IOSR Journal of Engineering (IOSRJEN) **www.iosrjen.org**
ISSN (e): 2250-3021, ISSN (p): 2278-8719
Vol. 09, Issue 3 (March. 2019), ||S (II) || PP 42-53

Influence of Thermal Power Generation in Nigeria Environment

Ijeoma R.C[1] & Kiani I.[2]
[1]Electrical/Electronics Engineering Department, [2]Science Laboratory Technology Department
Captain Elechi Amadi Polytechnic, Rumuola Port Harcourt, Rivers State Nigeria
Corresponding Author: Ijeoma R.C

Abstract: Electrical energy covers the highest level in energy pecking order. It finds numerous applications in homes, industry, agriculture, defense, transportation etc. In order to ensure that Nigerians can enjoy a reliable energy system at a reasonable cost. Several thermal power generating stations that contribute to the nations grid which includes Afam, Egbin, Delta, Sapele thermal power station, Ijora and Oji river thermal power station. This study engages method that applies the ultra-careful study of power generating stations and their various environments and utilizes the application of questionnaires, interviews & investigations, and personal observations in data gathering. Analyses of the various data collected were in tabular exhibitions, mathematical models, pictorial charts, percentages and graphical illustrations. Results obtained from the analyses shows that nitrogen oxides account for 97% of the total emission released from natural gas when used as fossil fuel for thermal stations in Nigeria and particulates 3%. The actual contributions of the greenhouse gases to global warming are 50% carbon dioxide, 18% methane, 14% CFCs and 6% nitrous oxides. In this paper, there were several parameters studied and was discovered that in the management of the environmental influence of electric power generation in Nigeria, the factors involve depends on the type of power stations. Conclusively, this work shows that electricity is being generated at the expense of the surrounding environment, and this is damaging to human existence. It is recommended that, environmental problems be anticipated and adequately reflected in the planning, designing and implementation of electricity generation schemes for sustainability of power generation

Keywords: Electrical Energy, Environment, Thermal Station, Energy Consumption, Influence

---

Date of Submission: 01-03-2019 Date of acceptance: 18-03-2019

I. INTRODUCTION

Electricity covers the highest level in energy pecking order. It finds numerous applications in homes, industry, agriculture, defense, transportation etc. The fact that electricity can be transported instantaneously and pollution free at consumer end makes it attractive as compared to other forms of energy. Sule and Salami (2013) reported that, the environmental impacts associated with electricity generation, transmission and distribution has become of great importance in power systems planning, design and operations. Every technologically advanced countries of the world, public electricity distribution and supply dominates the industrial scene in the scale of its capital investment requirements, huge tonnage of primary fuel it consumes and its rapid growing demands for large, complex and technically sophisticated plants and equipments.

Nigeria is richly endowed with numerous energy resources, which offers the nation opportunities to tap into the strength of the various energy media available. The energy sector however, has not exploited this gift of nature; the progress in the use and development of oil and gas, in past years has created an impression that hydrocarbon is the major viable energy medium available to Nigeria. This has negatively impacted on a comprehensive assessment and use of all Nigeria's energy resources. In order to ensure that Nigerians can enjoy a reliable and robust energy system at a reasonable cost, it is essential that supply be generated from a variety of sources. With the cost of oil being uncertain, alternative energy options need to be assessed and development plans expedited to enable a broad-based infrastructure.

According to Ibe and Okedu (2015), maintaining a reliable electric power generation is therefore a very important issue in power system design and operation. Nigeria, being the threshold of industrial development, has high energy demand. The country is endowed with rich reserves of conventional energy resources like; crude oil, natural gas, coal and hydro potential. Currently, the national energy consumption mix is dominated by oil, which is approximately 53 percent, seconded by natural gas which approximates to 39 percent and then hydroelectricity that is almost 7 percent. Coal, nuclear power, biomass and other renewable sources are presently not the major part of Nigeria's energy consumption mix. Meanwhile, in Nigeria electrical power stations are mostly thermal power stations.

II. MATERIALS AND METHODS

A. STUDY DESIGN

This study engages method that applies the ultra-careful study of power generating stations and their various environments and utilizes the application of questionnaires, interviews & investigations, and personal observations in data gathering.

However, the approach adopted in the analysis of data collected were tabular exhibitions, mathematical models, pictorial charts, percentages and graphical illustrations.

- **SPECIFIC OBJECTIVES**

i. To ascertain influence of thermal electric power stations.
ii. To ascertain preventive mechanisms for power stations negative influences.
iii. To ascertain positive environmental influence of electric power stations.
iv. To proffer ways of managing the influence of electric power generation.

B. THERMAL POWER STATIONS EMISSIONS ANALYSIS

The operations of the thermal electric power stations result to the emission of some effluents into the atmosphere. These effluents are air borne and they are by-products of the combustion of fossil-fuels from the thermal power stations. These emissions from the burning of fossil-fuels from operating thermal power stations in Nigeria as a result from electricity generation from the stations is shown in table 1 below.

