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Impact of electricity consumption on economic growth in Nigeria: An approach of time series econometrics

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Abstract

Electricity is a vital form of energy and therefore electricity supply security is crucial to ensure the continued supply of electricity from a well-functioning industrial process. The broad objective of this study is to analyze the impact of electricity consumption in Nigeria economy. The specific objectives are to: (i) evaluate the impact of state street-light electricity consumption on economic growth in Nigeria, (ii) ascertain the impact of residential electricity consumption on economic growth in Nigeria, (iii) determine the impact of commercial electricity consumption on economic growth in Nigeria. The electricity consumption variables consist of commercial electricity consumption (CEC), state street-light electricity consumption (SLEC), Residential electricity consumption (REC) and Real Gross Domestic Product (RGDP). All the variables were sourced from Central Bank of Nigeria's (CBN) statistical bulletin for various years. The data collected was estimated with multiple Least Square Regression. The study employed statistical package for social science (SPSS) statistical application software to analysis the data. The findings of the study revealed that commercial electricity consumption (CEC) has positive significant impact on economic growth in Nigeria (t – statistics (7.935354) > $t_{0.05}$ (1.684). State street-light electricity consumption (SLEC) has positive significant impact on economic growth in Nigeria (t – statistics (3.547276) > $t_{0.05}$ ((1.684). It also revealed that residential electricity consumption (REC) has positive significant impact on economic growth in Nigeria (t – statistics (0.867141) < $t_{0.05}$ ((1.684). Based on the findings of the study recommended that the Citizens of Nigeria should be educated to use the limited electricity supply wisely. It suggests that the policy of conserving energy consumption may be implemented with little or no adverse effect on economic growth, such as in a less energy-dependent economy.

Keywords: Electricity Consumption, Economic Growth, Time Series Econometric

Introduction

Electricity is a vital form of energy and therefore electricity supply security is crucial to ensure the continued supply of electricity from a well-functioning industrial process. Digital technologies and modern economies are all dependent on a guaranteed supply of dependable, reliable and efficient supply of electricity. Ellahai (2011) [16] stated that the industrial sector is the engine of economic growth and the performance of an industrial sector depends on a sustained and efficient electricity supply.

The importance of electricity consumption in developing countries like Brazil, Russia, India, China and South Africa (BRICS) has been viewed over the years as a significant factor contributing to economic growth and development. Digital technologies and modern economies are all dependent on a guaranteed supply of electricity. Electricity is referred to as a building block for economic growth (Khobai & Le Roux, 2017) [19]. It has a direct impact on livelihood and it is an infrastructural input in socio-economic development. Energy economists believe that electricity is the main driver of the factors of production and it is vital for manufacturing of goods into final products. This shows that when electricity is scarce, it imposes constraint to the growth of an economy.

Energy plays a major role in the economic development of a country. It is one of the key factors for production. It is an essential commodity for most human activities, such as serving as source of fuel for transport, source of light, and power for household appliances and industrial production. All these make energy play a crucial role in the socioeconomic development of the country. However, in the traditional economic growth theories, energy is not included among the factors of production.

Energy is taken as an intermediate input in the production function. Electricity, a component of energy, is one of the renewable and clean energies, with minimal negative health impacts. It is a major factor in economic development of the country and very important in achieving the Millennium Development Goals. Electricity is a key source of energy in both industrial and agricultural sectors of the economy. It also plays a key role in the health, education, and domestic sectors of the economy. It enables the low-income households in poor countries to engage in income-generating projects, which can facilitate them to move away from poverty. Poor access to modern, affordable, and clean energy hinders the economic development of the country. Without access to modern energy, the country will be pushed further to poverty (Attigah & Mayer-Tasch, 2013) [3]. During the past few years, numerous studies have been conducted to examine the relationship between electricity consumption and economic growth of an economy. So far, it has been found that there is a strong relationship between electricity consumption and economic growth. Ferguson, Wilkinson and Hill (2002) [17] have studied the issue in over 100 countries and found that there is a strong correlation between electricity consumption and economic growth. However, the existence of strong relationships does not necessarily imply a causal relationship.

