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Investigation of Load Control and Energy Consumption Rate in Using Enugu Electricity Distribution Company, EEDC in Abakaliki Metropolis.

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ABSTRACT

This study was to find out how load is being control and energy consumption rate in Nigeria. To achieve this purpose, Enugu Electricity Distribution Company, EEDC Abakaliki was used as case of study. Data were collected from EEDC and analyzed using Analytical and Statistical method. The study reveals that there is no uniformity in sharing of electricity among the ten feeders in Ebonyi State and hence consumption rate does depend on the load usage. To avoid overloading the feeders; load is shared among the feeders by closing some while some will be open. Consumption rate depends on the energy supplied to the distribution substation at mile 50, Abakaliki from the transmission station at New Heaven, Enugu. From the figures, there is an increase in the rate of energy consumption from 2014 t0 2016 due an improvement in energy generation and distribution in Nigeria. Bills are shared according to the total energy consumed at the end of every month and those that have prepaid meter are charged accordingly while those without meter were billed based on estimation.

Keyword: Energy consumption, load control, electricity distribution, consumption rate, transmission station, feeders and substation

INTRODUCTION

Nigeria is a vast country with a total of 356, 667 sq miles (923,768 sq km), of which 351,649 sq miles (910,771 sq km or 98.6% of total area) is land. The nation is made up of six Geo-Political Zones subdivided into 36 states and the Federal Capital Territory (FCT). Furthermore, the vegetation cover, physical features and land terrain in the nation vary from flat open savannah in the North to thick rain forests in the south, with numerous rivers, lakes and mountains scattered all over the country. These national physical and political attributes themselves present challenges for the effective provision of power needs to all nooks and crannies of the country. To provide adequate power to ensure that Nigeria is among the industrialized nations, three critical activities must be effectively achieved [1], [2], [3].

a) Adequate power must be generated;
b) The power must effectively be transmitted to all parts of the country; and
c) Finally be efficiently control and distributed to the consumers.

Since development and population growth in any country are highly dynamic, these three activities must also be carefully addressed in a dynamic, creative and logical manner. Adequate power supply is an unavoidable prerequisite to any nation's development, and electricity generation, transmission and distribution are capital-intensive activities requiring huge resources of both funds and capacity. In the prevailing circumstances in Nigeria where funds availability is progressively dwindling, creative and innovative solutions are necessary to address the power supply problem [4], [5].

Ebonyi State as example, being new and rapidly growing in development, industry and commerce, is battling with the problems of continually expanding consumption and increase in demand for electricity. However, adequate supply of electric power is a basic pre-requisite for rapid industrialization and

general economic development of an nation [6].

Therefore, steady electricity supply in the state and the entire country, should be the cog through which the wheel of progress rotates. It will as well, encourage the state toward economic self-reliance and development, since virtually all the small scale industries depend on electricity supply. In the events of power outage in the state, vital activities crumble. An outage as mentioned here describes the state of an electrical component when it is not available to perform its intended function due to some events directly associated with those components and to achieve all these, load need to be controlled and shared [7], [8].

In Nigeria, the authority responsible for generation, transmission, distribution and control of electricity is the National Electric Power Authority (NEPA). It was established under Decree Number 24 of April 1972. Electric Power from all its numerous power stations are harnessed together and fed through associated transmission lines and equipment which in turn supply power to several towns and states through distribution lines and equipment.

This forms solid power supply chain link. The break in these chain links for whatever reasons causes power interruptions. Such breaks may be due to storms, lightening strike, contractor excavating NEPA underground cables, vehicles hitting NEPA poles and overloading of circuits. Others are short circuiting, earth faults, human error, poor working equipment and infrastructures, poor town planning and remuneration on the part on NEPA staff, inadequate working facilities etc [9].

Furthermore, there is inadequate utilization of the abundant natural resources. The mere possession of primary resources could only be termed a necessary condition which is not necessarily sufficient to guarantee adequate supply of electricity. In fact, the capability to convert these available resources into useable forms will, of course, be as important if not more important than the possession of electricity potentials. According to [6], one inconvertible attribute of electricity development and utilization is a country's technological capability in which Nigeria is apparently deficient. In this case, when the centre is weak, other segments such as the state sub stations become weaker. It is therefore, obvious that Nigeria may not have made any contribution to the world progress in electricity technology but this does not mean that, traditionally, she cannot offer anything. We lack electricity supply in the midst of plenty; especially as Nigeria supply electricity to some of her neighboring countries.