Table 1: Fossil-Fuel Emission from Operating Power Stations in Nigeria (Tonnes/1000MW).

Air Borne Effluents	Coal	Oil	Natural Gas
Sulphur oxides	11,000	37,000	20
Nitrogen oxides	27,000	25,000	20,000
Carbon oxides	2,000	710	0
Particulate	3,000	1,200	510
Hydrocarbons	400	470	34
Aldehydes	0	240	0
Ash	360,000	9,000	0
Total	403,400	73,620	20,564

Source: Noise control handbook of principles and practices by David and Arthur (2016).

C. ANALYSIS OF POLLUTANTS AND THEIR SOURCES

Apart from thermal electric power stations, there are also other sources of pollutants emissions into the atmosphere. These pollutants and their various sources are tabulated below in table 2.

Table 2: Estimated emission of pollutants by different source in Nigeria (Tonnes/year).

Source	Black smoke	Sulphur oxides	Nitrogen oxides	Carbon oxides
Domestic	191	135	68	339
Commercial/Industrial	92	683	337	342
Power Stations	25	2644	786	47
Refineries	0	109	36	1
Vehicles (Petrol Engines)	15	22	703	5644
Vehicles (Diesel Engines)	182	30	596	12
Railways	0	3	32	12
Forest	0	0	0	0
Gas Leakage	5	0	0	0
Others	30	65	144	31
Total	540	3691	2702	6523

Source: National Environment Protection (Effluent Limitation) Regulations (2016).

From table 2 above, it can be shown that the total pollutants in tonnes/year from power station is 3502 tonnes/year i.e (25 + 2644 + 786 + 47 = 3502 tonnes/year), and the Total pollutants from all sources = 13456 tonnes/yr.

Hence, the percentage composition of pollutants from power stations becomes:

$\frac{3502}{13456} x \frac{100\%}{1} = 26\%$

Thus, 26% of the total pollutants released into the atmosphere per year come from thermal power stations.

D. GREENHOUSE GASES

Greenhouse gases are responsible for global warming. They cause the depletion of the ozone layer and thus, expose the earth's surface to intensive heat from the sun. These gases however, are also been discharged from the power stations and their percentage distributions can be seen below in table 3.

Table 3: Distribution of Greenhouse Gases

GREENHOUSE GAS	PERCENTAGE
Carbon dioxides (CO_2)	50%
Methane (CH_4)	18%
Chlorofloro carbons (CFCS)	14%
Nitrous oxides (NO_X)	6%
Ozone /Others	12%

Source: Relative Contributions of Greenhouse Gases to Global Warming by Lashof and Ahuja (2016).

These greenhouse gases are not only been discharged by the power stations, there are other various sources. These sources are been tabulated below in table 4.

Table 4: Sources of Greenhouse Gases

Gas	Sources	% Contribution to Global warming
Carbon dioxide (CO_2)	Combustion of fossil (80%) and biomass (20%).	50%
Methane (CH_4)	Biomass burning, anaerobic fermentation in wetlands, natural gas exploration and transportation.	18%
Chlorofloro carbons (CFCs)	Aerosol pollutant, coolants, foamier and fire extinguishers.	14%
Nitrous oxides (NO_X)	Combustion of fossil fuels and fertilizer.	6%
Ozone /Others	Formed by action of sunlight on hydrocarbons and nitrogen oxides from vehicles	12%

Source: Relative Contributions of Greenhouse Gases to Global Warming by Lashof and Ahuja (2016).

E. NATURAL GAS CONSUMPTION OF UGHELLI THERMAL POWER STATION

The natural gas consumption of ughelli thermal power for the year 2001 is seen in appendix I. These data collected on the natural gas consumption is analyzed to show that the rate of natural gas utility in ughelli thermal power station varies for each month. Table 5 below contains the amount of natural gas consumed for the year 2012 in meter cube.

Table 5: Natural Gas Consumption of Ughelli Thermal Power Station (2012)

Month	Gas Consumption (Estimated) Factor m^3
Jan	53,186,914.77
Feb	25,886,540.51
March	68,068,023.70
April	51,754,674.73
May	600,871,544.10
June	58,205,698.64
July	79,603,786.74
Aug	86,162,564.19
Sept	0
Oct	0
Nov	52,358,247.90
Dec.	0

F. ELECTRIC POWER STATIONS AND THEIR INSTALLED CAPACITIES

The various electric power stations installed capacity differs and so do they vary in terms of their outputs. The numbers of units in the different power station differs. These variations are illustrated in table 6 below.

Table 6: Thermal Power stations and their installed capacities

Power Station	Installed Capacity(Mw)	Numbers Of Units	Plant Type
Delta	912	20	Thermal
Afam	700	20	Thermal
Sapele	920	10	Thermal
Egbin	1320	6	Thermal
Ijora	66.9	4	Thermal
Oji	30	4	Thermal
total installed capacity	5,887.3	64	

Source: PHCN publications on Ughelli thermal power station, 4th November, 2013.