Statement of the problem

Poor access to electricity in Nigeria has been a major impediment to Nigeria's economic growth. SMEs have been adjudged as the engine of economic growth but its performance is grossly dismal due to inadequate power supply. Researchers have identified the increase in energy use as a vital component of emerging economies; economic growth of the South Asia Association for Regional Cooperation (SAARC) countries – involving Bangladesh, India, Pakistan and Sri Lanka is closely related to its energy consumption which is an impediment for enhancing export values, increasing remittances receipts from manpower supply, Sheriff (2002) [41]. Whether African economies, most especially Nigeria are ready for developmental take-off should be based on its readiness to ensure adequate and regular power supply.

In order to ensure an appropriate recovery of the socio-economic process of Nigeria within the framework of effective economic system, development, enhancing structures, patterns and evolution of production, allocation and utilization of its vast resources, similarly ensuring optimal development and efficient management of available resources, equitable allocation of such resources and effective utilization in order to ultimately achieve economic development; the issue of electricity (power) availability needs to be taken as a vocal point in development planning, that is, the modern technologies needed to drive economic development are strictly tied to the use of energy. This therefore, is a function of adequate supply and distribution of energy, most especially electricity. This study therefore becomes imperative in analyzing the impact of electricity consumption on economic growth in Nigeria.

Objectives of the study

The broad objective of this study is to analyze the impact of electricity consumption on economic growth in Nigeria. The specific objectives are to:

1. evaluate the impact of state street-light electricity consumption on economic growth in Nigeria.
2. ascertain the impact of residential electricity consumption on economic growth in Nigeria.
3. determine the impact of commercial electricity consumption on economic growth in Nigeria.

Conceptual literature

Electricity

Electricity is a high-quality energy carrier – more productive and flexible than other energy vectors, with zero pollution at the end use point. Electricity is far more thermodynamically efficient than any alternative technology in applications such as lighting. There are many high-value applications such as computing and telecommunications for which electricity has no substitutes. Where there are alternatives, the high cost of electricity limits its use to quite high-value applications (Kaufmann, 1994 [27] cited in Okorie, & Manu, (2016) [35] but where electricity is subsidized it will also be used in low-value applications.

In the 19th Century, electric motors proved much more flexible than steam engines and allowed the reorganization of work in factories, providing productivity gains (Kander, Malanima, and Warde, 2014) [26]. Other early applications were lighting and telecommunications, first the telegraph and then telephones. Communications, lighting, and industrial power are likely to still be the first applications when electricity is introduced in previously unsupplied regions today.

Energy Consumption and Economic Growth

Physical laws describe the operating constraints of economic systems (Boulding, 1966 [6]; Ayres and Kneese, 1969 [4] cited in Okorie, & Manu, (2016) [35]. Production requires energy to carry out work to convert materials into desired products and to transport raw materials, goods, and people. The second law of thermodynamics (the entropy law) implies that energy cannot be reused and there are limits to how much energy efficiency can be improved. These limits can be approximated by a production function with an elasticity of substitution significantly below one (Stern, 1997 [43] cited in Okorie, & Manu, (2016) [35]. A meta-analysis of the existing empirical literature found that the elasticity of substitution between capital and energy is indeed less than one (Koetse, de Groot, and Florax, 2008) [30]. As a result, energy is an essential factor of production and continuous supplies of energy are needed to maintain existing levels of economic activity as well as to grow and develop the economy (Stern, 1997 [43] cited in Okorie, & Manu, (2016) [35]. There may also be macroeconomic limits to substitution of other inputs for energy. The construction, operation, and maintenance of tools, machines, and factories require a flow of materials and energy. Similarly, the humans that direct manufactured capital consume energy and materials. Thus, producing more of the substitutes for energy requires more of the thing that it is supposed to substitute for. This again limits potential substitutability (Cleveland *et al*., 1984) [14]. While there are limits to substituting energy for other inputs, meta-analysis of existing studies suggests inter-fuel substitution possibilities are good (Stern, 2012) [44]. Transitions between different energy sources have taken place in the past and can take place in the future.

Theoretical framework

This theoretical Framework of the study is anchored on Keynesian Growth Theories, Theory of Endogenous Economic growth and Wagner's Law

Keynesian growth theories

Keynesian Growth theory was formulated in the 1930s offering a response to the unique challenges of the Great Depression. Keynesian economics involves: government intervention to stabilise the economic cycle e.g., expansionary fiscal policy – cutting tax and increasing spending. The argument is that governments can speed up economic recovery, during the great depression of the 1930s, existing economic theory was unable either to explain the causes of the severe worldwide economic collapse or to provide an adequate public policy solution to jump-start production and employment.

