

Negative Effects of Gas Flaring: The Nigerian Experience

Anslem O. Ajugwo*

Department of Haematology and Blood Transfusion, Madonna University Elele, Nigeria

*Corresponding author: slemjugwo@yahoo.com

Received July 01, 2013; Revised July 24, 2013; Accepted July 26, 2013

Abstract Gas flaring have been condemned severally in different countries of the world. Though the practice is still obtainable in some countries with many calling for a stop. The environmental and health implications were examined with Nigeria as a case study. Data and information were retrieved from pubmed, medline and other search engines. All available data/information depict the negative effects of gas flaring on the environment and humans. Gas flaring have impoverished the communities where it is practiced, with attendant environmental, economic and health challenges. Reluctance on the part of government and policy makers is also a factor. These difficulties faced by local communities from gas flares are a sufficient justification for ending gas flaring practice. Fines by defaulting companies should be so exorbitant so as to deter them while the gas can be processed and produced into cooking/domestic gas. The time to stop is now and the place to stop is here: Nigeria.

Keywords: *environment, natural gas, climate change, hematological, pollution, carcinogens, Nigeria*

Cite This Article: Ajugwo, Anslem O., "Negative Effects of Gas Flaring: The Nigerian Experience." *Journal of Environment Pollution and Human Health* 1, no. 1 (2013): 6-8. doi: 10.12691/jephh-1-1-2

1. Introduction

Gas flaring is the burning of natural gas that is associated with crude oil when it is pumped up from the ground. In petroleum-producing areas where insufficient investment was made in infrastructure to utilize natural gas, flaring is employed to dispose of this associated gas [1]. Also chemical factories, oil refineries, oil wells, rigs and landfills, gaseous waste products and sometimes even non-waste gases produced are routed to an elevated vertical chimney called a gas flare and burnt off at its tip. This is called gas flaring. Waste gases are subjected to such a process either because the gases are waste or it is difficult to store and transport them. Non-waste gases are burnt off to protect the processing equipment when unexpected high pressure develops within them. Gas flaring in oil rigs and wells contribute significantly to greenhouse gases in our atmosphere [2].

1.1. Gas Flaring in Nigeria

Nigeria flares 17.2 billion m³ of natural gas per year in conjunction with the exploration of crude oil in the Niger Delta. This high level of gas flaring is equal to approximately one quarter of the current power consumption of the African continent. Even though we have grown to be fairly dependent on oil and it has become the center of current industrial development and economic activities, we rarely consider how oil exploration and exploitation processes create environmental, health, and social problems in local communities near oil producing fields.

The Nigerian government has not enforced environmental regulations effectively because of the overlapping and conflicting jurisdiction of separate governmental agencies governing petroleum and the environment as well as because of non-transparent governance mechanisms. Neither the Federal Environmental Protection Agency (FEPA) nor the Department of Petroleum Resources (DPR) has implemented anti-flaring policies for natural gas waste from oil production, nor have they monitored the emissions to ensure compliance. The Federal Environmental Protection Agency (FEPA) has had the authority to issue standards for water, air and land pollution and has had the authority to make regulations for oil industry. However, in some cases their regulations conflict with the Department of Petroleum Resources (DPR)'s regulations started in 1991 for oil exploration [3].

From an economic perspective, the Nigerian government's main interest in the oil industry is to maximize its monetary profits from oil production. Oil companies find it more economically expedient to flare the natural gas and pay the insignificant fine than to re-inject the gas back into the oil wells. Additionally, because there is an insufficient energy market especially in rural areas, oil companies do not see an economic incentive to collect the gas. From a social perspective, the oil-producing communities have experienced severe marginalization and neglect. The environment and human health have frequently been a secondary consideration for oil companies and the Nigerian government. However, although there may be reasons for the continuous gas flaring, there are many strong arguments suggesting that it should be stopped. Corporations' accountability to the

people and environment surrounding them imply that oil companies should be required to re-inject the gas, to recover it, or to shut down any extraction facilities in which the gas flaring is occurring. Because of this massive oil exploration in the Niger Delta, the ramifications for human health, local culture, indigenous self-determination, and the environment are severe. As is the case in most oil producing regions of less developed countries, the economic and political benefits are given significantly more weight by the government than the resulting damage to the environment and human health.

2. Environmental Implications

2.1. Climate Change

Gas flaring contributes to climate change, which has serious implications for both Nigeria and the rest of the world. The burning of fossil fuel, mainly coal, oil and gas-greenhouse gases-has led to warming up the world and is projected to get much, much worse during the course of the 21st century according to the intergovernmental panel on climate change (IPCC). This scientific body was set up in 1988 by the UN and the World Meteorological Organization to consider climate change. Climate change is particularly serious for developing countries, and Africa as a continent is regarded as highly vulnerable with limited ability to adapt. Gas flaring contributes to climate change by emission of carbon dioxide, the main greenhouse gas. Venting of the gas without burning, a practice for which flaring seems often to be treated as a synonym, releases methane, the second main greenhouse gas. Together and crudely, these gases make up about 80% of global warming to date.

