens. The already existing whistle blowing policy of the Federal government should be extended to energy theft. To do this, ideals should be borrowed from the USA to see that along with educating the paying public, utilities provide a secure web portal and confidential toll-free phone number for customers to report suspected energy theft.

We disagree on jail term for first time offenders (5 – 7 years) as ascribed in the Electric Power Sector Reform Act. We consider it very harsh and it has not been effective in reducing electricity theft. Instead, as done in the USA, penalties for electricity theft depends on how often the crime has been committed. We advocate that fines should be given to first and second time offenders. However, the penalty for a second time offender should be substantially higher than that of a first time offender. For third time (or more) offender, the penalty should include fines and possible jail time.

There should also be an increased liability for owners of property were electricity theft occurs. This will pass some burden of monitoring from the DISCOs to the owners of such property. For such properties, the owners will ensure that electricity theft does not occur, in order not to bear any form of loss through fines. On this basis, we recommend for the amendment of the Electric Power Sector Reform Act to reflect these innovative and current measure for deterring electricity theft through legislation.

[1] https://joburg.org.za/bylaws/electricity_bylaws.pdf

For consumers who are meter billed, the continuous use of AMR meters should stop. AMR meters do not allow for two way communications between the DISCOs and the consumer. Thus, when these meters are tampered with, there are time lags between when the tampering occurred and when the DISCOs become aware of it. Instead, we recommend for the installation of Smart meters (an example is the Open Smart Grid Protocol (OSGP) commonly used in Europe or Elster REX mesh network reading and time-of-use meters commonly used in the USA). These smart meters allow for the recording of electricity consumption on an hourly basis and relate same to the DISCOs for monitoring.

The instalment of Smart meters with AMI technology should not be restricted to consumer locations only. They should also be installed at distribution and sub – distribution (small transformers and larger (grid) transformers) points. The essence of this is to allow for efficient monitoring and balancing of distributed electricity from the DISCOs and reported electricity consumption from the consumers. With any difference, it will be easy to detect electricity theft and localise where the theft has occurred.

Given that a large proportion of electricity consumers are unmetered, the DISCOs should increase their efforts in monitoring electricity consumption. The DISCOs and the Federal Government should create a joint task force with the sole responsibility of monitoring illegal connections and meter tampering. At the end of every month, when consumer electricity bills are being delivered for unmetered consumers, the task force should check for all forms of electricity theft. We also recommend for random walk – in carrying out inspection checks for metered consumers. However, it has to be noted that the task force can only be effective if there are incentives to report electricity theft. If the incentives for reporting electricity thefts are higher than the incentives for not reporting, the task force can effectively report cases of electricity theft. The incentives not to report electricity theft may be in the form of bribes from the consumer at the point of electricity theft detection, need to maintain personal relationship, among others. If the reported cases of electricity theft is tied to the wages and salaries of the task force employees by way of added allowances, then they will be encouraged to report cases of electricity theft.

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