British economist John Maynard Keynes spearheaded a revolution in economic thinking that overturned the then-prevailing idea that free markets would automatically provide full employment—that is, that everyone who wanted a job would have one as long as workers were flexible in their wage demands. The main plank of Keynes's theory, which has come to bear his name, is the assertion that aggregate demand—measured as the sum of spending by households, businesses, and the government—is the most important driving force in an economy. Keynes further asserted that free markets have no self-balancing mechanisms that lead to full employment. Keynesian economists justify government intervention through public policies that aim to achieve full employment and price stability.

Keynes argued that the solution to the Great Depression was to stimulate the economy ("inducement to invest") through some combination of two approaches:

- A reduction in interest rates (monetary policy), and
- Government investment in infrastructure (fiscal policy).

Investment by government in infrastructure injects income into the economy by creating business opportunities, employment and demand and reversing the effects of the aforementioned imbalance.

Empirical literature

Syed, and Muhammad, (2009) [45] investigated a study that examined the Granger causality between electricity consumption and Gross Domestic Product (GDP) for Pakistan using annual data covering the period 1971 to 2007. Augmented Dickey-Fuller test and Phillips-Perron test reveal that both the series, after logarithmic transformation, are non-stationary and individually integrated at order one. Engle and Granger Cointegration test exhibits the absence of long-run relationship among the variables. Two tests of causality, standard Granger Causality test and Modified WALD test (T-Y test) affirm the existence of unidirectional Granger causality from electricity consumption to economic growth without any feedback effect. Therefore, an immediate effort to increase electricity availability is required and energy conservation policies are supposed to halt the economic growth.

Hamdi and Sbia, (2012) [19] conducted a study to test the causal relationship between electricity consumption per capita and gross domestic product (GDP) per capita for Brazil, India, Indonesia, China and South Africa for the period 1971–2009. To reach this goal, the study used panel cointegration analysis and Granger causality tests. The results reveal that electricity consumption and GDP are cointegrated and the granger causality tests indicate a long-run relationship between electricity consumption and GDP growth for all countries except for South Africa. The short-run estimations indicate that GDP granger cause electricity consumption but not the reverse; hence the existence of unidirectional short-run causality relationship the two variables.

Adeyemi, (2013) [1] conducted research to examine the relationship between electricity consumption and economic growth in Nigeria using the Johansen and Juselius Co-integration technique based on the Cobb-Douglas growth model covering the period 1980-2008. The study adopted also conducted the Vector Error Correction Modelling and the Pairwise Granger Causality test in order to empirically ascertain the error correction adjustment and direction of causality between electricity consumption and economic growth. The study found the existence of a unique co-integrating relationship among the variables in the model with the indicator of electricity consumption impacting significantly on growth. Also, the study shows evidence of bi-directional causal relationship between electricity consumption and economic growth. Prominent among the policy recommendation, is the need to strengthen the effectiveness of energy generating agencies by ensuring periodic replacement of worn-out equipment in order to drastically curtail transmission power losses.

Pao, Li, and Fu, (2014) [37] conducted a study to investigate the relationship between energy consumption and economic growth in Brazil during the period of 1980-2008. The co-integration test indicates a long-run equilibrium relationship between variables, and energy consumption appears to be real GDP elastic. This elasticity suggests that energy consumption has a great positive influence on changes in income. The causality results from the error correction model reveal a unidirectional short-run causality from energy consumption to economic growth and a bidirectional strong causality between them. These findings suggest that Brazil should adopt a dual strategy of increasing investment in energy infrastructure, and stepping up energy conservation policies to reduce any unnecessary waste of energy, in order to avoid having a negative effect on economic growth by reducing energy consumption.

Hlalefang, Sanderson and Pierre, (2016) [22] investigated a study to probe the short and long run relationship between economic growth, electricity supply, trade openness, electricity prices, employment and capital in South Africa within a multivariate framework. The autoregressive distributed lag bound testing was employed to establish the long run relationship between these variables using data for the period between 1985 and 2014. Major findings of the study include that economic growth, electricity supply, trade openness, electricity prices, employment and capital are co-integrated. Overall, the paper suggests that efficient planning and increased investments in electricity supply industry infrastructure is of essence to solve the problem of electricity supply as this would force the sustainable economic growth in South Africa.