G. ENERGY CONSUMPTION PATTERN

The rate at which electric energy is been consumed differs according to sectors. This means that the energy consumption by residential areas differs from commercial energy consumption, and this in turn varies from industrial energy consumption**.** The annual energy consumption between 2004 to 2014 is shown in table 7.

Table 7: Energy Consumption Pattern (2004 To 2014)

Year	Energy Generated (MWH)	Residential Energy Consumed (MWH)	Commercial Energy Consumed (MWH)	Industrial Energy Consumed (MWH)	Total Consumption (MWH)	% Energy Consumption	% Energy Losses
2004	15,463,145	5,948,475	2,687,099	2,037,463	10,673,037	69.02	30.97
2005	16,166,613	5,743,068	2,060,140	2,068,566	9,871,774	61.06	38.93
2006	14,933,689	4,370,081	2,163,241	2,183,439	8,716,761	58.36	41.63
2007	16,787,333	4,807,918	2,639,990	2,241,157	9,689,065	57.71	42.28
2008	15,656,201	4,583,559	2,430,179	2,056,998	9,070,736	57.93	42.06
2009	15,845,038	4,935,222	2,631,875	2,252,468	9,819,565	61.97	38.02
2010	16,656,201	5,244,256	2,601,069	2,143,267	9,988,592	59.96	40.03
2011	16,006,821	6,034,325	2,700,321	2,427,861	11,162,507	69.73	30.26
2012	15,986,743	5,957,605	3,001,231	3,498,512	12,457,348	77.92	22.07
2013	16,898,456	6,745,632	2,790,243	2,934,571	12,470,446	73.79	26.20
2014	16,768,345	7,004,560	3,165,342	2,134,532	12,304,434	73.37	26.62
Total	177,168,585	61,374,701	28,870,730	25,978,834	116,224,265		

H. QUESTIONNAIRES ANALYSIS

This study assesses the impacts of electric power generation on the Nigerian environment. Thus, the study is more of a descriptive research.

Thus, questionnaires were distributed to various establishments and feedbacks were gotten as seen in table 8. Some of the questionnaires were sent through e-mails, others by phone conversations and the rest questionnaires data were gotten from direct interview conversations.

Table 8: Questionnaires Distribution

Establishment	Copies Given Issued Out	Copies Received	Percentage %
Federal Environmental Protection Agency	10	8	80
Federal Ministry Of Health	10	8	80
Power Holding Company Of Nigeria	10	8	80
Egbin Thermal Power Station	10	7	70
Delta Thermal Power Station	10	6	60
Sapele Thermal Power Station	10	7	70
Afam Thermal Power Station	10	9	90
Ijora Thermal Power Station	10	8	80
Oji Thermal Power Station	10	6	60
Power Station Host Communities	45	43	95.56
Total	135	110	

- **Environmental Impact Assessment Analysis of the Thermal Power Stations.**

In order to ascertain the various impacts of constructions of thermal electric power stations on the people, houses, villages and lands around its vicinity, questionnaires were sent out. From the data gathering using the questionnaires, the mean of each of the parameter was taken. Table 9 below reflects the outcome of the data collection. It is also of importance to note that, information on some parameters of some of the thermal power stations were not feasible to ascertain.

Table 9: Villages/Peoples/Houses displaced and Land Mass used During the Construction of Thermal Power Stations

	Power stations	Number people displaced	Number People available	Number of villages displaced	Number of villages available	Number of houses displaced	Number of houses available	Land mass used
1	Sapele	None	Not available	None	Not available	None	Not available	130 acres
2	Delta	2,150	9,860	2	5	680	1940	Not available
3	Egbin	1,860	9,940	3	7	2780	6230	63
4	Afam	None	Not available	None	Not available	None	Not available	Not available
5	Ijoro	685	2970	1	4	78	280	Not available
6	Oji	Not available	Not available	Not available	Not available	Not available	Not available	Not available

III. RESULTS AND DISCUSSIONS

- **RESULTS ON THERMAL POWER STATIONS EMISSIONS**

Considering the data in table 1, the effluents discharge are not from one source, the percentages variations of coal, oil and natural gas compositions for each effluent can be shown in the column bar chart as this is illustrated in figure 1below.

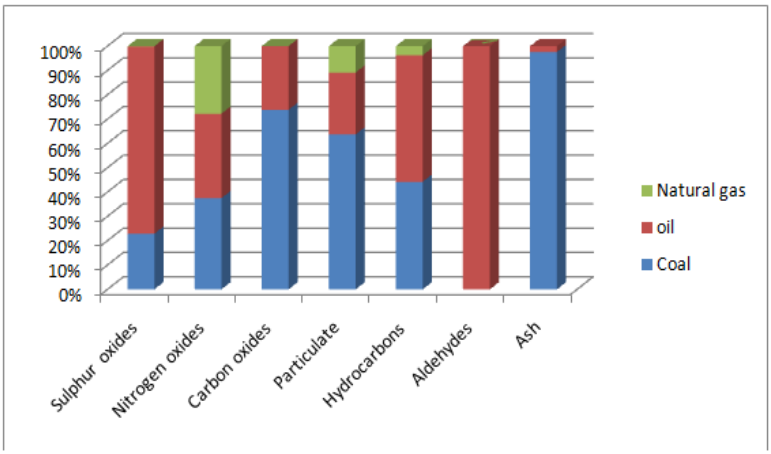

Figure 1: Column bar chart representation of the effluents emitted and their percentage constituents in coal, oil and natural gas.