2.2. Acid Rain

Acid rains have been linked to the activities of gas flaring [4,5]. Corrugated roofs in the Delta region have been corroded by the composition of the rain that falls as a result of flaring. The primary causes of acid rain are emissions of sulphur dioxide (SO₂) and nitrogen oxides (NO) which combine with atmospheric moisture to form sulfuric acid and nitric acid respectively. Size and environmental philosophy in the industry have very strong positive impact on the gas-flaring-related CO₂ emission [6].

Acid rain acidifies lakes and streams and damages vegetation. In addition, acid rain accelerates the decay of building materials and paints. Prior to falling to the earth, SO₂ and NO₂ gases and their particulate matter derivatives, sulfates and nitrates, contribute to visibility degradation and harm public health.

2.3. Agriculture

The flares associated with gas flaring give rise to atmospheric contaminants. These include oxides of Nitrogen, Carbon and Sulphur (NO₂, CO₂, CO, SO₂), particulate matter, hydrocarbons and ash, photochemical oxidants, and hydrogen sulphide (H₂S) [7,8]. These contaminants acidify the soil, hence depleting soil nutrient. Previous studies have shown that the nutritional value of crops within such vicinity are reduced [9]. In some cases,

there is no vegetation in the areas surrounding the flare due partly to the tremendous heat that is produced and acid nature of soil pH [10].

The effects of the changes in temperature on crops included stunted growth, scotched plants and such other effects as withered young crops [11]. Reference [11] concluded that the soils of the study area are fast losing their fertility and capacity for sustainable agriculture due to the acidification of the soils by the various pollutants associated with gas flaring in the area.

3. Health Implications

3.1. Adverse Effects

The implication of gas flaring on human health are all related to the exposure of those hazardous air pollutants emitted during incomplete combustion of gas flare. These pollutants are associated with a variety of adverse health impacts, including cancer, neurological, reproductive and developmental effects. Deformities in children, lung damage and skin problems have also been reported [12].

3.2. Haematological Effects

Hydrocarbon compounds are known to cause some adverse changes in hematological parameters. These changes affect blood and blood-forming cells negatively. And could give rise to anemia (aplastic), pancytopenia and leukemia [8].

4. Other Effects

4.1. Economic Loss

Aside from the health and environmental consequences of gas flaring, the nation also loses billions of dollars worth of gas which is literally burnt off daily in the atmosphere. Much of this can be converted for domestic use and for electricity generation. By so doing the level of electricity generation in the country could be raised to meet national demand. Nigeria has recorded a huge revenue loss due to gas flaring and oil spillage [13]. Though more than 65 % of governmental revenue is from oil [14], it is estimated that about \$2.5 billion is lost annually through gas flaring in government revenues.

4.2. Pollution

Drilling mud and oil sometimes find their way to the streams, surface waters and land thus making them unfit for consumption nor habitable by man or animal. This problem has been produced by a range of international oil companies which have been in operation for over four decades. The economic and environmental ramifications of this high level of gas flaring are serious because this process is a significant waste of potential fuel which is simultaneously polluting water, air, and soil in the Niger Delta.

5. Discussion and Conclusion

Gas is being increasingly seen as a viable source of energy to speed up developmental needs in Africa. In

Nigeria, while gas is wasted through the air, creating harmful air pollutants, biomass is still the mainstay of cooking and other heating [15]. As a matter of fact, the natural gas currently flared in Nigeria can serve the cooking needs of 320 million people not served by modern fuels [16].

Petroleum exploitation and production in the Niger Delta over the years have resulted in a number of environmental, socio-economic and political problems in the region. Oil spillage and gas flaring have caused severe environmental damages, loss of plants, animals and human lives, and loss of revenue to both the oil producing companies and the government. Petroleum exploration, exploitation, production, storage, distribution and transportation activities affect the environment in a conspicuously negative manner. Vegetations are removed to make way for seismic lines and sites. Storage, distribution and transportation of oil and gas using Tankers and pipeline network result in some quantities of petroleum products being released into the environment [17].

