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EXAMINED THE ADAPTATION AND MITIGATION STRATEGIES EMPLOYED BY THE LOCAL PEOPLE WITHIN THE GAS FLARE SITES OF NIGER DELTA

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Abstract

Flaring of gas results in significant methane emissions. It is generally assumed that flares operate at 98% efficiency, meaning that 2% of the waste gas is not burned, and approximately 2 million metric tons per year of methane is released into the atmosphere as unburned gas. In most countries with large-scale flaring activity (for example, Russia, Nigeria, Iraq, Iran), flaring is associated with conventional oil and gas production. Adaptability and mitigation strategies has been a problem unresolved which this study tend to solve. We employed the used of ArcGIS environment will aid the buffering of rings around the gas flare sites to determine the population density of communities within the study area and also the Landsat imagery will help in observing the variation in temperature and vegetal health of the study area. The Likert scale questionnaire shall be the main research instrument of the study. The results shows that, more of preventive and mitigations strategies need to be put in place in the flaring area of gas in the Niger delta

KEYWORDS: Flaring strategy, Mitigation Strategy, Gas Flaring

1.0 Introduction

According to the Federal Ministry of Petroleum Resources, Africa's largest oil and gas producer is flaring eight billion cubic metres of gas per year – losing approximately $10 billion of revenue annually. If flare gas was captured and used for energy, Nigeria could produce an additional 600,000 metric tonnes of Liquefied Petroleum Gas (LPG). This increased production would create thousands of jobs and help deliver electricity to 75 million people.

Without an adequate infrastructure to manage and store natural gas, Nigeria's oil and gas facilities are at risk of unplanned over-pressuring of equipment. Flares are used to burn off unwanted reserves of natural gas, avoiding build-ups of pressure and the risk of explosion. Nigeria's revenue loss is caused by the inability to capture and commercialise flared gas in the country.

Flares are emission-control devices used to burn flammable gases which would otherwise be released into the atmosphere. In petroleum and natural-gas supply chains around the world, it is estimated that open flaring burns approximately 145 billion cubic meters of gas per year. The amount of methane emissions from this flaring is estimated to be approximately 2 million metric tons, or 2% of the estimated methane emissions from global oil and gas production.(World Bank Global, 2019)

Nigeria is said to have released an estimated carbon dioxide gas of 35,000,000 tons and methane (CH_4) also of about 12,000,000 tons annually. According to Thomas and Allen, (1999) posited that the ratio the potential of warming of these two gases, CH_4 and CO_2 is about 64:1. The Nigerian efficiency in combustion is at the level of the ground and this brings about the emission of methane in quantities that are huge. The Nigeria oil and gas companies are the most contributors than all other companies to this issue that is globally common to the environment (Afuma and Ojeh, 2013).This has contributed to the global temperature on a mean scale and the confirmation recorded 0.5^0C within the last century which is no surprise because methane and carbon-dioxide are major gases that make up the green-house gases (CBN and Penner, (1995). The flaring flow stations around the Niger-Delta environment has been fingered for serious and tremendous damages in the quality of soil and of air in the fragile ecological delta of the Niger and contributed globally to greenhouse gases.

This act of huge flaring of gas in Nigeria over the years has undergone criticism by groups and experts that are related to the environment and has been named as the largest source in the world of warming of the globe through pollutants, this have also attributed to the rising level of the sea. The regulations and policies that relate to the environment in Nigeria can be described as slightest poor, this is because the Nigeria government makes profit a major priority from the detriment its citizens' welfare and of the detriment of the environment (International Energy Agency, 2019).

2.0 Literature

Flaring of gas results in significant methane emissions. It is generally assumed that flares operate at 98% efficiency, meaning that 2% of the waste gas is not burned, and approximately 2 million metric tons per year of methane is released into the atmosphere as unburned gas. In most countries with large-scale flaring activity (for example, Russia, Nigeria, Iraq, Iran), flaring is associated with conventional oil and gas production. However, in the United States, flaring is mainly associated with unconventional oil and gas production (International Energy Agency, 2019).

Flow rates of flared gas can vary widely between locations. Analysis of information from the United States , Nigeria and Canada indicate that a small fraction of sites tend to account for the majority of the flared gas.3,4 In Alberta, approximately 10% of sites accounted for half the gas flared,3 whereas in the United States, less than 5% of 20,000 flares accounted for half of the total volume of gas flared.4 This means that mitigation strategies may only be economical for a small number of sites where flares operate at high flow rates, and which account for a large fraction of flared gas.

Flow rates of flared gas can also vary over time, particularly for unconventional oil production (where production declines rapidly), or in regions where the infrastructure for using gas is being constructed. The duration of flaring may also influence how economically viable certain mitigation strategies are.

Best practice for reducing flaring includes preventing waste gas from being generated, recovering waste gas to sell it and injecting waste gas into oil and gas reservoirs. If waste gas cannot be recovered to be sold or injected into gas or oil reservoirs, it may be able to be used for generating electricity. As a final option, when flaring cannot be avoided, improving the efficiency of flaring can reduce methane emissions. Flaring and mitigation strategies are summarized in table 2.1 below. Other mitigation strategies that prevent venting of gases (for example, preventing condensation from natural gas from pooling in process lines) may also reduce flaring Burton et al. (2002).