Furthermore, to show variation in tonnes/1000MW in the combustion of the fossil-fuel, a pictorial diagram of the pie chart in figure 2 below gives a clearer view. The highest fossil-fuel emission from operating power stations in Nigeria (in tonnes/1000mw) emanates from the combustion of coal, which is about 81% of the entire emissions. This followed by emissions due to the burning of oil (15%) and then, the smallest of 4% which are emissions from natural gas combustion

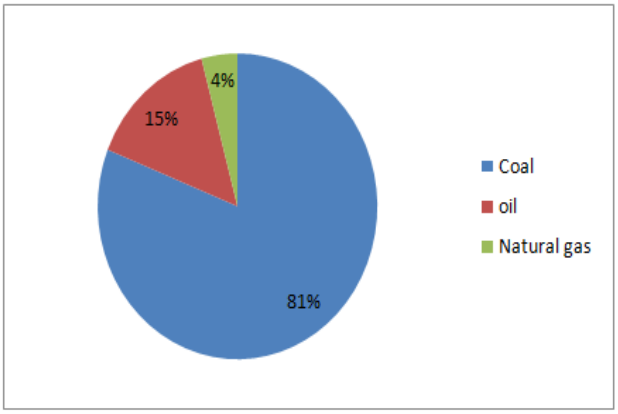

Figure 2: Pie chart representation of the total percentage emissions from combustion of coal, oil natural gas in Tonnes/1000MW.

In the analysis of thermal power stations emissions, from table 1, a column bar chart were developed showing the percentage capacity of emissions from fossil-fuel combustion of power stations in Nigeria (see figure 6). This infers that, it is only the combustion of oil that can produce 100% aldehydes effluents and the combustion of natural gas in the power stations cannot produce carbon oxides and ash as effluents. To show the percentage composition discharge of the effluents from the combustion of coal, oil and natural gas pie chart were used.

However, the crude oil used in Nigeria thermal stations comprises of certain gases like oxides of sulphur (Sox), oxide of nitrogen (Nox), oxides of carbon (Cox), particulate matter, hydrocarbon, aldehydes and ash. From the pie chart of the proportion of the effluents for oil as fossil-fuel source are seen.
However, table 1 shows the total capacity of emission from crude oil to be 73,620tonnes/1000MW.
Hence:

a. Total capacity of Sulphur oxides released = 37,000tonnes/1000MW (which constitutes 50% of the emission).
b. Total capacity of Nitrogen oxides released = 25,000tonnes/MW (which constitutes 34% of the emission).
c. Total capacity of Carbon oxides released = 710tonnes/I000MW (which constitutes 1% of the emission).
d. Total capacity of Particulate released = 1,200tonnes/I000MW (which constitutes 2% of the emission).
e. Total capacity of Hydrocarbons released = 470tonnes/I000MW (which constitutes 1% of the emission).
f. Total capacity of Aldehydes released = 240tonnes/I000MW (which constitutes 0% of the emission).
g. Total capacity of Ash released = 9,000tonnes/I000MW (which constitutes 12% of the emission)

Furthermore, the natural gas used in Nigeria thermal stations comprises of certain gases like oxides of sulphur (Sox), oxide of nitrogen (Nox), particulate matter and hydrocarbon. From the pie chart of figure 2, the proportions of the effluents for natural gas as fossil-fuel source are seen. Table 1 shows the total capacity of emission from natural gas to be 20,564tonnes/I000MW.
Therefore:

a. Total capacity of Sulphur oxides released = 20tonnes/1000MW (which constitutes 0% of the emission).
b. Total capacity of Nitrogen oxides released = 20,000tonnes/MW (which constitutes 97% of the emission).
c. Total capacity of Particulate released = 510tonnes/I000MW (which constitutes 3% of the emission).
d. Total capacity of Hydrocarbons released = 34tonnes/I000MW (which constitutes 0% of the emission).

However, it has been shown that nitrogen oxides account for 97% of the total emission released from natural gas when used as fossil fuel for thermal stations in Nigeria, particulates accounts for 3%, while oxides of sulphur and hydrocarbons accounts for approximately 0% . Hence, in the combustion of natural gas by thermal stations, nitrogen oxides are the predominant gases released into the atmosphere.

- **SOURCES OF POLLUTANTS AND GREENHOUSE GASES**

Considering Table 2, it can be seen that black smoke is the highest pollutant from gas leakage. Sulphur oxides are the highest pollutant from power stations. Nitrogen oxides are the second highest pollutant given off from the power stations. Carbon oxides are the highest pollutants from vehicles. This is best illustrated using a column bar chart as seen in figure 3 below.