In Nov, 1996, the then Minister of Mine and Steel, Alhaji Bashir Dalhata announced Federal Government's approval of the privatization of distribution and sales functions of NEPA PLC. Important in the ministerial pronouncement was the need to provide stable and reliable electricity supply, generate more funds into NEPA scoffers, check illegal consumption etc. He further opined that the measures would enhance efficiency in the sector, as enough money would be collected to improve the epileptic nature of electricity supply.

On privatization of NEPA for a steady power supply, the then president of Nigeria society of Engineers feels strongly that it would provide the needed tonic to improve power supply situation in the country and also enhance efficiency. This will curb the effects of irregular power supply in the country in general. Privatization would also free the trapped manpower in NEPA who on account of bureaucratic system cannot aspire and advance to achieve their challenge of professional excellence, can have the ample opportunity to advance themselves and the cause of engineering practice. This would enhance the work-study program for the distribution and commercial staff of NEPA [9].

In Ebonyi State, research has shown that due to inexperience, it takes a very long period to clear minor electrical faults, hence, the acute irregular electricity supply within the NEPA district areas of the state and other states in the country.

Collection of data

Data was collected at Enugu Electricity Distribution Company of Nigeria, EEDC Abakaliki, Ebonyi State and Mile 50 Abakaliki distribution substation.

RESULTS

The data collected on load control and energy consumption in Nigeria using EEDC Abakaliki as a case study for three consecutive years (i.e. 2014-2016) is presented in figures 1 to 3 below.