Okorie, and Manu, (2016) [35] conducted a study to evaluate the causal relationship between electricity consumption and economic growth in Nigeria for the period of 1980 to 2014.

The study employed the analysis of Johansen co-integration and VAR-based techniques. A long run relationship exists among the variables. The result shows that in the long-run, electricity consumption has a similar movement with economic growth, following the positivity hypothesis. The Granger causality test reveals that there is a unidirectional causal relationship between electricity consumption and economic growth. The study recommends that the industries increase daily generation of power to meet up with the increasing demand for power, more plant stations should be built, and the alternatives to power supply by PHCN should be made more competitive so as to increase productions and the output of the economy as a whole.

Adeyemi, Opeyemi, and Oluwatomisin, (2016) [2] conducted a study to examine the relationship between electricity consumption and economic development using an extended neoclassical model for the period 1970-2013. The study incorporates the uniqueness of the Nigerian economy by controlling for the role of institutions, technology, emissions, and economic structure in the electricity consumption-development argument. The study adopted a cointegration analysis based on the Johansen and Juselius (1981) maximum Likelihood approach and a vector error correction model. In order to ensure robustness, the study adopted the wald block endogeneity causality test to ascertain the direction of causal relationship between electricity consumption and economic development. The study found an existence of long-run cointegration equation with electricity consumption inversely related to economic development. Likewise, the vector error correction model failed to reject the null hypothesis of non-convergence in the long-run. Finally, the study found evidence supporting unidirectional causal relationship running from economic development to electricity consumption.

Hlalefang, (2018) [21] conducted a study to investigate the causal relationship between electricity consumption and economic growth in the Brazil, Russia, India, China and South Africa (BRICS) countries during the period 1990–2014. Carbon dioxide emissions and urbanisation were included as additional variables to form a multivariate framework. The Kao panel co-integration and Johansen Fisher panel co-integration techniques are applied to analyse the co-integration relationship between the variables while the vector error correction model Granger-causality test is used to estimate the causality relationship among the variables. The study's results reveal that there is a long run relationship between the variables. The research outcome further detected a unidirectional causality flowing from economic growth to electricity consumption in the long run in BRICS countries. So, in the light of determination of the study, the policy implication is that a significant transformation of low carbon technologies such as renewable energy should be implemented to curb the emissions and sustain economic growth and development.

Onuonga, (2020) [36] conducted research that investigated the long-run relationship between gross domestic product, access to electricity, and remittances within the multivariate framework in Kenya using the data for the period 1987-2018. The autoregressive distributed lag (ARDL) bounds test was used to investigate the long-run relationship. Causality between variables was investigated by use of the Granger causality method. The bounds test indicated that there is cointegration when gross domestic product, electricity access, and remittances are dependent variables. The long-run estimation of coefficients suggests that electricity access and remittances have significant positive impact on economic growth in Kenya in the sample period. Causality analysis provides evidence that there is unidirectional Granger causality running from gross domestic product to electricity access and not vice versa and from gross domestic product to remittances and not vice versa. There was no causality between remittances and electricity access. The policy implications of the paper suggest that the government and other companies concerned should enhance electricity access and encourage inflows of remittances as these contribute positively to economic growth in Kenya.

Methodology

This study made use of ex post-facto research design. The major source of data/information for the study was secondary data sources. A number of variables have been taken into consideration in this study. These variables consist of commercial electricity consumption (CEC), state street-light electricity consumption (SLEC), Residential electricity consumption (REC) and Real Gross Domestic Product (RGDP). All the variables were sourced from Central Bank of Nigeria's (CBN) statistical bulletin for various years. The study covered a period of 2000 to 2019 as defined in our model specification. The method of data analysis was multiple regression. The descriptive statistics which show the nature of the variables were used in the study. The study employed e-view version (9) statistical application software to analysis the data because it is user-friendly software.

Theoretical framework

The study adopts the Keynesian aggregate demand framework. In a simple Keynesian framework, the desired aggregate demand relationship in the Keynesian framework is expressed as follows:

$$Y = C + I + G + (X - M) \ldots\ldots\ldots\ldots \quad (1)$$

The behavioural equation is written as;

$C = a + bY^d$, $b > 0$

$Y^d = Y - T$

$I = \partial + Yi$, $Y < 0$

$G = G^*$

$X = S + \sigma e$, $\sigma > 0$

$M = M + \phi Y^d$ $\phi > 0$

Where Y = output, C = Consumption, = Disposable income, T = Tax revenue, I = Investment, $\partial\partial$ = exogenous investments, I = interest G = exogenous government expenditure (G*), X = exports, s= exogenous exports, e=exchange M= Imports, m= exogenous imports and b, $\sigma\sigma$, $\phi\phi$ and $\gamma\gamma$ are coefficients.