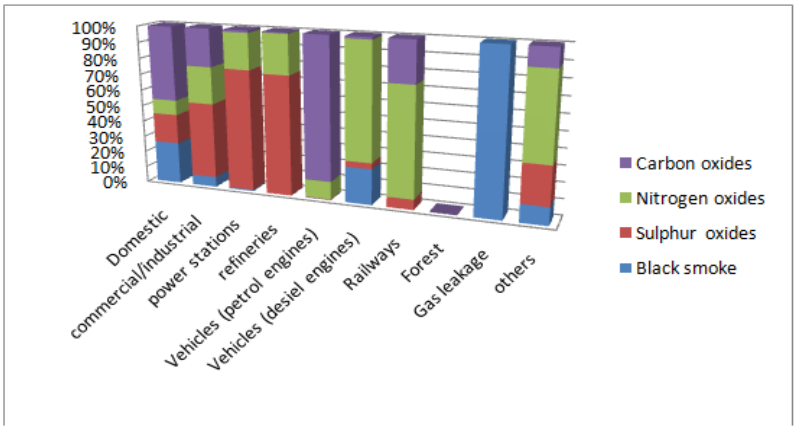

Figure 3: Column bar chart representation of the estimated emission of pollutant by different sources in Nigeria.

The total percentage compositions of black smoke, sulphur oxides, nitrogen oxides and carbon oxides from the various pollutant sources is best illustrated with a pie chart. This is shown in figure 4 below.

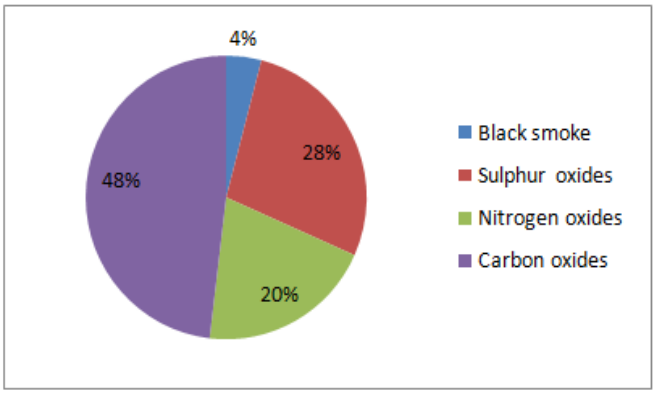

Figure 4: Pie chart percentage representation of the total estimated emissions by pollutants.

The electric power stations, though can discharge effluents into the environment, they are not the only sources pollutants. There are several other sources such as; Domestic sources, Commercial/Industrial sources, Refineries, Vehicles (petrol engines and diesel engines), Railways, Gas Leakage e.t.c.

Table 2 shows the feasible types of pollutants these sources can discharge and their quantity in tones/year for each types of pollutants. Figure 3 tends to compare the estimated emission of pollutants by the different sources in Nigeria with emissions of the same kinds obtainable from the electric power stations. This shows that the highest emission of oxides of nitrogen and sulphur are been discharged from the power stations.
Meanwhile, the actual contributions of the greenhouse gases to global warming from table 3 are around 50% for carbon dioxide, 18% for methane, 14% for CFCs and 6% for nitrous oxides. Ozone's and other factors contributes about 12%, this 12% contribution is sometimes a point of debate, due to the differing effects it has in the troposphere compared to the stratosphere.

- **NATURAL GAS CONSUMPTION OF UGHELLI THERMAL POWER STATION INTERPRETATION**

Considering Table 5, the variation in gas consumption rate in 2012 for Ughelli thermal electric power station can be made clearer in a bar chart. This is seen in figure 5 below

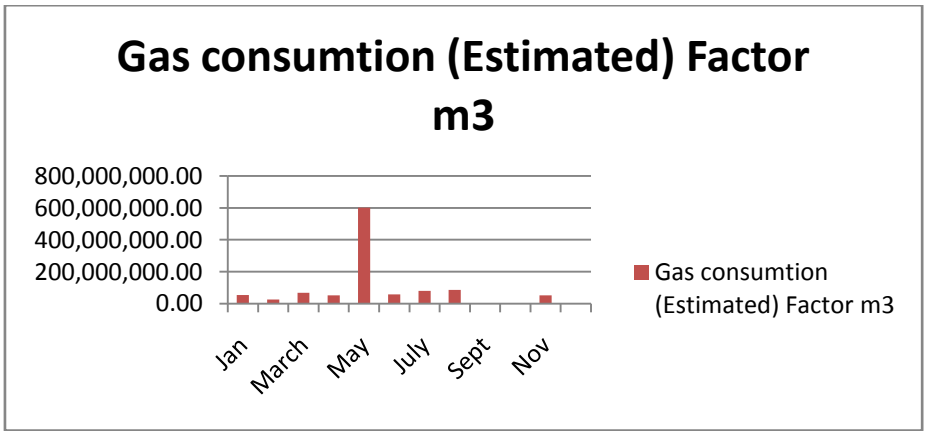

Figure 5: Bar Chart Representation of the Natural Gas Consumption of Ughelli.