Table 2.1: Methods of Reducing Flaring

Mitigation Strategy	Description
1. Prevent the need for flaring	Add a second separator when designing wells
2. Recover flared gases and sell them as natural gas or natural-gas liquid	2a.Add vapor-recovery units on tanks 2b. Reduce flaring during well-testing and completion 2c. Compress natural gas and transport it by road 2d. Recover natural-gas liquids
3. Store gases that would otherwise be flared	Store gases by injecting them into oil or gas reservoirs

4. Find alternative uses for flared gases	Use waste gases to generate electricity
5. Improve the efficiency of flaring	3.0 5a Improve combustion in manned steam- or air assisted flares 4.0 5b Improve combustion in small flares at unmanned Sites

Alternatively, there are multiple ways to reduce emissions from flaring. Ideally, waste gas production is prevented. If this is not feasible then waste gas recovery for sale can generate revenue. Otherwise, storing (re-injecting) gases in oil and gas reservoirs is also an alternative. If the waste gas cannot be recovered to be sold as a natural gas or natural-gas liquid product, or cannot be stored, it may be able to be used for generating electricity. If flaring cannot be prevented, improving the efficiency of flares can reduce emissions of methane (Ikata, 2011).

1. Keep an accurate inventory of flaring activities
2. Prevent flaring by designing systems that do not vent gases
3. Recover gases that are currently being flared, so they can be sold as natural gas or natural-gas liquid products
4. Store gases (through injecting into gas or oil reservoirs) that cannot be recovered and immediately sold
5. For gases that cannot be sold as natural gas or natural-gas liquid, find alternative uses such as generating electricity
6. For gases that need to be flared, make sure the combustion of those gases is efficient
7. Track flaring and venting activities in an annual inventory

3.0 Methodology

The Global Positioning System will be used to derive the coordinates of the gas flare sites across the study area and the results displayed in Maps. The community proximity to the enumerated gas flare sites will be analyzed using Google imagery dereferenced in the ArcGIS environment to see the relationship between phenomena on the ground and that of the image. The ArcGIS environment will aid the buffering of rings around the gas flare sites to determine the population density of communities within the study area and also the Landsat imagery will help in observing the variation in temperature and vegetal health of the study area. The Likert scale questionnaire shall be the main research instrument of the study. It will be formulated to elicit appropriate requisite information from the respondents focusing on risk assessment, livelihood alteration and mitigation strategies of communities exposed to gas flaring in Bayelsa, Rivers and Delta communities in the Niger Delta region of Nigeria. In this vein, the Likert scale questionnaire shall be deemed fit to enhance a proper analysis of the problem under investigation.

4.0 Results on Adaptation and mitigation strategies employed by the local people within the gas flare sites

Table 4.1: Living close to the gas flare site does not constitute any risk

	SA	A	D	SD	WA	Remarks	Total count & percent age
Bayelsa	12	18	72		2.41	Not Fully Agreed	102
% count	11.8	17.6	70.6				100

Delta	12	54	30	1.81	Disagree	96
% count	12.5	56.2	31.3			100
Rivers	12	60	24	1.87	Disagree	96
% count	12.5	62.5	25			100

In table 4.1, for Bayelsa state 11.8% strongly Agree that living close to the gas flare site does not constitute any risk, 17.6% Agree 70.6 % Disagree while 0% strongly disagree.

For Delta state 0% strongly Agree that living close to the gas flare site does not constitute any risk, 12.5% Agree, 56.2 % Disagree while 31.3% Strongly Disagree.

At Rivers state, 0% strongly Agree that living close to the gas flare site does not constitute any risk, 12.5% Agree, 62.5% Disagree while 25% strongly Disagree.

The fact that the respondents agreed that there is a rise in temperature above normal there is also a very high level of respondents appreciation of the risk associated with living close to gas flare site. This is shown on table 4.9 that life close to gas plant site is of high risk.

5.0 Conclusion

Gas flaring constitutes appalling risks to health, safety and the environment. Nevertheless, this social malady has captured much attention from the people and government of the country. But the challenges has turned a new dimension calls for a serious effort by the stakeholders to defuse the tension of gas flaring in the oil producing communities.

The magnitude of the hazardous effects of gas flaring is a function of intensities of extremity in view of the mitigation strategies put in place by the oil multinationals in the area. Furthermore, the study and in conformity with other related ones have proven the fact that the risky effects of gas flaring on the human population depends significantly in the distance between the gas flare and the communities in the area.

6.0 References

Afuma, M.I and Ojeh, V. N (2013). Effect of gas flaring on soil and cassava productivity in Ebedi, Ukwuani local government area, Delta state, Nigeria.

Burton et al. (2002). From Impacts Assessment to Adaptation Priorities: the Shaping of Adaption Policies. Climate Policy, 2, 145-159.

CBN & Penner (1995) Gas Flaring and the Depletion of the Ozone Layers, Penguin,Publishers, London.

Ikata O.F (2011) Gas Flare Risks and Mitigation Strategies, Ethiopia publishers, Benin City.

International Energy Agency, 2019:Methane tracker: Reducing methane emissions from oil and gas operations, available at: www.iea.org/ weo/methane.

Thomas, J.H. and Allen P.J. (1999). *CNN Weather Report,*" p. 3. U.S.A. Washington. DC.

World Bank: Global Gas Flaring Reduction Partnership; Estimates of Flaring using Satellite Data, available at http://pubdocs. worldbank.org/en/603281560185748682/ pdf/Gas-flaring-volumes-Top-30- countries-2014-2018.pdf (2019)