Model specification

This study specifically adopts the model of Adeyemi, Opeyemi, and Oluwatomisin, (2016) [2] to study of the impact of electricity consumption on Economic growth. Thus, the model is represented in a functional form as shown below:

$$RGDP = f(CEC, SLEC, REC) \ldots \quad (2)$$

Where CEC is commercial electricity consumption, SLEC is State street-light electricity consumption, REC is Residential electricity consumption, and RGDP is Real Gross Domestic Product (RGDP).
In a linear function, it is represented as follows:

$$RGDP = \beta_0 + \beta_1 CEC + \beta_2 SLEC + \beta_3 REC + \mu t \quad (3)$$

Where: β0 = Constant term, β_1 to β_3 = Regression coefficient and μt = Error Term.

To reduce the outliers among the variables, all variables will be expressed in logarithmic form.

$$RGDP = \beta_0 + \beta_1 LogCEC + \beta_2 LogSLEC + \beta_3 LogREC + \mu t \ldots\ldots \quad (4)$$

Where: β0 = Constant term, β_1 to β_3 = Regression coefficient and Ut = Error Term.

Descriptive Statistics of the Variables

Table 1: Descriptive Statistics of the Variables

	RGDP	REC	SLEC	CEC
Mean	215661.1	1333.260	83233.58	75735.36
Median	68088.36	1270.750	101676.8	100662.4
Maximum	527576.0	1976.900	123458.9	123458.9
Minimum	37474.95	883.7000	32793.10	32464.70
Std. Dev.	194069.2	358.9592	33471.53	35538.15
Skewness	0.477112	0.547544	-0.612019	-0.194128
Kurtosis	1.523602	1.855657	1.567460	1.200090
Jarque-Bera	2.575248	2.090616	2.958700	2.825348
Probability	0.275926	0.351583	0.227786	0.243491
Sum	4313222.	26665.20	1664671.	1514707.
Sum Sq. Dev.	7.16E+11	2448183.	2.13E+10	2.40E+10
Observations	20	20	20	20

Source: e-view's Result

The table 1 shows descriptive statistics of the variables. In the model established in the study, there is one dependent variable and three independent variables. These variables consist of commercial electricity consumption (CEC) (Megawatt per Hour); State street-light electricity consumption (SLEC) (Megawatt per Hour); Residential electricity consumption (REC) (Megawatt per Hour); and Real Gross Domestic Product (RGDP).
The mean of commercial electricity consumption (CEC) was 75735.36, the median was 100662.4, maximum was 123458.9, minimum was 32464.70, and sum of the variable was 1514707.0 respectively. The mean of State street-light electricity consumption (SLEC) was 83233.58, the median was 101676.8, maximum was 123458.9, minimum was 32793.10, and sum of the variable was 1664671.0 respectively. The mean of Residential electricity consumption (REC) was 1333.260, the median was 1270.750, maximum was 1976.900, minimum was 883.7000, and sum of the variable was 26665.20 respectively. The mean of Real Gross Domestic Product (RGDP) was 215661.1, the median was 68088.36, maximum was 527576.0, minimum was 37474.95, and sum of the variable was 4313222.0 respectively.

Regression model
Empirical results of the Multiple Regression

Table 2: Empirical results of the Multiple Regression

Dependent Variable: RGDP				
Method: Least Squares				
Date: 04/20/21 Time: 09:43				
Sample: 2000 2019				
Included observations: 20				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
REC	54.10601	62.39589	0.867141	0.3987
SLEC	3.845890	1.084181	3.547276	0.0027
CEC	7.691737	0.969300	7.935354	0.0000
C	550227.7	63781.22	8.626799	0.0000
R-squared	0.883943	Mean dependent var		215661.1
Adjusted R-squared	0.862182	S.D. dependent var		194069.2
S.E. of regression	72045.90	Akaike info criterion		25.38485
Sum squared resid	8.30E+10	Schwarz criterion		25.58400
Log likelihood	-249.8485	Hannan-Quinn criter.		25.42373
F-statistic	40.62106	Durbin-Watson stat		1.971254
Prob(F-statistic)	0.000000			