Table 5 shows data on natural gas consumption of Ughelli thermal station from January to December 2012. A bar chart was developed as shown in figure 5. From this figure, it can be seen that much natural gas was consumed in May and hence more oxides of nitrogen (Nox) were released into the atmosphere during that period. There was no recorded value for the month of September, October and December.

- **INSTALLED CAPACITIES OF ELECTRIC POWER STATIONS RESULT**

Considering Table 6, the variations in the installed capacities of the various power stations can further be illustrated with a bar chart. This is seen in figure 6 below.

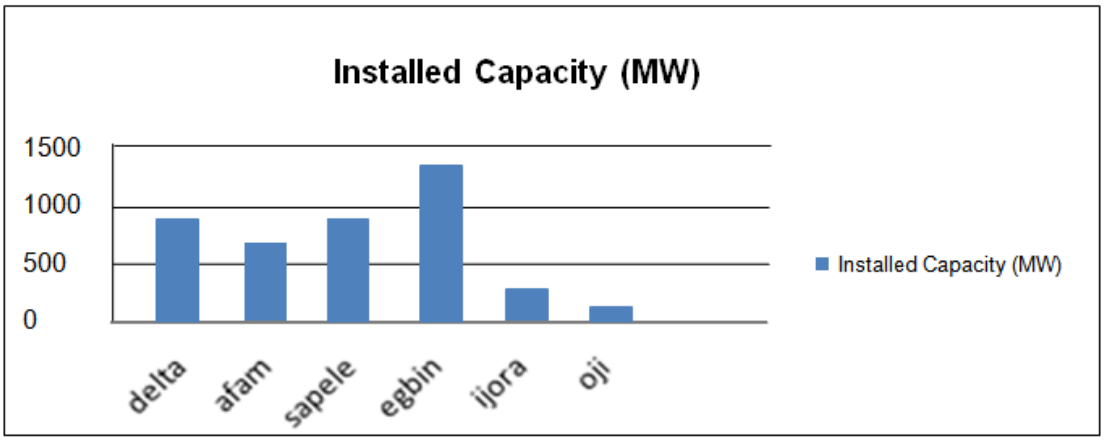

Figure 6: Bar chart representation of power stations and their installed capacities

THE TOTAL THERMAL POWER STATION INSTALLED CAPACITIES

The total thermal power station installed capacities can be obtained by:

$$\textit{Total thermal stations installed capacity} = \text{delta } \textit{installed capacity} + \text{afam } \textit{installed capacity} + \text{sapele } \textit{installed capacity} + \text{egbin } \textit{installed capacity} + \text{ijora } \textit{installed capacity} + \text{oji } \textit{installed capacity}$$

Hence,

$$\textit{Total thermal stations installed capacity} = 912 + 700 + 920 + 1320 + 66.9 + 30 = 3948.9 \text{ MW}$$

- **ENERGY CONSUMPTION PATTERN INTERPRETATION**

Considering Table 7 the energy consumption pattern is presented in the chart results as seen below.

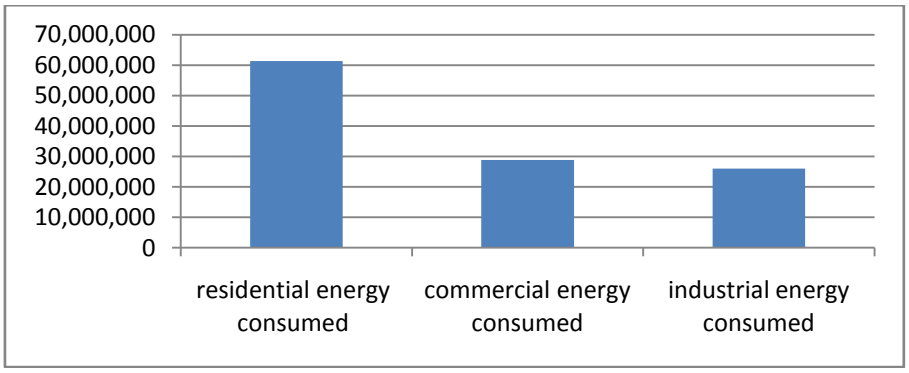

Figure 7: Bar chart representation of energy consumption by various sectors

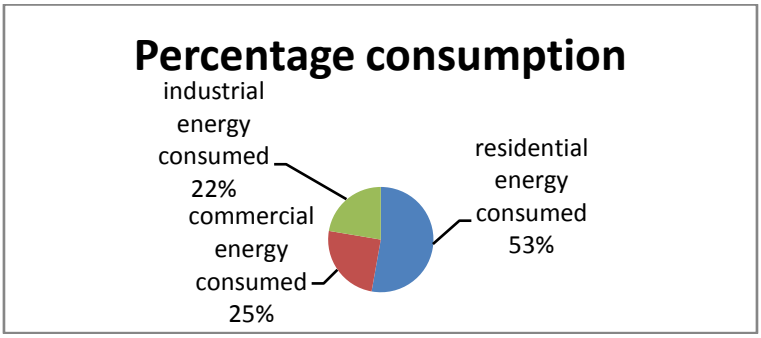

Figure 8: Pie chart percentage representation of energy consumptions by various sectors.

