



Gas Flaring: A Catalyst to Global Warming in Nigeria

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ABSTRACT

The concept of global warming has gone beyond a myth to a reality as man is now face – to – face with the adverse effects of his “intelligence and adventure”. This paper focuses on the contribution of gas flaring in Nigeria to global warming. The data used are secondary data such as the proportion of Climate Change caused by four (4) greenhouse gases, Nigeria natural gas production and disposal, 2003 – 2007 and the percentage of gas utilized and flared in Nigeria from 2003 – 2007. The temperature data used include the annual temperature of Orlu LGA of Imo State, 1998 – 2007, temperature of Umudike, 1972 – 2001; while data on the mean decadal temperature for Sokoto, Kano, Yola, Ibadan, Lokoja and Owerri, 1971 – 2010 were calculated from the temperature data obtained from the Nigerian Meteorological Agency, Oshodi, Lagos. Results are presented in tables and discussed. The results reveal a large quantity of gas flaring going on in Nigeria which in turn is contributing to a general rise in temperature across the country. The conclusion focuses on legislative measures to eradicate gas flaring in the country.

Keywords: Carbon, gas flaring, greenhouse gases, temperature and global warming.

I. INTRODUCTION

Natural gas, which is usually found along with petroleum or crude oil, is one of the major mineral resources found in Nigeria. It is pre – dominantly found in the Niger Delta other wise known as oil producing States such as Akwa – Ibom, Bayelsa, Cross River, Delta, Edo, Rivers, Ondo (South - West) and of recent Anambra / Kogi. Its discovery and exploitation have no doubt improved upon the socio – economic development of both the country and its people.

Natural gas is a product of carbon. It is also a major source of energy production in the world, Nigeria inclusive. In the developed world where technology is highly advanced, natural gas is properly explored and refined for consumption. However, in Nigeria; due to poor level of modern technology, a very high percentage of gas is been flared thereby constituting a major source of air pollution in the exploration area of the oil producing states as well as in the oil refineries located in Port Harcourt, Warri and Kaduna respectively. This situation also leads to global warming as carbon is been emitted into the atmosphere in a very large and uncontrolled rate. This carbon forms a blanket or extra thick layer in the troposphere mainly and traps the effective out going long wave radiation (heat) and forces it back to the earth surface instead of it floating off into space thereby making the earth and its lower atmosphere to become warmer. This condition leads to the circulation of heat between the earth surface and the green house gas layer which is getting thicker by the day. Gas flaring is the deliberate burning of large quantity of natural gas at both the drilling and refining sites / stages leading to the release of large amount of uncontrolled carbon into the atmosphere. Global warming is the gradual and consistence increase in the average temperature of the atmosphere, oceans and landmass of the earth ^[1]. The major cause of global warming is anthropogenic activities which are ever - increasing. ^[1] Burning of fossil fuels such as coal, diesel and natural gas which release Green House Gas (GHG) into the atmosphere is the main cause. ^[2] Flaring of

petro – chemical gas in the oil sector in Nigeria is a source of pollution. In the issue of global warming therefore, the petroleum sector of our economy is indicted as this is the major source of indiscriminate emission of injurious gas called carbon. The quantity of carbon presently in the atmosphere is beyond the atmospheric equilibrium hence natural balance cannot occur. This is what is causing the over – heating of the earth and its lower atmosphere. ^[3] Human activity since 1800 has resulted in the emission of great volume of gaseous materials into the atmosphere. Examples of GHGs are carbon dioxide (CO₂), methane (CH₄) and Chlorofluorocarbons (CFCs) – absorb earth's radiation, leading potentially to warming of earth's surface ^{[3] [4] [1]}. Nigeria is the world's biggest flarer of Associated Gas (AG) with more than 1000 gas flaring points that release over 23 billion / m³ of gas per annum and only 19% of the total gas flared is recovered ^[5]. A study in Bayelsa State in 2005 found that gas flaring caused 49 pre – mature deaths, 120,000 asthma attacks and 8 additional cases of cancer ^[5]. Despite all these tragic consequences of gas flaring, studies on it are very few. It should be noted that, global warming is the short – term effect of gas flaring on the atmosphere, while the long – term effect has to do with climate change which may usher in constantly high temperature and heat waves which will eventually last for a very long time even if gas flaring is eradicated.