Oil exploration causes a range of environmental problems. These include: contamination of both surface and ground water by benzene, xylene, toluene, and ethylbenzene; contamination of soil by oil spill and leaks; increased deforestation; as well as the economic loss and environmental degradation stemming from gas flaring. In order to address the problems of gas flaring, it is necessary to understand why the natural gas is being flared. Because oil and natural gas are mixed in every oil deposit, the natural gas called "associated gas" (AG) must be removed from oil before refining. Gas flaring is simply the burning of this associated gas. Gas flaring is currently illegal in most countries of the world, where gas flaring may only occur in certain circumstances such as emergency shutdowns, non-planned maintenance, or disruption to the processing system.

Though the draft Petroleum Industry Bill (PIB) stipulates that "natural gas shall not be flared or vented after 31st December, 2012, in any oil and gas production operation, block or field, onshore or offshore, or gas facility, except under exceptional and temporary circumstances", this draft is yet to be passed into law. Legislative backing and governmental bureaucracy still remains a stumbling block.

Recommendation/Suggestions

These difficulties faced by local communities from gas flares are a sufficient justification for ending gas flaring practice. Government should as a matter of urgency, make stringent laws and take drastic action against defaulting companies not just by payment of fines. Fines for defaulting companies should be so exorbitant so as to deter them. Furthermore, the gas can be processed and

produced into cooking/domestic gas. Environmentalists and human right activists should continue in their quest to end this act.

References

- [1] JINN, Gas Flaring in Nigeria: an Overview, Justice in Nigeria Now. April 2010. Available www.justiceinnigerianow.org.
- [2] Ayoola, T. J., "Gas flaring and its implication for environmental accounting in Nigeria," *Journal of Sustainable Development*. 4(5). 244-250. 2011.
- [3] Manby, B., 1999. The price of oil: corporate responsibility and human rights violations in Nigeria's oil producing communities. Human Rights Watch, New York. 1999. 202.
- [4] FOE (Friends of the Earth), Gas flaring in Nigeria, 2004. [E-book] Available: <http://www.foe.co.uk>.
- [5] Medilinkz, Nigeria: Focus on the environmental impact of gas flaring, 2010. Retrieved from: <http://www.medilinkz.org/news/news2.asp?NewsID=294> [Accessed on June 5, 2010].
- [6] Hassan, A. and Konhy, R., "Gas flaring in Nigeria: Analysis of changes in its consequent carbon emission and reporting," *Accounting Forum*. 37(2). 124-134. 2013.
- [7] Obioh, I. B., "Environmental Impact Assessment of Emissions from Major Facilities at QIT," *Atmospheric Emissions and Dispersion Modeling*. Faithlink Consults Nigeria Ltd., PortHarcourt. 1999.
- [8] Kindzierski, W.D, "Importance of human environmental exposure to hazardous air pollutants from gas flares," *Environmental Reviews*, 8, 41-62, 2000.
- [9] Imevbore, A. A. and Adeyemi, S. A., "Environmental monitoring in relation to pollution and control of oil pollution." *Seminar on the petroleum industry and the Nigerian environment*. 6. 135-142. 1981.
- [10] Ubani, E. C. and Onyejekwe, I. M., "Environmental impact analysis of gas flaring in the Niger delta region of Nigeria," *American J. of Scientific and Industrial Research*. 4(2). 246-252.2013.
- [11] Orimoogunje, O. I., Ayanlade, A., Akinkuolie, T. A. and Odiong, A. U., "Perception on the effect of gas flaring on the environment," *Research Journal of Environmental and Earth Sciences*. 2(4). 188-193. 2010.
- [12] Ovuakporaye, S. I., Aloamaka, C. P., Ojeh, A. E., Ejebe, D. E. and Mordi, J. C., "Effects of gas flaring on lung function among residents of ib Gas flaring community in Delta State, Nigeria," *Res. J. Env. Earth Sci*. 4(5). 525-528. 2012.
- [13] Effiong, S. A. and Etowa, U. E., "Oil spillage cost, gas flaring cost and life expectancy rate of the Niger Delta people of Nigeria," *Advances in Management & Applied Economics*. 2(2). 211-228. 2012.
- [14] Arowolo, A. A. and Adaja, I. J., "Trends of natural gas exploitation in Nigeria and the implications on the socio-economic stability and governance," in 35th Nigerian Statistical Association annual conference. 2011.
- [15] ERA/FOE Nigeria (Environmental Rights Action/Friends of the Earth Nigeria), Gas Flaring in Nigeria: Human Rights Environmental and Economic Monstrosity.2005. Retrieved from: http://www.foe.co.uk/resource/reports/gas_flaring_nigeria [Accessed February 10, 2008].
- [16] Goldenberg, J, Rural Energy in Developing Countries. In: *World Energy Assessment: Energy and the Challenge of Sustainability*. UNDP. NY. 2000.
- [17] Tolupe, A. O., "Oil exploration and environmental degradation: the Nigeria experience," *International society for Environmental Information Science*. 4(4). 34-36. 2004.