From the percentage analysis of the energy consumption, it is obvious that the residential energy consumption is highest (53%), followed by commercial energy consumption (25%) and then, the industrial energy consumption (22%).

- **ENVIRONMENTAL IMPACT ASSESSMENT RESULTS**

The impacts of the construction of power stations in the various localities where the power stations are been sited have been analyzed. Not all the thermal power stations data where obtainable. But the data for delta, egbin and ijoro thermal power stations that were available have been analyzed. The visual basic software developed for computation of percentage was used to model the percentages of the people, houses and villages displaced at the time of the constructions of the power stations. The percentage results for the numbers of people, houses and villages displaced is tabulated below in table 10.

Table 10: Percentage Displacements Due To Power Stations Construction

Power Station	Percentage of People Displaced (%)	Percentage of Houses Displaced (%)	Percentage of Villages Displaced (%)
Delta Station	21.81	35.05	40.00
Egbin Station	18.71	44.62	42.86
Ijora Station	23.06	27.86	25.00

As in table 10 above, during the construction of Ijora thermal power station, 23% of the population of people residing within the Ijora station locality where been displaced. 28% of the houses where displaced and about 25% of the villages where displaced. It then entails that many people were left homeless as at then within the Ijora power station vicinity.

Also, it can be deduced from table 10, that for every power station constructed, a certain percentage of the people, houses and villages residents within the power station area where been displaced.

IV. DISCUSSION

The construction of thermal power stations has significant impacts on the lives and activities of the inhabitants of the area. Table 11 below shows the occupations of the indigenes of the power stations environments before and after the construction of the stations.

Table 11: Indigenes Occupation before and after the Construction of the electric thermal Power Stations

Power station	**Occupation before the construction of power station**	**Occupation after the construction of power station**
Sapele Thermal Station	1. Hunting activities	1. Reduction in hunting
	2. Farming that involves land clearing, cultivation and harvesting	2. Reduced farming
	3. Fishing which involves inshore fishing	3. Contractors to power station
	4. Palm wine tappers	4. Fishing, though limited
	5. Traders	5. Land transportation
	6. Construction of boat and river transportation	
Ughelli	1. Hunting 2. Farming which involves land clearing cultivation and harvest. 3. Trading	1. Constructors to power station with few still carrying out farming activities. 2. Reduced hunting 3. Teaching 4. Improved trading 5. Civil servants
Egbin Station	1. Farming which includes clearing of land, cultivation and harvesting. 2. Fishing which involves in-shore fishing 3. Horticultural activities 4. Construction of agricultural implement and boats. 5. River transportation	1. Contractors to power station with few still carrying out farming activities. 2. Fishing though limited 3. Improved trading 4. Teaching 5. River and land transportation
Afam station	1. Farming 2. Fishing 3. Trading 4. Construction of agricultural implement and boats 5. Hunting 6. River and land transportation	1. Indigenes employed by NEPA and some are contractors to power station 2. Reduced farming 3. Reduced hunting 4. Reduced fishing 5. Land and river transportation.
Ijora station	1.Farming 2.Fishing 3.Trading 4.Hunting	1.Teaching 2. Contractors to power station 3. Reduced farming 4. Reduced hunting 5. Reduced fishing
Oji station	1.Farming 2.Fishing 3.Trading 4.Hunting	1.Teaching 2. Contractors to power station 3. Reduced farming 4. Reduced hunting 5. Reduced fishing

However, due to the discharges of effluents into the environments that result from the operations of the power stations, several health hazards have been encountered by the inhabitants of the power stations area. In table 12, the health challenges associated with the power stations construction is compared to those occurring before the power stations constructions.

Table 12: Health Hazard Associated With Indigenes Before and After Construction of Thermal Electric Power Stations.

Power station	Health Hazard Before Construction Of Power Stations	Health Hazard After The Construction Of Power Station
Sapele station	1. Malaria 2. Headache 3. High blood pressure 4. Cough 5. Cartah 6. Rheumatism	1. Cancer 2. Chronic bronchitis 3. Irritation of eyes 4. Nose and throat irritation 5. Increases cough victim 6. Asthma 7. Increases victim of high blood pressure
Afam station	1. Malaria 2. Headache 3. Cholera 4. Dysentery 5. Rheumatism	1. Irritation of the eyes 2. Asthma 3. Guinea worm 4. Chronic bronchitis 5. Increased high blood pressure 6. Typhoid 7. Increased cholera victim 8. Increased cartah victim 9. Increased dysentery victim
Delta station	1. Malaria 2. Headache 3. High blood pressure 4. Cough 5. Cartah 6. Rheumatism	1. Cancer 2. Chronic bronchitis 3. Irritation of eyes 4. Nose and throat irritation 5. Asthma 6. Increases cough victim 7. Increases victim of high blood pressure
Egbin station	1. Malaria 2. Headache 3. High blood pressure 4. Cough 5. Cartah	1. Cancer 2. Chronic bronchitis 3. Increases cough victim 4. Asthma 5. Increases victim of high blood pressure
Ijora station	1. Malaria 2. Headache 3. Cough 4. Cartah 5. Rheumatism	1. Guinea worm 2. Chronic bronchitis 3. Increased high blood pressure 4. Typhoid 5. Increased cholera victim
Oji River	The same as in the above	The same as in the above.