The effects of gas flaring are numerous some of which are changing of the micro climate, increasing temperature, air pollution, poor visibility and death of some less resistant living organisms. ^[6] Man's activities add 5700 million tones to the atmosphere through burning fossil fuels (coal, oil and gas). Carbon dioxide (CO₂) levels began to increase in the 19th century with industrial revolution ^[6]. However, the increase in atmospheric carbon concentration is attributable to population explosion and advancement in modern technology which have led to high demand for goods and services (especially, the sophisticated ones) and industrial revolution. Of all the GHGs, CO₂ is the major one contributing the greatest percentage to global warming of which gas flaring is a major actor (see table 1).

Table 1: Proportion of Climate Change caused by four (4) Green House Gases (GHGs)

Gas	Percentage
Carbon dioxide (CO ₂)	64
Methane (CH ₄)	19
Chlorofluorocarbons (CFCs)	11
Nitrous Oxide (N ₂ O)	06
Total	100

Source: ^[7]

From table 1, it could be seen that carbon dioxide contributes more than half of the destructive gas to the atmosphere of which gas flaring cannot be exonerated. Despite this large quantity of carbon emitted into the atmosphere via gas flaring, studies on carbon emission focus more on global scale and usually focused on the industrialized nations like China, Japan, South Korea, United States of America and so on, while studies on local carbon emission are very scanty especially in Nigeria; hence this research.

II. THE STUDY AREA

^[8] Nigeria is a former British colony, which came into existence as a result of the amalgamation of Northern and Southern protectorates, empires and smaller territories. Today, Nigeria is made up of 36 states and the Federal Capital Territory (FCT). Nigeria extends from latitude 4°N to 14°N and from longitude 3°E to 15°E ^[9]. It is bounded to the North by Niger Republic, Benin Republic in the West, Cameroun in the East and the Atlantic Ocean to the South ^[9]. Nigeria experiences both rainy and dry seasons ^[10]. In terms of size, Nigeria has a total area of 923,769km²^[10]. There are three (3) most influential ethnic groups namely, Hausa, Yoruba and Igbo. The major export commodity is crude oil (petroleum) which also serves as the backbone of its economy. Its relief is generally divided into lowlands and highlands ^[8]. It is drained by many rivers the major ones being Rivers Niger and Benue. The vegetation is also grouped into two (2) main categories- forest and savanna ^[8]. Its population is estimated to be one hundred and sixty seven million (167,000,000) ^[11]. Of this population, over 60% engages in agriculture ^[8]. The crops grown in Nigeria are classified into three (3) namely; tree, tuber and grains.

