

Energy Problem in Nigeria - Advantages Of Renewable Energy Sources over the Current Energy Matrix in Nigeria

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Abstract— Energy generation has become a major problem in Nigeria today. Currently in Nigeria, burning of fossil fuel for electricity generation is the order of the day. This contributes to environmental pollution and the consequent global warming in the world we live in. In view of this, the advantages of renewable sources energy over burning of fossil fuels (for electricity generation) were considered. The aim of this review work is to investigate the energy problems in Nigeria and to look into the advantages renewable energy sources have over the current energy matrix in Nigeria.

Index Terms— Energy, Renewable, Nigeria, Electricity, Burning

I. INTRODUCTION

Nigeria is known as the most populous nation in Africa. In spite of its popularity, it is faced with power challenges. For over 20 years now, the nation of Nigeria had been experiencing power challenges [6]. Interruption in power supply is the order of the day in Nigeria [12]. In some parts of the country hardly will a day pass without power failure. In some other parts of the country, there is little or no power supply at all. In our country today, burning of fossil fuel for electricity generation is the order of the day. Almost every house hold in Nigeria has a generating set. Banking industries and telecommunication companies are using generating sets to run their businesses [7]. The power holding company of Nigeria (PHCN) generates over one thousand mega watts of electricity via thermal stations. These thermal stations use up gas supplied to them via the National Gas Company. Whenever there are hitches in gas supply, electricity supply would be affected. In the Nation newspaper of 8th June, 2011 the Managing Director of PHCN gave the reason for the low power supply in the nation. According to him: “Power generation has dropped from 3700 megawatts (MW) to 3200MW, indicating a loss of 500MW”. The Managing Director of PHCN, Alhaji Labo Hussien, told the Nation’s correspondent that the drop was as a result of shortage of gas supply to the thermal power stations. This has resulted in

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blackout and load-shedding in some parts of the country [11], [12].

The fact is that burning of coal and gas to generate electricity is not the solution to the energy problem we have in Nigeria. The reason is that the crude oil reserve is dropping seriously and very soon would be exhausted [1]. The second reason is that the burning of fossil fuel is seriously contributing to global warming [8], which the UN summit on climate change is trying to address. It is high time the government of Nigeria look into renewable energy sources such as: solar, biogas, hydro, wind, etc, in order to solve Nigeria’s energy problem. The government of Nigeria should take off their eyes from nuclear energy source of power because that has its own challenge too. Apart from the environmental challenges it will bring about, it will also pose a security threat following what is happening in our country today.

II. PERFORMANCE OF THE CONVENTIONAL ENERGY SOURCES IN NIGERIA

The conventional energy sources in Nigeria include both the renewable and non renewable sources [13]. The renewable energy sources were the hydro sources which came from three dams located at: Jebba, Kainji and Shiroro. There were about ten stations from where power was generated for national use. Out of these ten stations, six were thermal stations, one used diesel and the remaining were hydro stations (renewable energy sources). The gas power plants were located at Afam, Delta, Eghin, Ijora, Sapele and Orji River. On the other hand, the hydro power plants were located at Jebba, Kainji and Shiroro. These were the major sources of power in Nigeria as at the time of this study. The performances of these power stations [10] were summarized in Table 1.

Table 1: The conventional energy sources in Nigeria

Site	Type	Installed Capacity (IC) (MW)	Available Capacity (AC) (MW)	Number of Units
Afam	Thermal	700	488	18
Delta	Thermal	812	540	20
Egbin	Thermal	1,320	1100	6
Ijora	Thermal	66.7	40	3
Sapele	Thermal	1020	790	10
Jebba	Hydro	540	450	6
Kainji	Hydro	760	560	12
Shiroro	Hydro	600	600	6
Orji River	Thermal	60	-	4
Others	Diesel	46	18	-

Source: Okoro et al, 2007

Table1 shows the site of each of the plants, the type of plants, the number of units installed, the installed capacity and the available capacity.

III. FURTHER EXPLANATION OF THE INFORMATION IN TABLE1

Table1 shows the performances of the thermal stations and the hydro stations. The blue colour represents the installed capacities (IC) of each of those plants while the red colour represents the available capacity (AC). The installed capacities were the original power (in mega watt) of the plants when first installed, while the available capacities were values available (as at the time of study) from the plants.