In this research, there were several parameters studied. It has been discovered that in the management of the environmental influence of electric power generation in Nigeria, the factors involve are dependent on the type of power stations.

V. CONCLUSION

The dangers inherent in the generation of electricity by different generating modes have been highlighted in this work. This paper has shown that electricity is being generated at the expense of the surrounding environment, and this is detrimental to human existence. Thus, electricity generation is associated with environmental degradation which if not adequately checked might almost undermined a nation's development because it is said that power is the bedrock of development. It is not enough to ensure that an electric power generating project yields economic advantage at present without anticipating the environmental challenges that could result from electric power generation, which may yield positive results on the short run but will be unsustainable on the long-run.

An electric power scheme depending on the type of mode applied requires the use of resources like coal, oil, natural gas e.t.c., and these results in the replacement of natural ecosystem by artificial ones. This

presents not only very important impacts on the biophysical environment but it also causes changes in social and economic structures of the society. These factors are often accounted for in planning, design and implementation of electric power schemes.

However, the influence can be grouped into two:

1) Negative influence, which includes:

i. Health hazard
ii. Increases in noise level
iii. Climate change
iv. Human movement and migration
v. Scaring away of wildlife

2) Positive influence, such as:

i. Employment opportunity to indigenes
ii. Enjoyment of electricity
iii. Provision of pipe borne water
iv. Provision of schools and hospitals
v. Construction of road

VI. RECOMMENDATION

This research shows that electricity is being generated at the outlay of the immediate environment, and this is detrimental to human subsistence. It is recommended that, environmental troubles be projected and adequately reflected in the setting up, designing and execution of electricity generation schemes for sustainability of power generation

REFERENCE

[1]. Abrahamision, D.E. and Pogue, R.E. (2009), "The environmental impacts of a growing nuclear power industry", Minnesota Academy of Science Press, New York
[2]. Ada, U.U., (2012), "NEPA Management Development in Nigeria", Caxtom Press (Invest. African) Limited, Ibadan
[3]. Ayodele A. I., (2012), "Electricity development in Nigeria: Pattern of Nigeria 's Electric Energy Use", pp 30-32, Universal Press, Ibadan.
[4]. Ben Caven, (2016), "Impact Of Climatic Change On The Performance Of The Nigerian Power Supply System", PHCN Review, Volume VI, pp 10-11
[5]. David M. Lipscomb and Arthur C. Tayler, (2016), "Noise Control Handbook of Principles and Practices", Longman publishers, New York
[6]. Desgauliers G.T. (2012), "Energy Models For Planning And Policy Assessment", pp. 342-401
[7]. R.C Ijeoma & I. Iyenemi "Hydro Power Generation In Nigeria, Environmental Ramifications "IOSR Journal of Electrical and Electronics Engineering (IOSR-JEEE) 13.5 (2018): 01-09.
[8]. Eisenbu, M. and Gleason, G.G., (2008), "Electric Power and Thermal Discharges", Science Publishers, New York.
[9]. Foell, W.K., Green, C. W., and Hanson, M.E. (2011), "Environmental Considerations in Renewable Energy Policy", Washington D.C
[10]. Furlan, G., Rodriquez, H. and Violini, G., (2006), "Non-conventional Energy Sources", ACIF series Volume 3, World Scientific publishing Co. Ltd. Singapore
[11]. Hottel, H.C. and Howard, J.B., (2013), "New Energy Technology Facts and Assessments", Massachusetts Institute of Technology Press, London
[12]. Ibe, A.O. and Okedu, K.E., (2015),"Optimized Electricity Generation in Nigeria", Nigerian Journal of Engineering Management (NJEM), Volume 8 No. 4, pp 7-16
[13]. Lashof, D. and Ahuja, D. (2016), "Relative Contributions of Greenhouse Gases to Global Warming", nature.com
[14]. Lawal Y. O.(2010), "Maintenance Culture: The Nigeria Situation", Nigeria Journal of Engineering Management (NJEM), Vol. 1.No. 4
[15]. National Environment Protection (Effluent Limitation) Regulations, (2016), Published by Federal Environmental Protection Agency for Federal ministry of Environment
[16]. Niels, H. And Heathcote, V. (2011); "The Early Meaning Of Electricity", Annals Of Science 63 (4): pp. 261–275
[17]. Onyekwere, O. (2014), "Laws To Break Nepa Monopoly"
[18]. PHCN publications on Ughelli thermal power station, (2016)

R.C Ijeoma. "Influence of Thermal Power Generation in Nigeria Environment." IOSR Journal of Engineering (IOSRJEN), vol. 09, no. 03, 2019, pp. 42-53.