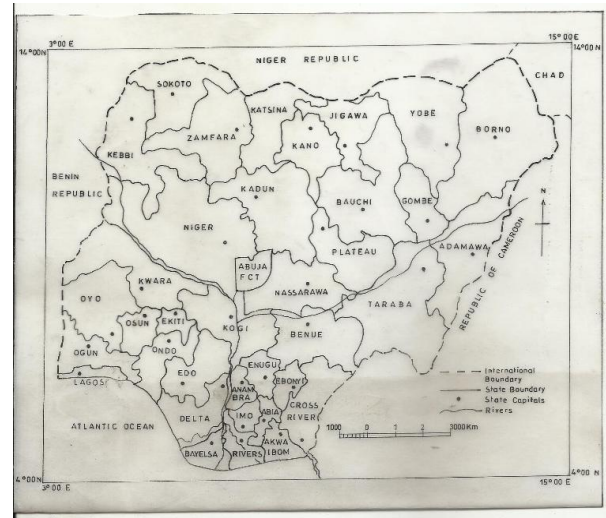


Fig. 1: Map of Nigeria

III. MATERIALS AND METHOD

The materials used for this study are secondary data. The proportion of climate change caused by four (4) GHGs was gotten from ^[7]. Data on the Nigerian Natural gas production and disposal, 2003 – 2007; was obtained from ^[10] while the percentage of gas flared was computed by the author using the data on natural gas production and disposal, 2003 – 2007. Temperature data of Umudike was obtained from ^[12]. Computation of the difference was done by the author. The temperature of Orlu LGA, 1998 – 2007 was obtained from ^[1]. The decadal mean temperatures for Sokoto, Lokoja, Owerri, Ibadan, Yola and Kano were computed by the author using the data on maximum and minimum temperatures obtained from the Nigerian Meteorological Agency, Oshodi, Lagos. The results are presented in tables and discussed.

IV. RESULTS

The results of this paper are presented in tables 2 - .6.

Table 2: Nigerian Natural Gas Production and Disposal, 2003 – 2007

Year	Gas Produced	Gas Utilized	Gas Flared
2003	1828.3272	982.5124	845.8148
2004	2113.9921	1230.2361	883.7561
2005	2082.9260	1241.5368	841.3892
2006	2116.8082	1438.7148	678.0934
2007	2,401.7706	1615.4916	786.2790

Source: ^[10]



Table 3: Percentage of Gas Utilized and Flared, 2003 – 2007.

Year	Percentage of Gas Utilized	Percentage of Gas Flared	Total Percentage
2003	53.7	46.3	100
2004	58.2	41.8	100
2005	59.6	40.4	100
2006	68.0	32.0	100
2007	67.3	32.7	100

Source: Author's computation (2012).

From tables 2 and 3, although gas flaring is on the decline; but it is true that Nigeria is actually flaring gas. Nigeria is not only giant in Africa in terms of population, but also giant in West Africa in the aspect of gas flaring. According to the World Bank in ^[13] 76% of the gas produced in Nigeria is flared in spite of the Degree 99 which bans unauthorized gas flaring. This apart from constituting an economic loss also contributes significantly to the Green House Gases (GHGs) in the atmosphere. Both the amount and percentage flared annually are very alarming. This dangerous atmospheric threatening gas called carbon emitted into the atmosphere leads to consistent temperature rise. There is also a general steady annual and decadal temperature increase across Nigeria. Table 4 shows the annual temperature of Orlu Local Government Area (LGA) of Imo State, Nigeria (1998 - 2007).

Table 4: Annual Temperature of Orlu LGA of Imo State, 1998 – 2007

Year	Temperature (°c)
1998	30.3
1999	28.4
2000	28.6
2001	28.8
2002	29.2
2003	29.4
2004	29.7
2005	30.0
2006	30.2
2007	31.2
Difference	+0.9

Source: ^[1] / Author's computation (2012).

Table 5: Mean decadal temperature (°c) of Umudike, Umuahia, Abia State, at the National Root Crops Research Institute, 1972 – 2001

Month	1972 – 1981	1982 - 1991	1992 – 2001	*Difference from 1972 – 2001
Jan	26.2	26.4	26.8	+0.6
Feb	28.1	28.4	28.5	+0.4
Mar	27.7	28.3	28.4	+0.7
Apr	27.3	27.9	28.2	+0.9
May	26.8	27.1	27.7	+0.9

Jun	26.0	26.2	26.8	+0.8
Jul	25.3	25.3	25.8	+0.5
Aug	25.3	25.3	25.9	+0.6
Sep	25.7	25.6	26.0	+0.3
Oct	26.0	26.1	26.4	+0.4
Nov	26.5	27.0	27.1	+0.6
Dec	25.9	26.0	26.5	+0.6
Total	26.4	26.7	27.0	+0.7

Source: ^[12] * Author's computation (2012).

Table 6: Mean Decadal Temperature (°c) for Sokoto, Kano, Yola, Ibadan, Lokoja and Owerri, 1971 – 2010 (40 yrs)

Station / Years	1971 – 1980	1981 – 1990	1991 - 2000	2001 – 2010	Difference in temperature
Sokoto	28.4	28.8	28.9	29.4	+1.0
Kano	26.5	26.6	26.7	26.8	+0.3
Yola	28.1	28.4	28.6	28.4	+0.3
Lokoja	27.8	28.0	28.2	28.1	+0.3
Ibadan	26.6	27.2	27.2	27.2	+0.6
Owerri	27.1	27.6	27.6	28.0	+0.9

Source: Author's computation (2012).