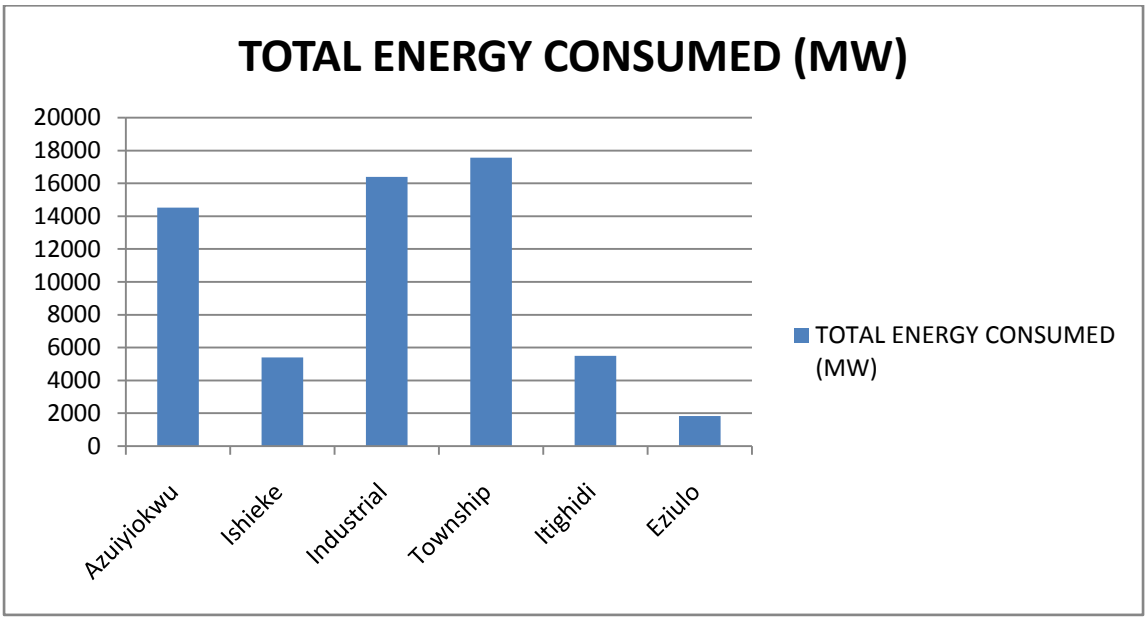

Figure 1: Total energy consumed by six feeders in 2014

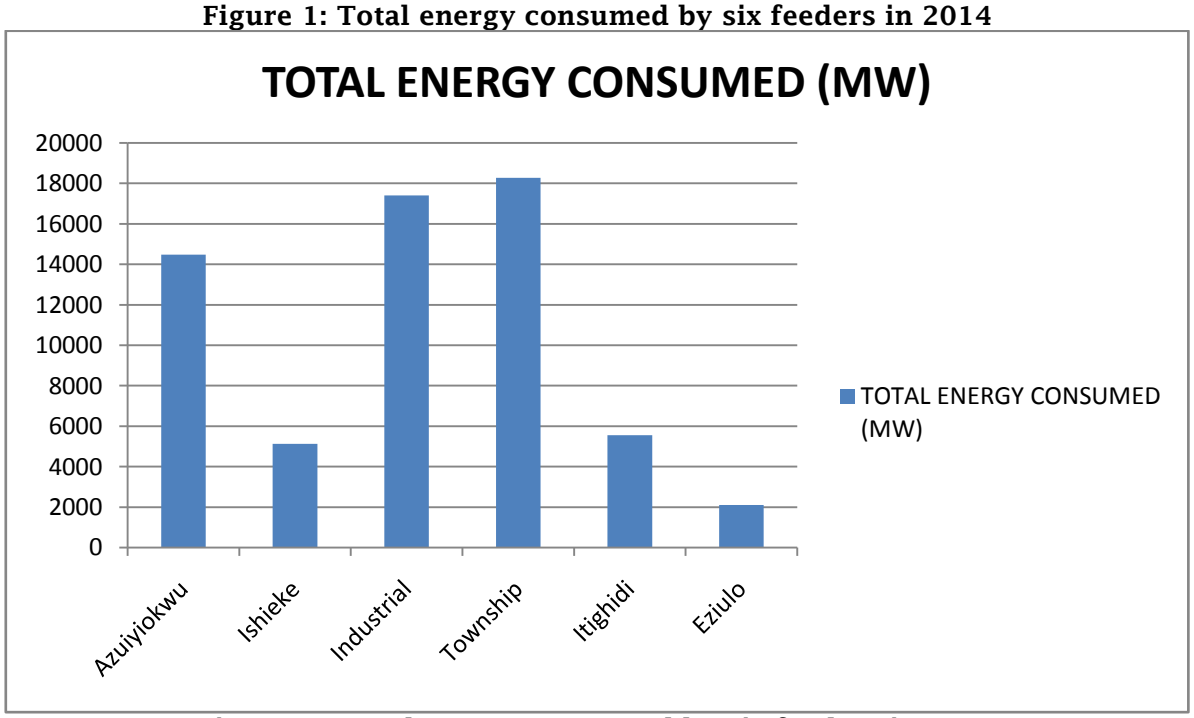

Figure 2: Total energy consumed by six feeders in 2015

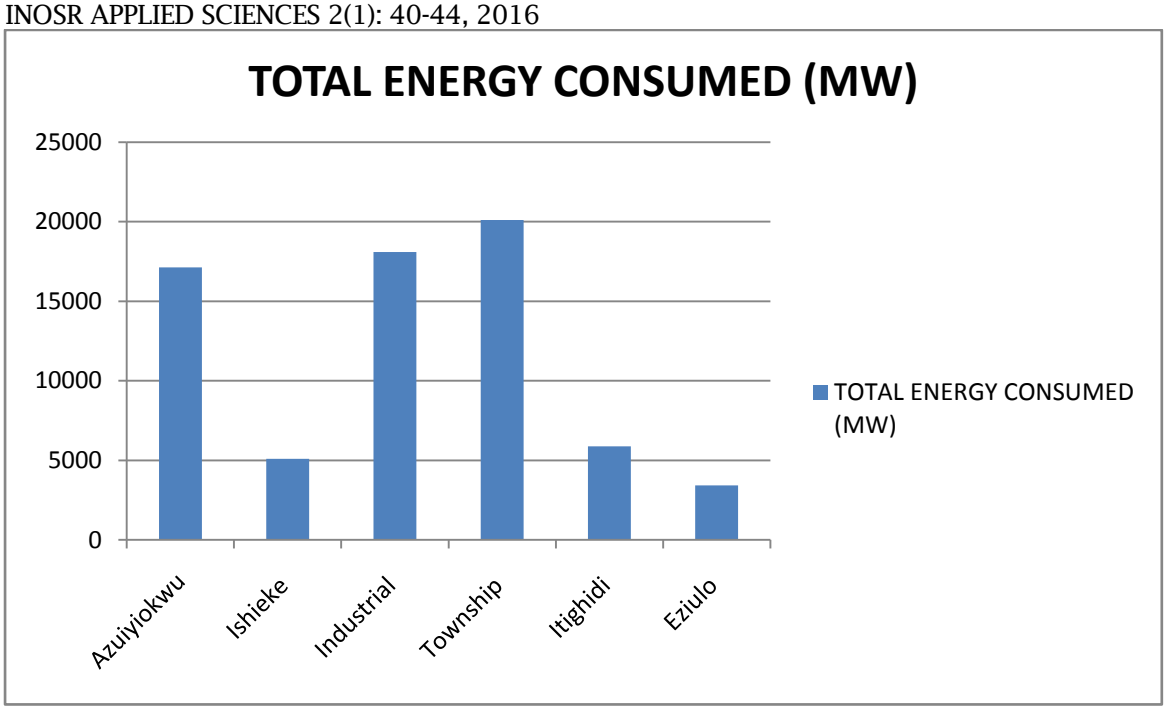

Figure 3: Total energy consumed by six feeders in 2016

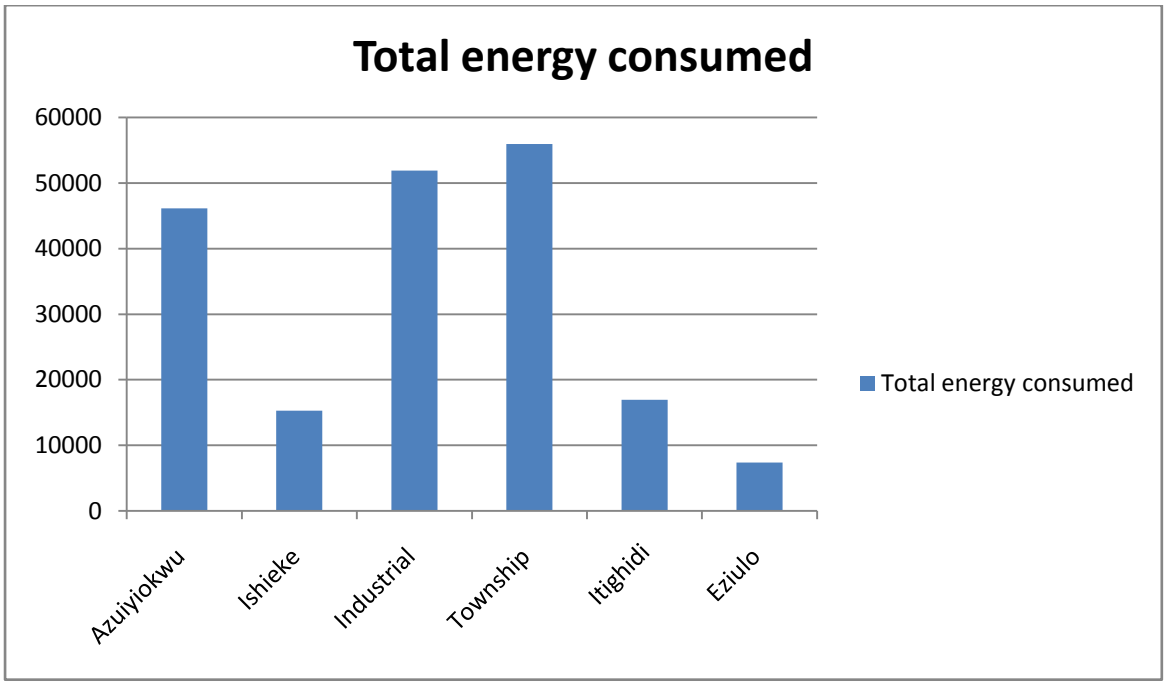

Figure 4: Summary of Energy Consumed by the Six feeders from 2014-2016

DISCUSSION

From the data collected EEDC substation Mile 50 Abakaliki, it revealed from the annual records on energy consumption and sketched diagram of how power is being stepped down from the transmission station that two different transformers are used: the 30MVA transformer which carries only three feeders among the 10 feeders we have in Abakaliki substation. And this can only carry 20MW which can never be loaded up to that 20MW rather it is shared among the feeders by closing two and leave one open, then the 60MVA which

can carry up to 120MW and according to the research, is shown to be overloaded because it carried the remaining 7 feeders.

From the figures, it is observed that energy is consumed based on the facilities used and also on the population using the facilities. From figure 1-2, it is obviously clear that township feeders consume more energy than other feeders followed by industrial feeders. In 2014, Township feeders consumed a total of 17570MW followed with Industrial feeders which is 16385MW and Eziulo with least energy consumption of 1840MW. There was much increase in the consumption rate in the year 2015 and 2016 as seen in figure 2 and 3. The increase in consumption rate depends on the increase in supply of electricity and improvement in maintaining the feeders. Moreover, Township, Industrial and Azuiyiokwu feeders were given much preference in supply of energy more than other feeders because they fall within the capital territory of Ebonyi State. This may also contribute very much to increase of consumption of energy in those areas as they have sometimes steady supply of electricity. However, the supply of energy in rural areas is nothing to write home about. Some communities stay up to weeks, months even a year without electricity, yet they pay on the energy not consumed. These were noticed in feeder 4 and 5 with a low consumption rate in the years as shown in figure 1 to 3. Generally, from the study, there are overloading of the circuit in the area which usually results to low voltage supply, poor/unstable electricity supply, tripping OFF of feeder and damages to transformers and other electrical equipments.

CONCLUSION

There should be total overhauling of power system in Nigeria and building of more generating power stations, changing and installations of more transformers and other electrical equipment should be a priority by the government. Inadequate supply of electricity affects the economy of any nation.

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