Source: E-view Results

The autoregressive distributed lag model was carried out to examine parameters estimates. In testing this hypothesis, commercial electricity consumption (CEC), State street-light electricity consumption (SLEC), and Residential electricity consumption (REC) were regressed against Real Gross Domestic Product (RGDP). The result of the regression analysis represents the model for the impact of electricity consumption in Nigeria economy. The empirical result showed that the coefficient of commercial electricity consumption (CEC) has positive significant effect on Real Gross Domestic Product (RGDP) because observed values of t – statistics (7.935354) was greater than its critical value ((1.684). The empirical result showed that the coefficient of State street-light electricity consumption (SLEC) has positive significant effect on Real Gross Domestic Product (RGDP) because observed values of t – statistics (3.547276) was greater than its critical value (1.684). The empirical result shows that the coefficient of Residential electricity consumption (REC) has positive but insignificant effect on Real Gross Domestic Product (RGDP) because observed values of t – statistics (0.867141) was less than its critical value ((1.684). The results of the F – statistical test showed that the overall regression of the variables was statistically significance because observed values of the F – statistics (40.62106) was greater than its critical value (3.456). Again, our empirical result shows that the adjusted R-squared (R^2) is 0.883943. Explanatory powers of the variables were very high. The Durbin-watson test was used to identify whether the model suffer from autocorrelation problem. The autocorrelation problem violates of ordinary least square assumption that says there is no correlation among error terms of different observation. Durbin- Watson statistics (d*) was carried to test randomness of the residuals and the assumption of ordinary least square was not violated. The null hypothesis; there is autocorrelation problem. The result of Durbin–Watson test (1.971254) carried out at five percent level of significance shows that the model is free from Autocorrelation problem and was greater than upper critical value of Durbin-watson (3.356). This denotes that prediction

base of the Ordinary Least Square estimates were efficient and unbias.

Summary of findings

The following are the major findings of the study**:**

1. Commercial electricity consumption (CEC) has positive significant impact on economic growth in Nigeria (t – statistics (7.935354) > $t_{0.05}$ (1.684).
2. State street-light electricity consumption (SLEC) has positive significant impact on economic growth in Nigeria (t – statistics (3.547276) > $t_{0.05}$ ((1.684).
3. Residential electricity consumption (REC) has positive significant impact on economic growth in Nigeria (t – statistics (0.867141) < $t_{0.05}$ ((1.684).

Conclusion

This study concluded that the electricity consumption has significant impact on economic growth in Nigeria. The commercial electricity consumption was the electricity consumption variable that is more relevant to the economic growth in Nigeria. The residential electricity consumption was the electricity consumption that has positive but insignificant impact on economic growth in Nigeria. In Nigeria, there is a unidirectional relationship from electricity consumption to real GDP, which means that electricity consumption acts as a stimulus to economic growth. With these findings, energy policies aimed at improving the energy infrastructure and increasing the energy supply are the appropriate options for these countries since electricity consumption increases the income level. Energy conservation policies could hamper social and economic progress when there is a unidirectional relationship between electricity consumption and real GDP. The results highlight the importance of electricity policy on economic growth, economic development and welfare. The current energy policy and the electricity sector restructuring process should be designed to meet this goal. In Nigeria, the appropriate options are energy policies aimed at improving the energy infrastructure, in the context of the elasticity and Granger Causality results, and policies aimed at increasing the energy supply.

Recommendations of the study

Based on the findings of this study, the following recommendations were made.

1. The Citizens of Nigeria should be educated to use the limited electricity supply wisely. It suggests that the policy of conserving energy consumption may be implemented with little or no adverse effect on economic growth, such as in a less energy-dependent economy.
2. The prepaid metering system should be extended to public institutions, private institutions and the remaining households of the country. This will further ensure wise usage of the limited electricity supply, reduce or prevent illegal connections drastically and ensure 100 percent revenue collection for the power providers.
3. The government should invest heavily in electricity infrastructure; this will ensure that there is enough energy to meet the needs of the agricultural, manufacturing and services sectors of the Ghanaian economy. Households, industries and government should find new ways of investing in energy conservation methods so as to ensure sustainability now and in the future.

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