From table 4, Orlu LGA experienced an increase in temperature of about 0.9°C within ten (10) years. This also confirms global warming in Nigeria. From table 5, Umudike is experiencing both monthly and mean decadal temperature rise due to global warming attributable mainly to gas flaring. One alarming issue about this station is that there is increasing monthly temperature even during the peak of the raining season. The lowest mean monthly temperature increase was recorded in September (0.3°C), while the highest was recorded in April and May (0.9°C) respectively. In the area of annual decadal temperature, the station recorded an increase in temperature of about 0.6°C (1972 - 2001).

In the same manner, table 6 shows the mean decadal temperatures with Sokoto having the highest increase in temperature of 1.0°C; Kano, Yola and Lokoja have 0.3°C difference each, Ibadan 0.6°C and Owerri, 0.9°C. These six (6) meteorological stations cut across various agro – ecological zones in Nigeria and are experiencing steady temperature increase thereby warming both the country and the globe in general. ^[4] Changes in climate occur in two (2) ways namely: climatic warming and climatic cooling. From this study therefore, it is an established fact that Nigeria is currently experiencing climatic warming. This also has confirmed the study of ^[4] which revealed a difference of +0.71°C in air temperature in semi – arid region of Nigeria during the planting months of May – October. Global warming therefore is not only viewed in increase of earth's temperature, but also the temperatures of water bodies, plants, man, animals and so on.



V. CONCLUSION & RECOMMENDATIONS

^[14] *The orchestration has gone to the extreme of singing solos of CO₂, NO₂, SO₄ and all the oxides that result in warming and choruses on what the world must do to stop further warming as if all factors of warming can be wiped out “overnight” to return planet earth to pre – industrial era when man lived from “hand – to – mouth” by tilling the soil as God commanded and living an organic life.* Although, it is a known fact that there are natural causes of global warming, but the fact remains that man’s activities have led to the skyrocketing increase of greenhouse gases beginning from the 1880s when the industrial revolution started. This confirms the study of ^[15] which said that with increasing population and human activities, the greenhouse gases have risen beyond the natural level. In Nigeria, the large amount of carbon emission began following the discovery of petroleum and natural gas in commercial quantities in the late 1950s, but little or no attention was given to the gradual but long – lasting effect of the dangerous emission not until the negative sides of it started to manifest. Unfortunately, the effects of gas flaring on the environment of man cannot be corrected over night. From the fore – going therefore, gas flaring in Nigeria is contributing greatly to carbon concentration in the atmosphere which in turn is resulting in warming the environment across the country. This increase in temperature is viewed in maximum and minimum temperatures, nocturnal, monthly, annual as well as decadal. Even during the harmattan, temperature rise is experienced. Although, the UN climate negotiations that ended in Bangkok, Thailand on Friday, 9th October, 2009; failed largely to deliver any substantive progress on target for reducing GHGs emissions ^[16], efforts should be intensified by the government of Nigeria at all levels to enforce stringent environmental legislative measures on oil companies that still practice gas flaring so as to eradicate gas flaring in the shortest possible time in order to protect the environment and its habitats from total destruction as effects of global warming are already manifesting in form of rain spells which in turn is raising the episodes of running water, landslide and flooding, modification of human comfort ^[17], loss of and decline in biodiversity ^[18], melting of ice, increasing sea level ^[18], increasing evaporation from both water bodies and moist soils ^[19], increasing transpiration and high pests and diseases incidences ^[18]. Also, due to environmental warming in Nigeria, tropical illnesses (pneumonia, malaria, anemia, meningitis, number of children running temperature and so on) are on the increase. Also, gas should be refined and use as a domestic gas and for export. The time to act fast is now as any further delay would be too dangerous.

Finally, eradicate gas flaring and save the atmosphere and the entire environment from over heating.

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