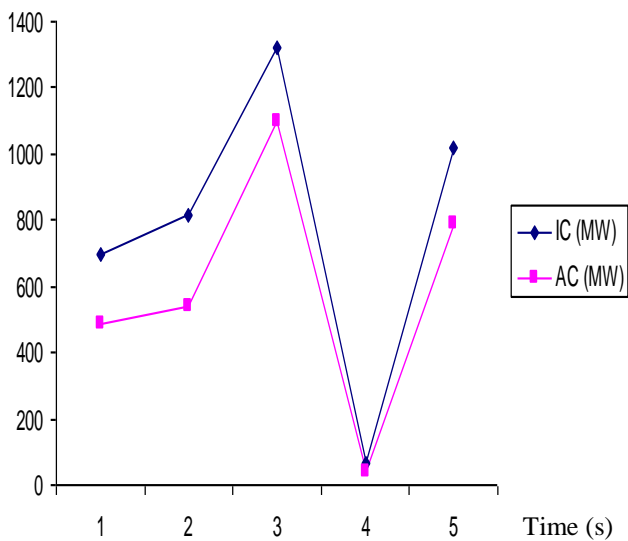


Fig.1: Performance of the thermal stations in the light of plots

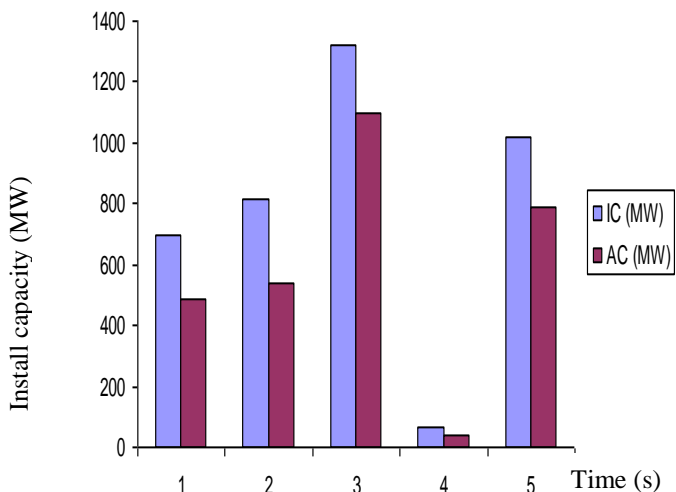


Fig.2: Performance of the thermal stations in the light of charts

From the data given in Table1, it can be observed that out 700MW installed capacity of Afam thermal station, only 488MW were available for use. Similar thing applied to Delta, Egbin and Sapele thermal stations. For the renewable

sources, we had similar results minus the Shiroro hydro station where the installed capacity was the same as the then available capacity. From the data analysis shown in Figures 1 and 2, it is glaringly obvious that the conventional energy sources we had were under performing, since the then available capacities were lower than the installed capacities.

IV. ADVANTAGES OF RENEWABLE SOURCES OF ENERGY OVER BURNING OF FOSSIL FUELS FOR ELECTRICITY GENENERATION

The advantages of renewable sources of energy cannot be overemphasized. It is obvious that burning of coal and gas to generate electricity is not the solution to the energy problem we have in Nigeria. The reason is that the crude oil reserve is dropping seriously and very soon it would be exhausted [2]. The second reason is that burning of fossil fuel is seriously contributing to global warming, which the UN summit on climate change is trying to address [4]. The third is that there are many alternative energy sources that are more environmental friendly which the government of Nigeria could invest in. The renewable energy sources we have include: solar, wind, hydro, geothermal, etc. These are called renewable because they are replenished naturally [13]. The renewable sources of energy have the following advantages over burning of fossil fuels for electricity generation:

1. They have little or no environmental challenge. The pollution arising in the case of thermal stations from combustion of fuel is not environment friendly due to the fact that sulphur oxides, heavy metals, radio-active elements, hydro carbons and large quantities of carbon dioxide are emitted which leads to acid rain.
2. Renewable sources of energy are replenished naturally while Fossil fuels are finite and nonrenewable.
3. In the case of burning of nuclear fuels as in nuclear reactors, radiation problems usually result. And this is not good for the human health. In the case of accident, there are usually serious health challenges that result. An example is the case of Japan’s fucoshima nuclear plant accident. Special system designs are required to prevent radioactivity arising from normal operation nuclear plants or due to accidents. Major portions of a nuclear plant are radioactive during and after operation, requiring special precautions and advanced technology for maintenance of much of the plant. Nuclear power plants fuels usually require remote handling and special processing and disposal of toxic waste whereas renewable sources of energy do not require such.

V. POSSIBLE SHORT TERM SOLUTION TO THE ENERGY PROBLEM IN NIGERIA

The possible short term actions we think could be taken to improve the present fossil fuel based system include:

1. To upgrade the capacities of the available fossil fuel plants. This will help to meet the energy need of the nation.
2. To decentralize the distribution of power from the national grid. Each state in Nigeria is expected to have its own fossil fuel power plant in order to reduce the excessive load on the national grid.
3. Nigerian Government is expected to subsidize the cost of solar cells for household usage.

By these, we think that the current energy problem in Nigeria can be improved in the short term; while the nation pursue the adoption of the renewable sources (mainly the hydro and solar sources) at the national level

VI. CONCLUSION

The energy problem in Nigeria has been a long lasting one [9] It is evident that the conventional energy sources in Nigeria are under performing. And this has led to irregular power supply in the country. Thus there is need to do something in order to check this problem. Some of the things that could be done include:

1. Replacement of the older plants with newer ones
2. Building plants with higher capacities
3. Power regulators should be advised to avoid overloading the plants
4. Decentralization of the energy sources should be encouraged. Here, a power plant can be installed in each town to supply power specifically for the town.
5. Other renewable energy sources such as solar source of energy should be pursued ([3], [5]).

By these, the problem of under performances of the conventional energy sources would be curbed.

Lastly, it is high time the Nigerian government and its populace started looking out for alternative energy sources; such as renewables, since these have immense advantages over burning of fossil fuel. The advantages of renewable sources of energy are enormous; we only saw a few of them. For our environmental safety sake, let all and sundry in Nigeria encourage the use of renewable sources of energy; for this will mean well for our country.

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